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

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**Abstract**

Improving access to maternal health services is a critical policy concern, especially in Sub-Saharan Africa (SSA) where maternal mortality rates remain very high, particularly so among the poorest segments of society. Hence, following the global call to reduce maternal mortality embedded in the Sustainable Development Goal 3, multiple interventions have been designed and implemented across SSA countries to foster progress towards Universal Health Coverage (UHC) of maternal health services, including skilled birth attendance. While evidence on the impact of these interventions on access to service use is increasing, evidence on the distributional incidence of the financial investment they entail is still limited. This paper aims 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 maternal health services in three Sub-Saharan African countries: Burkina Faso, Malawi and Zambia. The study relied on healthcare utilization data derived from different national-level household surveys (including Demographic and Health Survey, Performance-based Financing Survey, and Zambia Household Health and Expenditure Survey) and health expenditure data derived from National Health Accounts. The findings demonstrate increasing equality in health spending over time, but also considerable persistent heterogeneity in distributional incidence across provinces/regions/districts. These findings suggest that the implementation of UHC-specific reforms targeting maternal care was effective in increasing equality in 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 regional disparities and identify strategies to overcome them.

**Keywords**

Benefit incidence analysis, maternal services, institutional delivery, inequality, health spending, Africa

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**Résumé**
L'amélioration de l'accès aux services de santé maternelle est une préoccupation politique essentielle, notamment en Afrique subsaharienne où les taux de mortalité maternelle restent très élevés, en particulier pour les plus pauvres de la société. Ainsi, à la suite de l'appel mondial à la réduction de la mortalité maternelle inscrit dans l'objectif 3 du développement durable, de multiples interventions ont été conçues et mises en œuvre dans les pays d'Afrique subsaharienne pour favoriser les progrès vers la couverture sanitaire universelle (CSU) des services de santé maternelle, y compris l'accouchement par du personnel qualifié. Si les preuves de l'impact de ces interventions sur l'utilisation des services sont de plus en plus nombreuses, les preuves de distribution des bénéfices de l'investissement financier qu'elles impliquent sont encore limitées. Ce document vise à combler cette lacune dans les 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 maternelle dans 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 démographique et sanitaire, 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 démontrent une égalité croissante des dépenses de santé au fil du temps, mais aussi une hétérogénéité considérable et persistante de l'incidence de la répartition entre les provinces/régions/districts. Ces résultats suggèrent que la mise en œuvre de réformes spécifiques à la CSU visant les soins maternels a été efficace pour accroître l'égalité dans les dépenses de santé, ce qui signifie que davantage de ressources financières ont atteint les plus pauvres de la société, mais cela n'est pas encore suffisant pour éliminer les différences entre les provinces/régions/districts. Des recherches supplémentaires sont nécessaires pour étudier les raisons de ces disparités régionales et identifier les stratégies permettant de les surmonter.

**Mots-clés**
Analyse incidence des bénéfices, santé maternelle, accouchement, 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 more 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 health spending and overall health spending on institutional deliveries 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 institutional deliveries has become more equitable over time, especially as a function of introducing UHC-specific reforms in the study countries.

This study draws upon the Working Paper on the distributional incidence of health spending for curative health services, for both data sources and analytical approaches used (see Rudasingwa *et al*., 2020). Largely overlap. In addition, in some instances, the policies implemented to foster progress towards UHC were largely the same, targeting curative and maternal care services at once. Hence, we note that some wording is the same in the two papers, especially the methods section, but strictly referring to different outcome variables.

## Brief literature review

Ensuring access to maternal services such as prenatal care and skilled attendance at childbirth is an essential health policy concern given the interest in reducing maternal and neonatal mortality, especially in low-and-middle-income countries (LMCI). However, LMICs have experienced low use of maternal health services for many decades (Say and Raine, 2007). A study by Gwatkin *et al.* (2007) in 56 LMICs showed that better-off women used more skilled assistances at birth than poor women (85% *vs* 35%). The skilled birth attendance is estimated to be lower (below 50%) in Sub-Saharan Africa than in other low-resource regions (Yaya and Ghose, 2019). As a consequence, LMICs bear a higher burden of maternal deaths: out of 800 women who die worldwide each day from childbirth, 99% and 66% are from LMICs and Sub-Saharan Africa respectively (Kurvilla *et al.*, 2016). Following a global call to ensure universal health coverage of maternal health services, various international initiatives such Millennium Development Goals (MDG) and Sustainable Development Goals (SDG) sought to improve the use and quality of maternal health services (D'Ambruoso, 2013)

At country level, various policies targeting the increase of maternal health services use, especially, skilled birth attendance, have been implemented in different LMCs. Various studies have revealed that the use of maternal services in LMCs has increased due to different health policies; however, inequalities in the use of maternal services among socioeconomic groups and across different regions have persisted (Ahmed *et al.*, 2020; Yaya and Ghose, 2019). A World Health Organization report using Demographic and Health Survey data of between 2005 and 2016 from 86 LMICs revealed that the better-off women used more skilled birth assistances than the poor women to a difference up to 80 percentage points (WHO 2015). A quasi-longitudinal study including 74 LMICs indicated that the inequality in the use of maternal health services has persisted in some countries between 1990 and 2014 despite continually progress made to reduce it in all study countries (Alkenbrack *et al.*, 2015). There are various contextual determinants which explain the gaps between the poor and the better-off women in using maternal health services. These determinants include policy factors, sociocultural factors, perceived/need for maternal services, and economic and physical accessibility (Gabrysch and Campbell, 2009; Alkenbrack *et al.*, 2015). In the last two decades, countries and their development partners have invested in different interventions by combining a wide array of strategies, such as user fee removal, targeted voucher schemes, social health insurance, and results-based financing (RBF), to foster progress towards UHC of maternal services.

As investments towards UHC continue to grow, it is crucial to assess if women from different socioeconomic groups, especially poor women, are equally benefiting from these investments. A well-known methodology used to estimate the equity of financial benefits accruing to a different socioeconomic group benefits incidence

analysis (BIA). BIA is a technique used to assess the distributional incidence of health spending on health care 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 distribute across individuals of different socioeconomic 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 that the World Bank conducted (Demery, 2000; MCIntyre and Ataguba, 2011).

Most studies focused on inequality in the use of maternal health services. Few studies have assessed the distributional incidence of health spending on maternal services. A study by Ensor *et al.* (2008) in Indonesia found out that better-off women benefited more from public spending on skilled delivery services than poor women. Ensor and colleagues suggested that user fees were the main barrier for poor women to use skilled delivery care in Indonesia. Three BIA studies in India have shown that the distribution of public health spending on institutional deliveries changed from the 1990s to 2014 in favored of the poor. A BIA study by Mahal *et al.* (2001) using a representative sample in 16 Indian states from 1995/1996 Indian National Sample Survey, indicated that better-off women benefitted more from public health spending than poor women. However, two subsequent BIA studies conducted using 2004 and 2014 nationally representative data collected by the Indian National Sample Survey showed an increased share of the financial benefits accrued to poor women leading to an equal distribution of public health spending on institutional delivery for all women at the national level (Srivastava *et al.* 2016; Browser *et al*., 2019). The possible cause for this trend could be that some initiatives such as National Health Mission and conditional cash transfer aimed at increasing the use of maternal services, led to the reduction of the out-of-pocket expenditure on maternal health services, especially for the most impoverished population. One of these initiatives is Janani Suraksha Yojana (JSY), implemented in 2005 to reduce disparities in access to institutional deliveries (Srivastava *et al.* 2016). However, all these three BIA studies revealed high disparities in the distribution of the financial benefits across Indian states. In some states, poor women still benefit less from health spending on maternal care.

Given huge investments made in health sector towards UHC since the last two decades, McIntyre and Ataguba (2011) suggest assessing how the overall health system performs in meeting equitable distribution of financial health benefits across all socioeconomic groups. However, this evidence is still lacking for maternal health services in Sub-Saharan countries, particularly so in our study countries.

# 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 scenario 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. Maternal and neonatal mortality is estimated at 341/100,000 (WHO, 2015) and 24,7/1,000 live births (UNICEF, 2013), respectively. 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).

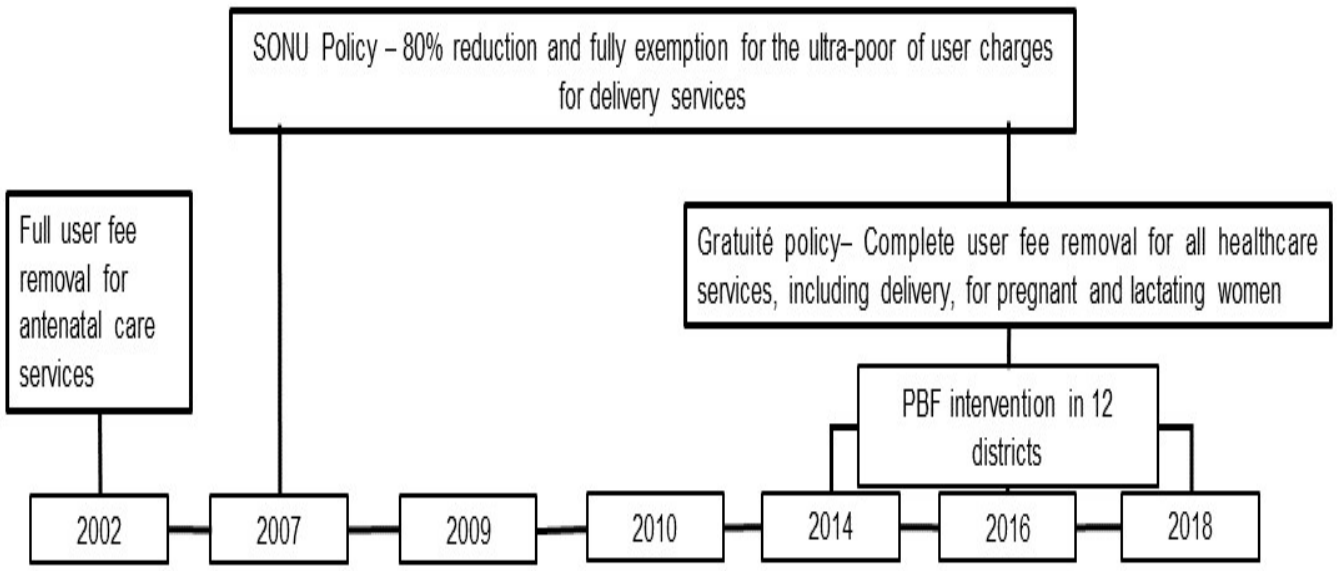
The health sector suffers from a generalized lack of resources. In 2014, total health expenditure was estimated at 5% of GDP, equivalent to Purchasing Power Parity USD 109. Government expenditure amounts to 58% of total health expenditure, including contributions by development partners being estimated 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 low 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 maternal health services (Atchessi *et al.*, 2016; Dong *et al.*, 2008; De Allegri *et al.*, 2015; Kadio *et al.*, 2014; Mwase *et al.*, 2018; Pokhrel *et al.*, 2010). A recent study estimated the out-of-pocket payments for obstetric care to range from US$ 0.08 to US$ 98.67 and to be higher in urban areas and in hospitals (Meda *et al.*, 2019). All the aforementioned barriers hinder women to use institutional delivery, especially women coming from poor and vulnerable groups.

Over the years, the country has put in place several health financing reforms aimed at increasing access to maternal care services. Specifically, in 2002, the Ministry of Health abolished user fees for antenatal care services and then in 2007 introduced a policy, generally referred to as SONU (*soins obstétricaux et néonataux d´urgence*), aimed at strengthening provision of obstetric and newborn services. An essential element of SONU was the introduction of an 80% subsidy for all population groups and a 100% subsidy for the poorest for delivery services. Albeit the policy was not as effective in reducing out-of-pocket payments as initially expected (Ridde *et al*., 2012; Ridde *et al*., 2013; Chinkhumba *et al*., 2017; Meda *et al*., 2019), evidence indicates that it resulted in substantial increases in health service utilization (Nguyen *et al.* 2018; De Allegri *et al.* 2015).

Between 2014 and 2018, the Ministry of Health, with financial and technical support by the World Bank, piloted a complex PBF pilot intervention in 12 out of its 60 districts, combining traditional PBF with three different equity measures. 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 5 years old (Ridde and Yameogo, 2018). Thanks to the introduction of these policies, 70% to 95% of all women deliver in a health facility today. Similarly, out-of-pocket spending on maternal care services has dramatically decreased, albeit not completely disappeared, as a result of these policies (Ministère de la Santé Burkina Faso, 2019).

**Figure 1. Health Policies and intervention timeline of maternal health services in Burkina Faso**



## 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). While the country has attained the Millennium Development Goals (MDG) targets related to child mortality (MDG 4) and HIV and AIDS (MDG 6), it has not met the goal pertaining to maternal mortality (MDG 5) (MoH Malawi and ICF International., 2014; United Nations Malawi, 2015). Neonatal and maternal mortality remains high at 29/1,000 and 439/100,000 live births respectively (National Statistical Office (NSO) [Malawi] and ICF, 2017). The poor quality of health services at health facilities is associated with a higher risk of newborn mortality (Leslie *et al.*, 2016). In spite of a high rate of institutional delivery reaching over 90% in both urban and rural areas (Mgawadere et al, 2017), evidence indicates that the vast majority of these deaths are preventable, since they are largely attributable to health system failures in ensuring adequate access to emergency obstetric care of adequate quality. The effective coverage is estimated at around 60% (Brenner *et al.*, 2018; Wang *et al.* 2018). 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).

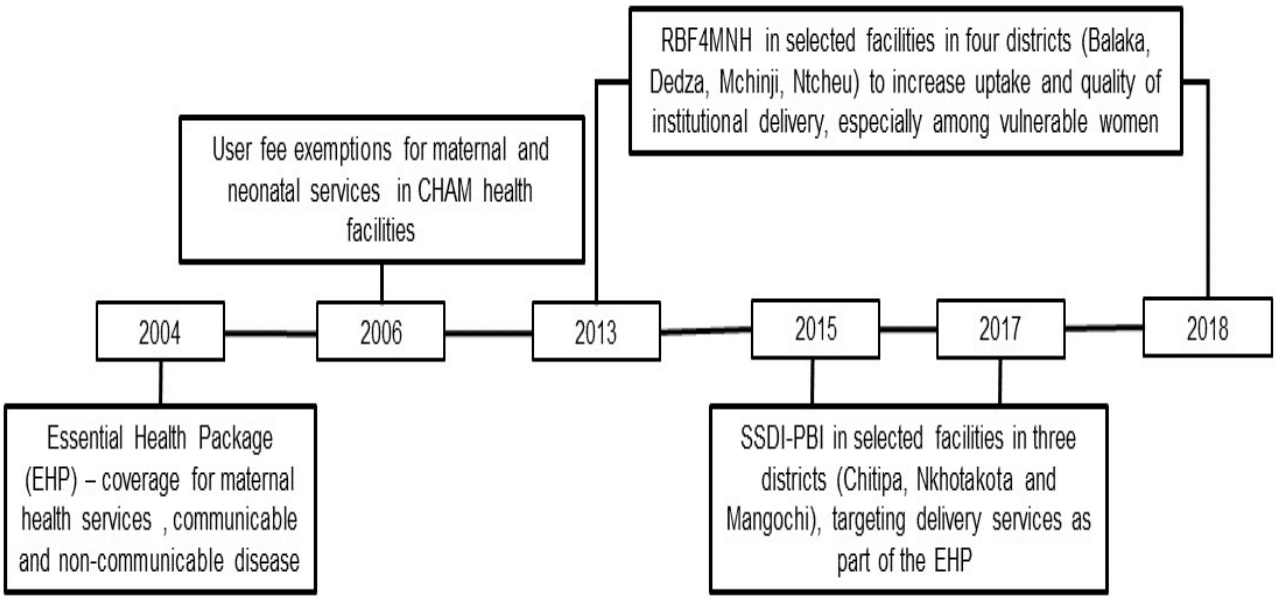
Healthcare delivery is largely centered around provision of an Essential Healthcare Package (EHP) (including reproductive health services, child health services, as well as services related to the prevention, detection and management of infectious and non-communicable health problems) which is intended 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). Evidence indicates, however, that services included in the EHP are not as effectively 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; Wang *et al.*, 2015).

Per capita total health expenditure amounts to approximately 40 USD, 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, other than central hospitals, retain very little autonomy over resource generation and management.

Two specific health financing interventions, both targeting strategic purchasing through the introduction of performance-based financing (PBF), have been piloted with the intention of advancing progress towards UHC. Between 2013 and 2018, the Reproductive Health Unit of the

Ministry of Health (MoH), with support from the German and the Norwegian government, piloted a Results-Based Financing program combining supply and demand-side interventions to target specifically obstetric services in four districts (Balaka, Dedza, Mchinji, Ntcheu) (BMZ, 2017) (Results-Based Financing for Maternal and Newborn Health - RBF4MNH). Between 2015 and 2017, the Ministry of Health, with financial support from United States Agency for International Development (USAID) and technical support by Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) and Abt Associates, launched the Service Delivery Integration performance-based incentive (SSDI-PBI) program, implemented in parallel to the RBF4MNH, but in a different set of districts (Chitipa, Nkhotakota and Mangochi) and targeting a much broader spectrum of EHP services, including maternal, child, and HIV services. Evidence emerging from studies accompanying the two programs suggests that they produce positive, albeit modest and not homogenous, improvements in both health service utilization and quality of service provision indicators (McMahon *et al.*, 2016).

**Figure 2. Health Policies and intervention timeline of maternal 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 millions on a land area of 752,612 square kilometers. Administratively, the country is divided into 10 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 Zambian gross domestic

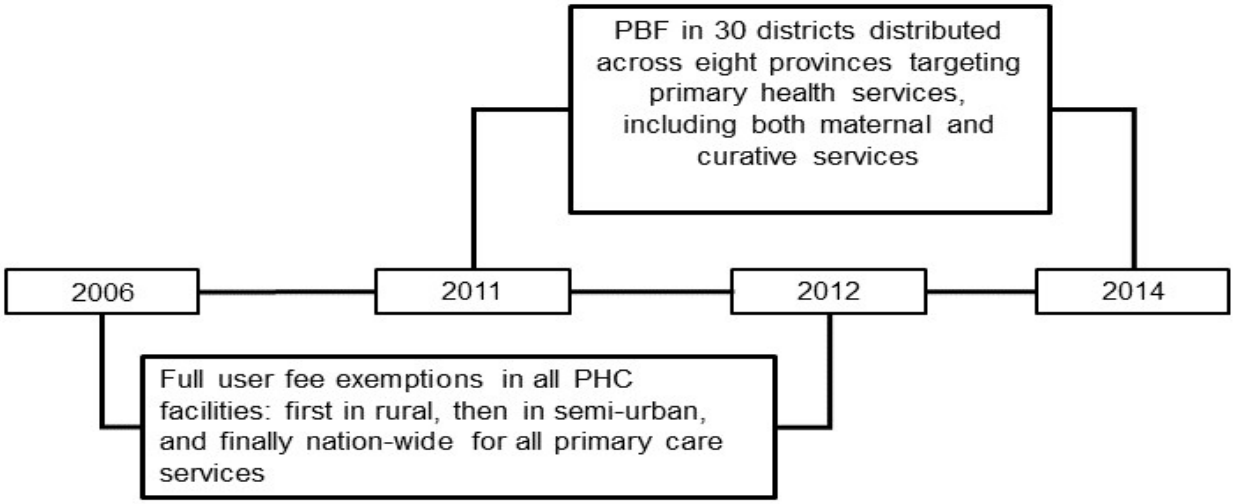
product (GDP) has experienced a continuous decline between 2010 and 2015, from a GDP growth of 10.3% in 2010 to a growth of 2.9% in 2015 (CSO, 2016). To tackle this severe poverty, the government of Zambia has set different policies with the aim of transforming the country into a nation of healthy and 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 spite of a gradual decrease over the last decades, maternal and neonatal mortality is estimated respectively at 213/100,000 (Serbanescu *et al.*, 2017) and at 23.5/1000 live births (World Data Atlas, 2018). The government has tackled maternal and neonatal mortality by ensuring universal access to facility-based delivery services. As a result, the rate of facility-delivery increased from 47.7 in 2008 to 83.8% in 2018 (Kaiser *et al.* 2019).

Various reforms aimed at reforming the health sector to achieve universal health coverage by improving maternal care 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 2011, 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. Another key health reform was the implementation of results-based financing in 11 districts between 2010 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.

Although the country had made more efforts in 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 mortality and infant rates have been halved between 2002 and 2015 (WHO, 2015).

**Figure 3. Health Policies and intervention timeline of maternal 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: Demographic and Health Surveys (DHS); Zambia Household Health and Expenditure Survey (ZHHEUS); and Performance-based Financing Survey (PBFS). These data sources contain information of utilization of institutional deliveries differentiating 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 have made use of Health Management Information System (HMIS) data to assess and account for seasonality in health service use (only for Burkina Faso and Malawi) and on own survey data (*i.e.* data available to the Principal Investigator 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 healthcare provider types of institutional delivery**
Source: Own illustration

| Country | Healthcare provider types | Data source (year) | NHA data (year) | Additional data sources for seasonality adjustment (year) | Sources for unit cost adjustment (year) |
|---|---|---|---|---|---|
| Burkina Faso | Public hospitals, public health centers | DHS (2003; 2010)<br>PBFS (2017) | 2003<br>2010<br>2017 | HMIS (2015) | Ridde *et al.* 2015 |
| Malawi | Public hospitals, public health centers, mission hospitals, mission health centers, and private facilities | DHS (2004;2010;2015) | 2004<br>2010<br>2015 | HMIS (2014-2018) | Chinkhumba *et al.* 2017 |
| Zambia | Public hospitals, public health centers, mission hospitals, mission health centers, and private facilities | DHS (2007)<br>ZHHEUS (2014) | 2006<br>2014 | No data | ZHHEUS (2014) |

## 2.2 Household surveys

The DHS household surveys are nationally representative repeated cross-sectional surveys in low- and middle-income countries. The DHS survey uses a two-stage stratified cluster sampling method to collect information on health and nutrition, focusing mainly on maternal care (women between 15 and 49 years of age) and childcare (children under five years of age) (Chukwuma *et al.*, 2017). The DHS is conducted by the National Statistical Office with technical support of Inner City Fund (ICF) International (an American organization) and funded by the United States Agency for International Development (USAID) (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.*, in progress). 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 Accounts

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, and so forth.
- 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.), and so forth.

- 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 national 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). We use HMIS data to estimate the seasonality indices.

## 2.5 Variables and their measurement

### 2.5.1 Health service utilization

We defined utilization of institutional delivery in relation to the proportion of deliveries within each socio-economic group that took place in a health facility within each socio-economic group. The assumption is that institutional deliveries are equivalent to skilled-attended deliveries, but our data did not allow us to check this information consistently.

### 2.5.2 Socioeconomic groups

We classified surveyed women in socioeconomic status quintiles by ranking women from the poorest to the least poor according to their current consumption based on food and non-food expenditure from ZHHEUS and based on household asset ownership (wealth index) from DHS and PBFS. For the consumption expenditure, we classified the women 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 component analysis.

### 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 provider í is equal to total subsidies/expenditure for healthcare level í divided by total utilization of institutional delivery for healthcare provider í.

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

Where $T_j$ is the value of the total health subsidy/cost imputed to the socioeconomic group j. $U_{ij}$ represents the number of institutional deliveries of socioeconomic group j at health facility type í, and $U_i$ is the total facility-deliveries at that health facility type by the different socioeconomic groups, and $\frac{S_i}{U_i}$ is the unit subsidy/cost of healthcare provision at health facility í which is assumed to be constant at t hat health facility. $S_i$ 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.

## 2.7 Benefit incidence estimates

### 2.7.1 Disaggregated benefit incidence by provider category

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) for both the traditional and comprehensive BIA.

### 2.7.2 Aggregated benefit incidence across provider categories

To analyze the overall benefit incidence of total health subsidies and expenditure, we aggregated the utilization of institutional deliveries and health subsidies and expenditure at all provider categories. Utilization of institutional deliveries at all provider categories (deliveries at public facilities, deliveries at mission facilities and deliveries at private facilities) 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.

### 2.7.3 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 provinces (Zambia), districts (Malawi), and regions (Burkina Faso), depending the data availability. Since NHA data do not provide disaggregated health spending data at rural/urban, provinces, 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.

## 2.8 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 of institutional delivery, but only for Burkina Faso and Malawi since such data were not available in Zambia.

Seasonality index is defined by:

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

To deseasonalize the utilization of institutional delivery, we divided utilization of institutional delivery in each month by its corresponding seasonality index.

## 2.9 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 women in quintiles using per capita expenditure for ZHHEUS data and wealth index for DHS and PBFS data;
(2) We estimated utilization of institutional delivery at different levels (e.g. 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.
(3) We calculated the unity subsidy and unity cost at different types of healthcare providers (e.g. public, mission or private health facilities) by dividing health spending by total utilization of institutional delivery at each type of healthcare provider;
(4) We multiplied utilization of institutional delivery by unity subsidy/cost at each type of healthcare provider for each quintile;

(5) We aggregated the monetary benefits of utilization of institutional delivery for each type of healthcare provider 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, and the dominance test to assess the dominance between the concentration curve and the line of equality.

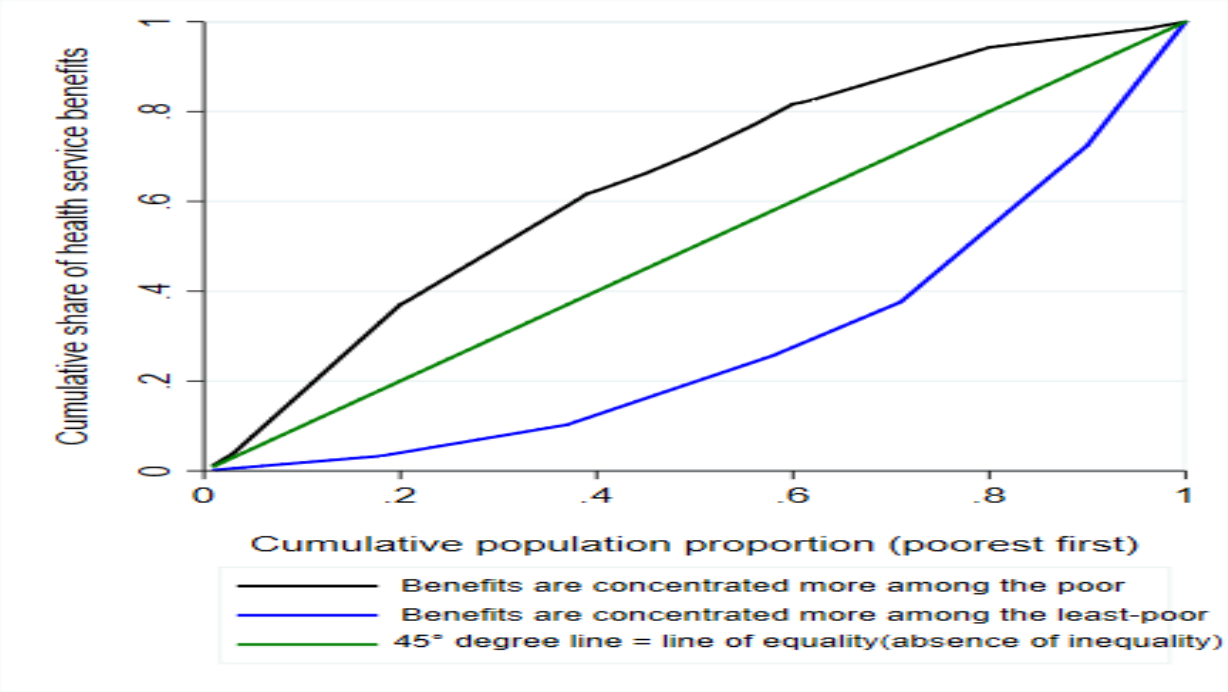
### 2.9.1 Descriptive statistics

We estimated the shares of institutional delivery use and their related shares of unit subsidy/cost for each quintile for each provider category.

### 2.9.2 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 poorer 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 poorer (least poor).

**Figure 4: Concentration curve**
Source: Own illustration




### 2.9.3 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. $\beta$ 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.

### 2.9.4 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.

## 2.10 Limitations

There were three main limitations that should be taken into account in 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, 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-rich (or less 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) showed that women from least-poor household used more institutional delivery than women from poorer households. The inequality was higher at public hospitals compared to public health centers. The inequality in use of institutional delivery declined overtime, especially at public health centers between 2003 and 2017.

The 2017 data from the PBF survey were collected only in 6 of 13 regions of the whole country. 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

This section assesses the distributional incidence of public spending on maternal health services on institutional delivery at public hospitals and public health centers at three time

points, from 2003 through 2010 to 2017. The BIA findings in table 2 indicate that the least-poor women mostly benefited from public spending on institutional deliveries at all public health facilities while the poorest women benefited less. The inequality decreased continually over time, with a higher decrease being observed between 2010 and 2017, especially at public health centers (by 93%, from a CI of 0.128 in 2010 to a CI of 0.009 in 2017) and for total public health spending (by 92%, from a CI of 0.155 in 2010 to a CI of 0.013 in 2017, albeit the financial benefits still reflect a slight pro-least-poor distribution.

**Table 2. Benefit incidence of public spending on institutional delivery in Burkina Faso**
Source: Authors' calculations DHS 2003-2010; PBFS 2017

| **Year** | **2003** | **2010** | **2017** | **Diff 2010-2003** | **Diff 2017-2010** | **Diff 2017-2003** |
|---|---|---|---|---|---|---|
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total public spending | 0.199[a]*** | 0.155[a]*** | 0.013[a]*** | -0.044 | -0.142*** | -0.186*** |
| | (0.029) | (0.021) | (0.002) | (0.036) | (0.012) | (0.015) |
| Public Hospitals | 0.584[a]*** | 0.406[a]*** | 0.078[a]** | -0.178 | -0.328** | -0.506*** |
| | (0.092) | (0.068) | (0.031) | (0.115) | (0.078) | (0.050) |
| Public health centers | 0.161[a]*** | 0.128[a]*** | 0.009[a]*** | -0.033 | -0.119*** | -0.152*** |
| | (0.031) | (0.023) | (0.003) | (0.038) | (0.013) | (0.016) |

***Note: CI= concentration index; SE= standard errors; dominance test: a= dominance, b= non-dominance, c= concentration curve and line of equality cross***
****, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively***

We observed a similar trend when we disaggregated public health spending by healthcare provider types. The pro-least poor inequality declined significantly over time between 2003 and 2017 at both public hospitals and public health centers. Comparing the pro-least poor inequality pattern between the two health facility types, the magnitude of the inequality was higher at public hospitals compared to public health centers. The observed difference by facility level is most likely a reflection of health service utilization patterns. It is probable that while the reduction of fees has been sufficient to bring women to their closest health facility, it has not been sufficient to bring them to higher level facilities. We know from the literature that geographical barriers impose additional direct and indirect costs, discouraging the poorest

from seeking care at higher levels of care (Mwase *et al*., 2018; De Allegri *et al*., 2015; De Allegri *et al*., 2011; Gabrysch and Campbell, 2009). While recognizing that delivery in district hospitals is not per se associated with better quality of care, as long as adequate basic emergency obstetric services are available at the first level of care, our findings point at the need to implement additional measures, such as free of charge emergency transport, to ensure that poorer women can make use of secondary facilities, where comprehensive obstetric care is available, in case of need. Here, we ask the reader to note that out-of-pocket spending on transport or indirect costs associated with seeking care are not included in our analysis. This does not represent a limitation of the method per se, but one of its prerogative, the focus being on the distributional incidence of direct medical costs only (McIntyre and Ataguba, 2011). Nevertheless, we do recognize the additional barrier that non-medical expenses impose on poor households in this context.

### 3.1.2 Benefit incidence of overall spending

We added donor spending and OOPE to public spending to assess the distributional incidence of overall health spending on institutional delivery (comprehensive BIA). Table 3 indicates that the distribution pattern of overall health spending is similar to the distribution of public spending. Inequality in total health spending decreased significantly between 2003 and 2017. The least-poor women disproportionately benefited from total health spending at all public health facilities. The decreasing trend of inequality over time remained. Comparing public spending and overall spending, we observed a similar decreasing trend of inequality in financial benefits at public hospitals and health centers. Despite the substantial decrease of inequality over time, the distributional incidence of health spending remained pro-least-poor in all three time points and at all public health facilities.

The continuous reduction of inequality in financial benefits of public and overall spending between 2003 and 2017 may be explained by different health policies, such as reduction and removal of user fees for delivery services and performance-based financing schemes, that were implemented in Burkina Faso to improve access to delivery services, especially for the poor groups (Figure 1). From 2007 and 2016, the government of Burkina Faso subsidized 80% of direct costs for skilled birth attendance and fully removed user fees for skilled birth attendance in 2016. Studies by De Allegri et al. (2012) and Langlois *et al.* (2016) showed that already the SONU policy resulted in increased utilization of skilled birth attendance across all socioeconomic groups. The distributional incidence of health spending inevitably becomes more equitable if a larger number of poor women start using the services they are entitled to, because this increased service use entails that poorer women start absorbing/making use of what financial resources are channeled towards institutional delivery.

**Table 3. Comprehensive benefit incidence of health spending on institutional facility in Burkina Faso**
Source: Authors' calculations DHS 2003-2010; PBFS 2017

| Year | 2003 | 2010 | 2017 | Diff 2010-2003 | Diff 2017-2010 | Diff 2017-2003 |
|---|---|---|---|---|---|---|
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total health spending | 0.242[a]*** | 0.195[a]*** | 0.062[a]*** | -0.047 | -0.133*** | -0.180*** |
| | (0.032) | (0.036) | (0.016) | (0.048) | (0.029) | (0.026) |
| Public Hospitals | 0.403[a]*** | 0.259[a]*** | 0.095[a]*** | -0.144 | -0.164* | -0.308*** |
| | (0.075) | (0.065) | (0.031) | (0.100) | (0.053) | (0.054) |
| Public health centers | 0.173[a]*** | 0.112[a]*** | 0.024[a]*** | -0.061 | -0.088*** | -0.149*** |
| | (0.031) | (0.024) | (0.003) | (0.039) | (0.013) | (0.0116) |

***Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross***
****, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively***

Beyond the SONU and the *gratuité* policy, PBF has also been observed to produce small changes in health service use, especially prior to the launch of the *gratuité* (Kuunibe *et al*., 2020), but not to contribute towards narrowing equity gaps between socio-economic strata (Ridde *et al*., 2015). The fact that inequalities may be larger when considering all sources of spending, including out-of-pocket spending, may be due to the fact that charges for materials and informal charges may persist even after the implementation of formal user fee removal policies. While evidence on the effects of the *gratuité* and PBF on out-of-pocket spending is still missing, we know from a study by Ridde *et al.* (2015) that while SONU led to a substantial decline in out of pocket payments for delivery care, it did not remove them completely, not even among the very poor. The impact of SONU on out-of-pocket payments was found to be equity-neutral, hence reducing payments for all socio-economic strata in the same manner. Nowadays, out of pocket payments on obstetric care are estimated to stand at US$ 1.44 on average in spite of the fact that the *gratuité* should have removed them completely (Meda *et al*., 2019). The persistence of out-of-pocket payments largely explains why we still observe a slightly pro-least-poor distributional pattern for overall health spending.

### 3.1.3 Heterogeneity and geo-spatial analysis

We disaggregated the distributional incidence of health spending on institutional delivery across residence areas (urban *vs* rural) and regions. Table 4 indicates that total public health spending was mostly equally distributed in urban areas but it disproportionately favored the least-poor in rural areas. In 2003 and 2010, public health spending at public hospitals and health centers in urban areas were in general almost equally distributed, while it disproportionately benefited least-poor women in rural areas. In 2017, public health spending generally favored least-poor in both urban and rural areas, except in urban area at public health centers where it was equally distributed. When we compared the distributional incidence of public spending between public hospitals and public health centers, surprisingly, the financial benefits were in general equally distributed at public hospitals in 2003 and 2010 whereas public health spending at public health centers disproportionately benefited the least-poor for all years.

**Table 4. Benefit incidence of public spending on institutional delivery in Burkina Faso**
**Urban *vs* rural heterogeneity**
Source: Authors' calculations DHS 2003-2010; PBFS 2017

| **Year** | **2003** | | | **2010** | | | **2017** | | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 public spending | -0.067 | 0.158*** | 0.225*** | -0.013 | 0.144*** | 0.158*** | 0.018* | 0.011*** | -0.007 |
| | (0.060) | (0.032) | (0.068) | (0.042) | (0.021) | (0.048) | (0.010) | (0.002) | (0.010) |
| Public Hospitals | 0.047 | 0.102 | 0.055 | *0.123* | 0.351*** | 0.229* | 0.184*** | 0.022 | -0.162** |
| | (0.081) | (0.135) | (0.158) | *(0.089)* | (0.097) | (0.131) | (0.064) | (0.035) | ( 0.073) |
| Public Health Center | -0.111* | *0.159**** | 0.271*** | -0.039 | 0.127*** | 0.167*** | -0.017 | 0.011*** | 0.029* |
| | (0.078) | *(0.033)* | (0.084) | (0.048) | (0.024) | (0.054) | (0.016) | (0.003) | (0.016) |

**Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

**Table 5. Comprehensive benefit incidence of health spending on institutional delivery Burkina Faso**
**Urban *vs* rural heterogeneity**
Source: Authors' calculations DHS 2003-2010; PBFS 2017

| **Year** | **2003** | | | **2010** | | | **2017** | | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 | -0.081* | 0.135*** | 0.217*** | 0.042 | 0.148*** | 0.106 | 0.152*** | 0.033** | -0.119*** |
| | (0.052) | (0.033) | (0.062) | (0.059) | (0.045) | (0.075) | (0.049) | (0.016) | (0.052) |
| Public Hospitals | -0.143* | -0.006 | 0.137 | 0.078 | 0.195*** | 0.116 | 0.191*** | 0.040 | -0.151** |
| | (0.076) | (0.119) | (0.141) | (0.089) | (0.085) | (0.124) | (0.064) | (0.035) | (0.073) |
| Public Health Centers | 0.006 | 0.161*** | 0.155*** | -0.023 | 0.097*** | 0.120*** | -0.001 | 0.026*** | 0.028* |
| | (0.039) | (0.031) | (0.050) | (0.047) | (0.025) | (0.054) | (0.016) | (0.003) | (0.016) |

**Note : CI= concentration index ; SE= standard errors**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

The distributional incidence of overall health spending on institutional delivery in urban and rural areas (table 5) indicates a slightly different distribution compared to the distribution of public health spending. The distributional incidence of overall health spending showed different distribution patterns across urban and rural areas. In 2003 and 2010, overall health spending disproportionately benefited the least-poor in rural areas, while it was either equally distributed or pro-poor in urban areas. In 2017, overall health spending mostly benefited the least-poor women in both urban and rural areas. The scattered pattern observed here, alternating pro-poor and pro-least-poor benefits over the years across rural and urban areas, suggests that policies might have been implemented at different paces over time. Unfortunately, no detailed evidence on implementation dynamics is available to match our analysis and therefore our results remain difficult to explain without a direct discussion with the concerned policy makers. One element to keep in mind is 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.

Despite the decline of inequality over time, looking at the regional disparities, we observed a high persistent heterogeneity in the distributional incidence of both public and overall health spending, particularly so for the latter. These patterns, probably also due to differences in implementation dynamics, 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 regions.

Figure 5 shows the distributional incidence of total public spending on institutional delivery over time across regions. The least-poor women mainly benefited from public spending, but the inequality declined between 2003 to 2017 towards equality.

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

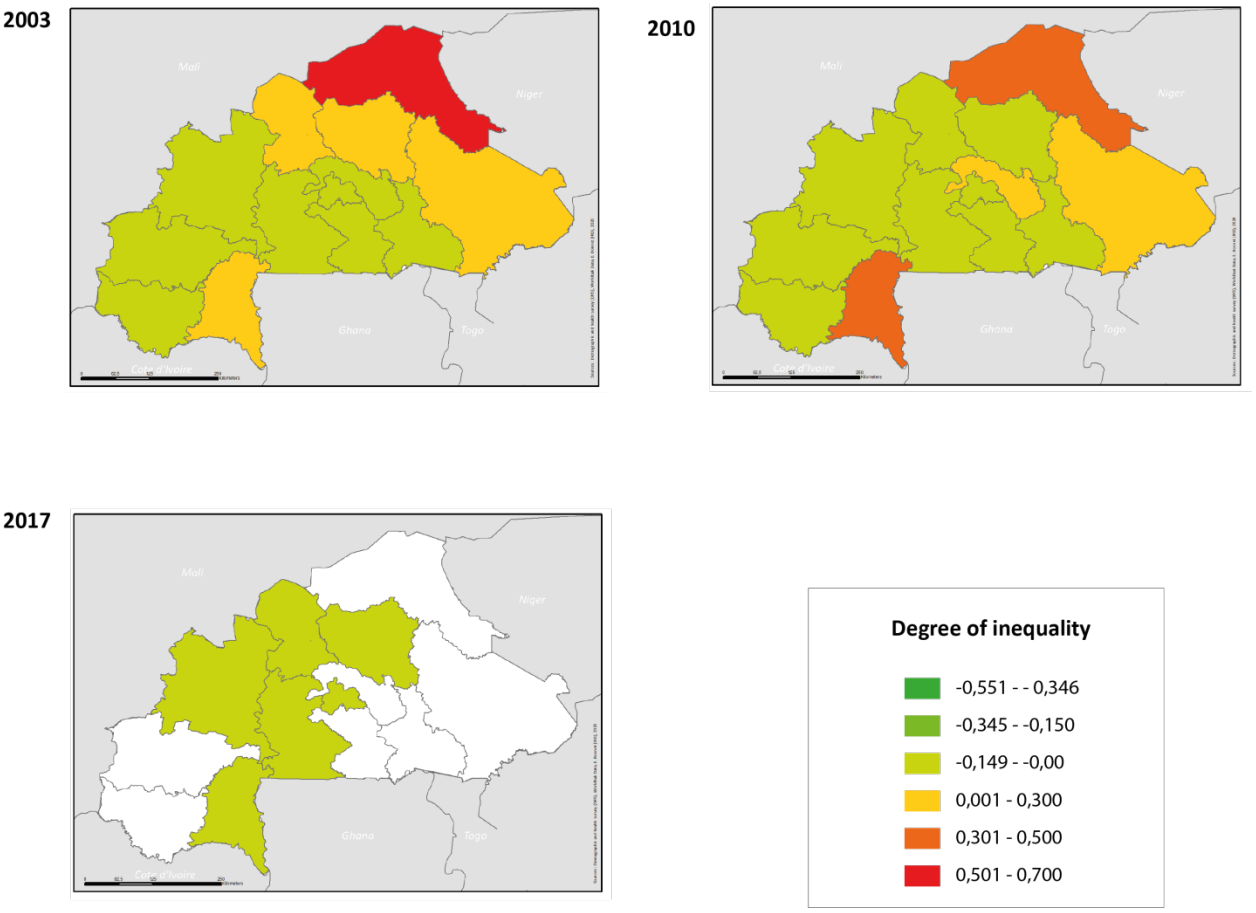
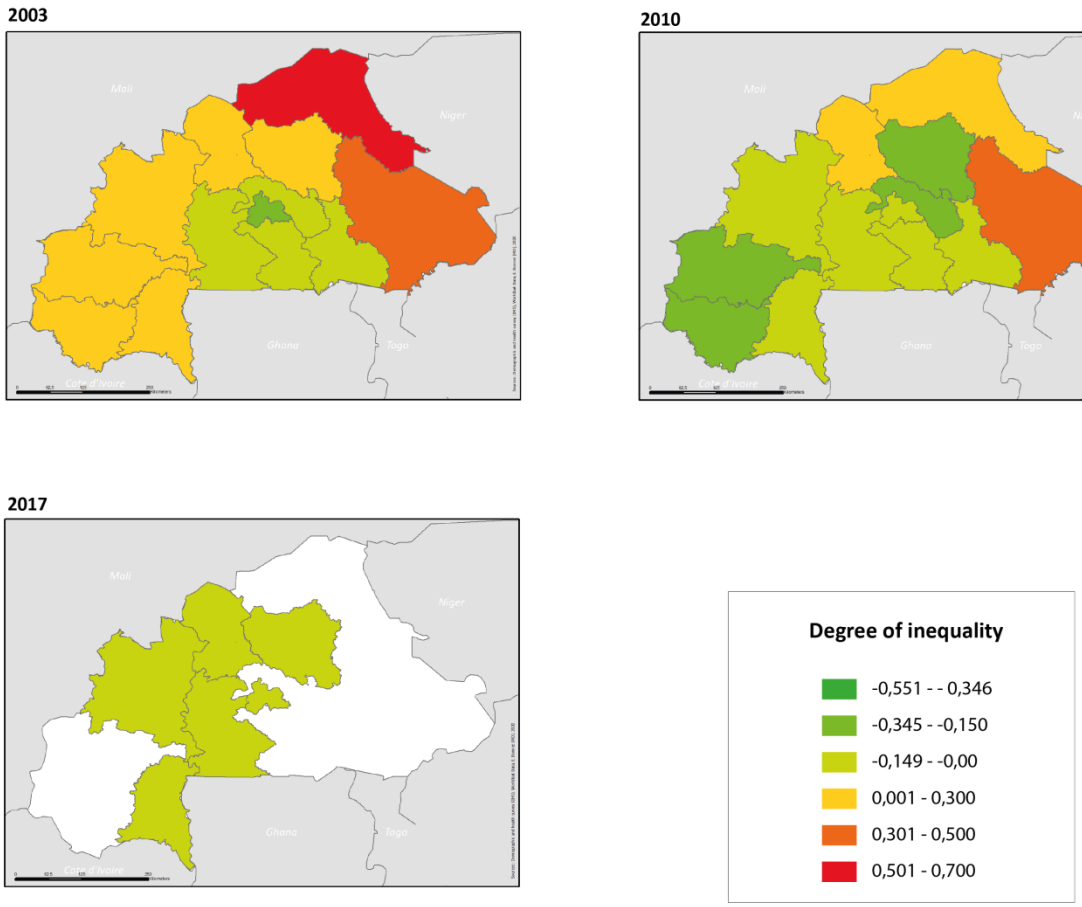


Figure 6 shows the distributional incidence of total overall health spending over time across regions. The distribution of overall spending appears similar to the distribution pattern of public spending across regions. However, the degree of inequality is more marked for overall spending than public spending as it is reflected at healthcare provider levels as well.

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




## 3.2 Malawi

Our descriptive analysis (appendix 2) indicates that women from least-poor households use more institutional delivery at public hospitals whereas women from poorer households use more institutional delivery at public health centers for all years from 2004 to 2016.

### 3.2.1 Benefit incidence of public spending

Table 6 shows the distributional incidence of public spending on institutional delivery over time and across public hospitals and public health centers. The public health spending benefited the least-poor in public hospitals while it benefited the poorest in public health

centers for all three time points. The pro-least-poor inequality at public hospitals moderately decreased between 2004 (CI =0.145) and 2015 (CI = 0.063) by 56%, whereas the pro-poor inequality at public health centers significantly increased between 2004 (CI = -0.065) and 2015 (CI = -0.154) by 137%. A significant increase of the pro-poor inequality at public health centers is observed between 2004 and 2015 and between 2010 and 2015. The financial benefits of total public spending were equally distributed in 2004 (CI = 0.032) and 2010 (CI = 0.01) but shifted to pro-poor distribution in 2015 (CI = -0.057). The equal distribution of total public spending in 2004 and 2010 is likely driven by the mutual compensation between pro-poor distribution in public health centers and the pro-least-poor distribution in public hospitals; while the relative high pro-poor distribution drives the pro-poor distribution of total public spending in 2015 at the public health center and the relative low pro-least-poor distribution at public hospitals.

**Table 6. Benefit incidence of public spending on institutional delivery in Malawi**
Source: Authors' calculations DHS 2004-2015

| **Year** | **2004** | **2010** | **2015** | **Diff 2010-2004** | **Diff 2015-2010** | **Diff 2015-2004** |
|---|---|---|---|---|---|---|
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total public spending | 0.032[b] | 0.001[b] | -0.057[a]*** | -0.031 | -0.058*** | -0.089*** |
| | (0.028) | (0.017) | (0.014) | | | |
| Public hospitals | 0.145[a]*** | 0.126[a]*** | 0.063[a]*** | -0.019 | -0.063 | -0.082 |
| | (0.047) | (0.025) | (0.024) | (0.049) | (0.035) | (0.049) |
| Public health centers | -0.065[a]* | -0.078[a]** | -0.154[a]*** | -0.013 | -0.076** | -0.089*** |
| | (0.027) | (0.024) | (0.018) | (0.049 | (0.030) | (0.032) |

**Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

### 3.2.2 Benefit incidence of overall spending

Table 7 shows the comprehensive BIA of overall health spending on institutional delivery over time and across public, faith-based and private health facilities. The distributional incidence of total health spending was close to equality in 2004 (CI = 0.036) and 2015 (CI = 0.028) but was slightly pro-least-poor in 2010 (CI = 0.078). With regard to the distribution of overall spending across health facilities, we observed different distribution patterns across the years. Like for

public spending, the overall spending disproportionately benefited the least-poor in public hospitals and the poorest in public health centers for all years. The pro-least-poor distribution at public hospitals moderately declined over time. The pro-poor distribution of overall spending at public health centers slightly decreased between 2004 (CI = -0.106) and 2010 (CI = -0.077) and substantially increased in 2015 (CI = 0.145). The pro-least inequality in CHAM hospitals decreased slightly between 2004 (CI = 0.154) and 2010 (CI = 0.132) and pushed towards equality in 2015 (CI = 0.024). Surprisingly, the overall health spending at CHAM health centers and private health facilities – which are non-profit and for-profit facilities, respectively – was equally distributed for all years.

The observed equality in CHAM health centers may be resulted from the Service Level Agreements (SLAs) implemented in 2006 between the Government of Malawi and CHAM health facilities. SLAs are contracts which allows the provision of maternal healthcare services, including management of both normal and complicated delivery, free of charge at point of use to all women in Malawi. The Government, in return, reimburses the mission health facilities for the services they provide. Approximately 36% of all health facilities in the country belong to CHAM. Trough SLAs, institutional delivery increased at CHAM health facilities (Manthalu *et al.* 2016).

**Table 7. Comprehensive benefit incidence analysis of health spending on institutional delivery in Malawi**
Source: Authors' calculations DHS 2004-2015

| Year | 2004 | 2010 | 2015 | Diff. 2010 – 2004 | Diff. 2015 – 2010 | Diff. 2015 – 2004 |
|---|---|---|---|---|---|---|
| Heath care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total health spending | 0.036[b] (0.022) | 0.078[a]*** (0.021) | 0.028[b] (0.018) | 0.042 (0.030) | -0.05* (0.027) | -0.008 (0.028) |
| Public hospital | 0.135*** (0.041) | 0.123*** (0.025) | 0.074*** (0.025) | -0.012 (0.048) | -0.049 (0.035) | -0.061 (0.048) |
| Public health centers | -0.106*** (0.027) | -0.077*** (0.024) | -0.145*** (0.018) | 0.029 (0.036) | -0.068** (0.030) | -0.039 (0.032) |
| CHAM hospital | 0.154*** (0.060) | 0.132** (0.067) | 0.024 (0.058) | -0.022 (0.090) | -0.108 (0.088) | -0.13 (0.083) |
| CHAM health center | -0.071 (0.053) | 0.069 (0.063) | 0.091 (0.081) | 0.14* (0.082) | 0.022 (0.104) | 0.162* (0.099) |
| Private health facilities | 0.102 (0.113) | 0.099 (0.100) | 0.096 (0.112) | -0.003 (0.151) | -0.003 (0.151) | -0.006 (0.159) |

**Note: CI= concentration index; SE= standard errors; CHAM=Christian Health Association of Malawi**
**Dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

The fact that we observe a more strongly marked pro-poor distribution of public compared to overall health spending may find its root in the Malawian health financing structure. More specifically, public healthcare provision in Malawi is based on an egalitarian principle, whereby all residents are entitled to free healthcare irrespective of their socio-economic status. Hence, we expect public subsidies to be distributed in an egalitarian matter. In practice, however, the literature has repeatedly reported shortcomings of the system, with people

being aware of the necessity to pay for healthcare services (Abiiro *et al.* 2014), including delivery services, especially when complications occur (Chinkhumba *et al.* 2017).

### 3.2.3 Heterogeneity and Geo-spatial analysis

Table 8 shows the geospatial analysis of public spending on institutional delivery at public hospitals and public health centers across urban and urban areas. The overall picture of the distribution of public health spending exhibited either an equal distribution or a pro-poor distribution for both public health facilities in urban and rural areas and across all years. In 2004, for both rural and urban areas and in 2010 for urban areas, the distribution of public health spending was close to equality in public hospitals and public health centers. In 2010, the equal distribution of public health spending observed in 2004 in rural areas at public hospitals and health centers shifted to pro-least poor and pro-poor, respectively. The mixed distributional incidence of public health spending observed in 2004 and 2010 shifted to a pro-poor distribution in 2015 in both rural and urban areas. In line with what observed earlier, the fact that differences in the distribution of public spending between urban and rural areas are not significant is likely also an indication of the egalitarian principle guiding the health financing structure in Malawi, with public funds being allocated in an egalitarian manner irrespective of location, at least insofar as institutional delivery services are concerned.

Table 9 shows the distributional incidence of overall health spending on institutional delivery over time and across different public, faith-based and private health facilities. We observed different distribution patterns across urban and rural areas and across different healthcare providers over time. The financial benefits of overall spending in public hospitals were in general equally distributed, although it was pro-least poor in 2010 in rural areas, which reflects an almost similar distribution like the one we observed for public health spending. A different distribution pattern was observed at public health centers which in general favored poorer women in all residence areas over time.

**Table 8. Benefit incidence of public spending on institutional delivery in Malawi**
**Urban *vs* rural heterogeneity**
Source: Authors's calculations DHS 2004-2015

| **Year** | **2004** | | | **2010** | | | **2015** | | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 | -0.106* (0.061) | 0.006 (0.022) | 0.112* (0.064) | -0.044 (0.041) | -0.023 (0.018) | 0.021 (0.044) | -0.132*** (0.043) | -0.072*** (0.016) | 0.060 (0.046) |
| Public hospital | -0.004. (0.079) | 0.027 (0.039) | 0.031 0.088) | -0.058 (0.054) | 0.062** (0.027) | 0.120** (0.060) | 0.015 (0.036) | -0.041* (0.021) | -0.056 (0.042) |
| Public health centers | -0.164 (0.108) | -0.013 (0.026) | 0.151 (0.111) | -0.020 (0.065) | -0.066*** (0.025) | -0.046 (0.070) | -0.100* (0.057) | -0.127*** (0.018) | -0.027 (0.060) |

**Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

In 2004 and 2010, the mission hospitals profited the least-poor women, but this inequality declined to near equality in 2015 for both urban and rural areas. The overall health spending in CHAM health centers and private health facilities in 2004 was generally equally distributed but in 2010 shifted to pro-least-poor at CHAM health centers in rural areas and at private health facilities in urban areas. Similarly to what noted earlier in relation to public spending, we note statistically significant differences between urban and rural areas only for public health centers and for private facilities. The former is likely explained by the fact that in urban settings, the poor face fewer geographical barriers and may therefore face lower overall costs when seeking care (Mazalale *et al*., 2015; Lohela *et al*. 2012) hence they are more encouraged to seek care given that medical services per se can be obtained free of charge or at low cost. The latter does not appear as a surprise since the vast majority of private facilities are located in urban centers and being private, they impose high fees, becoming accessible only for the least poor.

**Table 9: Comprehensive benefit incidence of health spending on institutional delivery in Malawi**
**Urban *vs* rural heterogeneity**
Source: Authors' calculations DHS 2004-2015

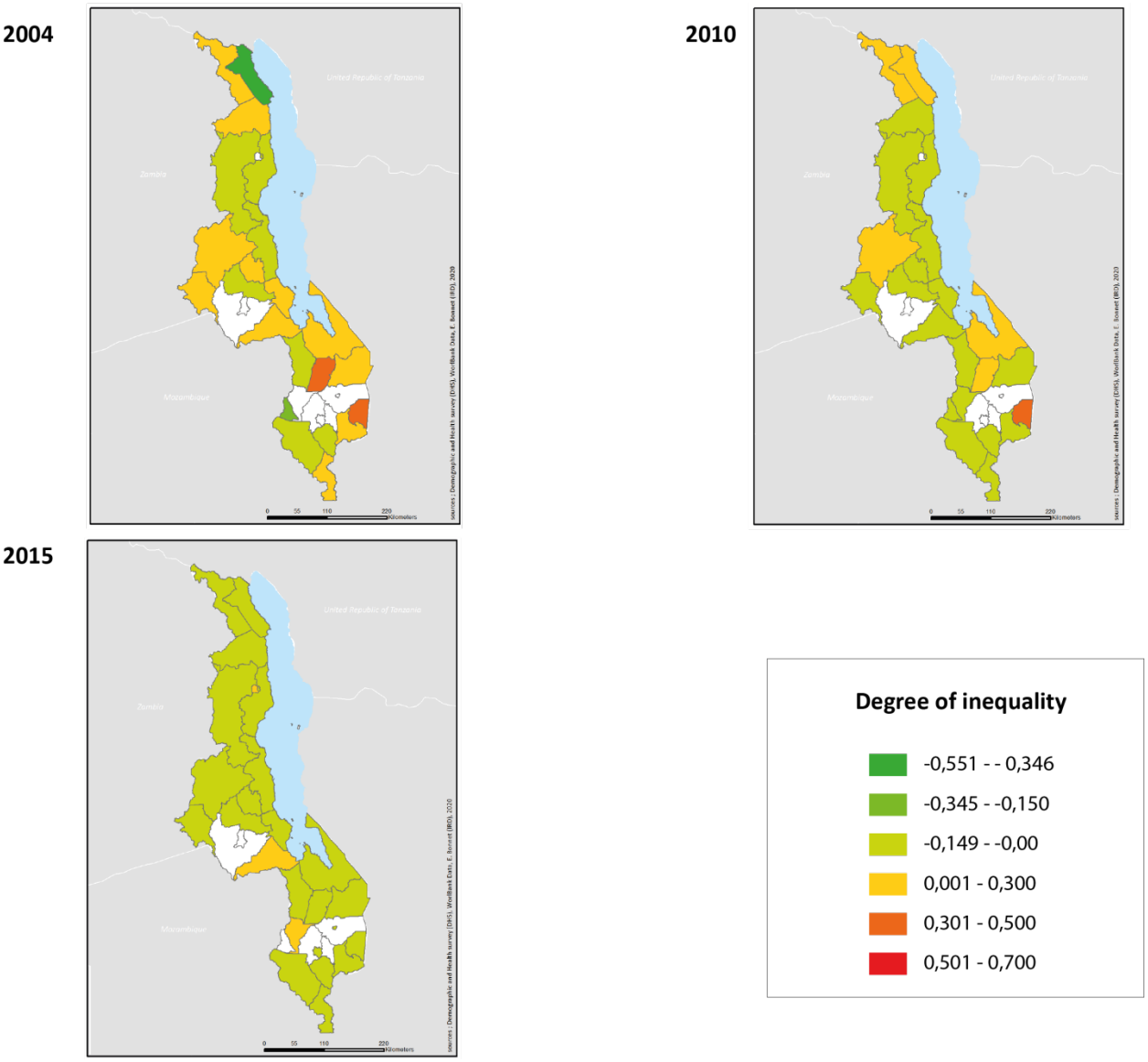
| **Year** | **2004** | | | **2010** | | | **2015** | | |
|---|---|---|---|---|---|---|---|---|---|
| | Urban | Rural | Diff | Urban | Rural | Diff | Urban | Rural | Diff |
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total health spending | -0.071 (0.053) | -0.002 (0.020) | 0.069 (0.056) | 0.009 (0.042) | 0.029 (0.019) | 0.020 (0.046) | 0.016 (0.039) | -0.023 (0.018) | -0.039 (0.042) |
| Public hospitals | -0.061 (0.078) | 0.030 (0.039) | 0.091 (0.087) | -0.055 (.055) | 0.058** (.025) | 0.113* (0.060) | 0.001 (0.045) | -0.024 (0.021) | -0.025 (0.050) |
| Public health centers | -0.253** (0.126) | -0.067** (0.026) | 0.186 (0.128) | -0.023 (.064) | -0.064** (.026) | -0.041 (0.069) | -0.275*** (0.064) | -0.115*** (0.018) | 0.160** (0.066) |
| CHAM hospitals | 0.151** (0.075) | 0.100** (.052) | -0.051 (0.091) | 0.223*** (.073) | 0.063 (.063) | -0.160 (0.096) | 0.247 (0.176) | 0.084 (0.067) | -0.163 (0.188) |
| CHAM health centers | 0.532 (0.380) | -0.011 (.050) | -0.543 (0.383) | 0.487 (.489) | 0.173** (.070) | -0.314 (0,494) | 0.277 (0.184) | 0.050 (0.068) | -0.227 (0.196) |
| Private health facilities | 0.039 (0.302) | 0.116 (.131) | 0.077 (0.033) | 0.904** (.413) | 0.095 (.103) | -0.809 (0.426) | 0.611** (0.301) | -0.036 (0.089) | -0.647** (0.314) |

**Note: CI= concentration index; SE= standard errors; CHAM=Christian Health Association of Malawi**
**Dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

The distribution pattern of public health spending at different health facilities is reflected in the geospatial analysis across districts. Overall, the pro-least poor inequality declined over time towards equality or pro-poor distribution. As shown in figure 7, overall, for both public hospitals and public centers, the total public spending is either equally distributed or pro-least-poor in 2004 and 2010 and shifted to equality or more pro-poor distribution in 2015, especially for the district Karonga. In general, the high heterogeneity in inequality observed in 2004 and 2010 declined toward equality in 2015 across all districts. As noted earlier, this pattern appears to

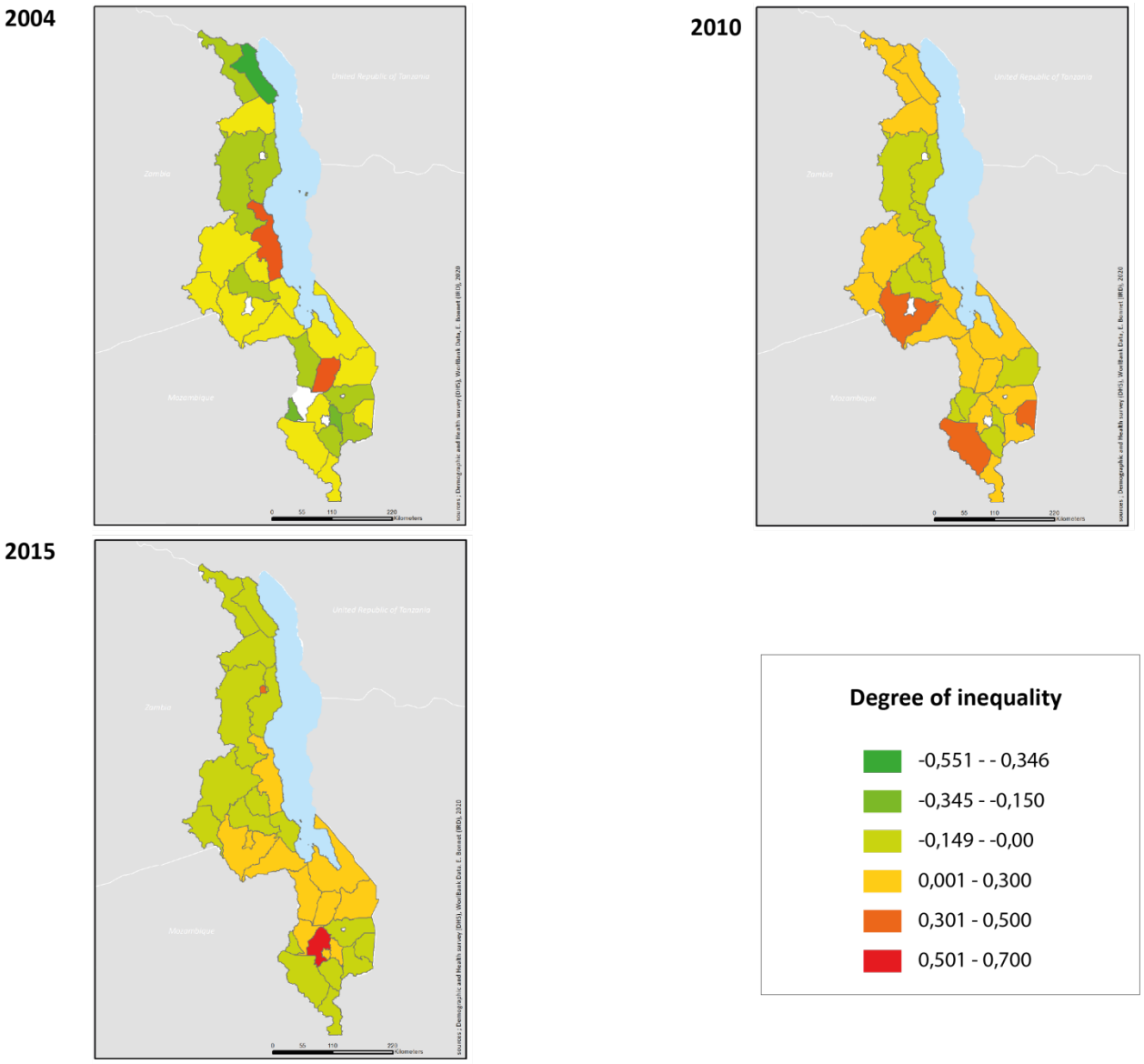
reflect the positive effects of SLAs on increasing service use for population groups that traditionally lacked it, especially in remote areas.

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




As shown in figure 8, a more significant heterogeneity across districts was observed for the distribution of the total overall spending for all years. This may be explained by the out-of-pocket expenditure that may have different effects on institutional delivery between districts. Similar to total public spending, the high heterogeneity in inequality in 2004 and 2010 shifted to equality or pro-poor inequality in 2015, especially in the district of Likoma. A higher heterogeneity in the distributional incidence of overall health spending appeared at public health facilities and CHAM hospitals compared to CHAM health centers and private health facilities which in general tended to equality.

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




The observed distribution patterns of public and overall health spending are difficult to explain exhaustively without direct appraisal with concerned policy makers. Given the egalitarian focus of national health financing structures, the observed differences across districts are more likely to be related to challenges to equitable access to institutional delivery services due to factors beyond health financing and should be object of further analysis. 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 unveil their causes and better understand contextual drivers of differential spending and health service use across regional settings.

## 3.3 Zambia

The wealth distribution among households in the ZHHEUS survey shows that 60 per cent of the population who are in the poorest three quintiles have access to about 38 per cent of the wealth. The utilization of health services shows that while over 95 per cent of the highest quintile delivered with the assistance of a health care worker at the health facility, only 50 of the lowest quintile or poorest ranked segment of the population were able to deliver at a health facility. This demonstrates that beyond an overall increase in use of facility-based delivery, important inequalities across socio-economic groups persist.

### 3.3.1 Benefit incidence of public spending in Zambia

As shown in table 10, total public health spending on institutional delivery benefited mostly the least-poor women over time but declined from a CI of 0.241 in 2007 to a CI of 0.120 in 2014. Our analysis excludes private facilities given that they are hardly used for delivery services. Public health spending at public hospitals slightly declined from a CI of 0.340 in 2007 to a CI of 0.304 in 2014, but stayed pro-least poor. A significant decrease of inequality occurred at public health centers and mission health facilities, by 120% and 68%, respectively. Public spending at public health centers benefited disproportionately the least-poor in 2007 (CI = 0.181) but this inequality decreased substantially towards a slight pro-poor distribution in 2014 (CI = -0.037). A different picture is observed for public spending at mission health facilities which stayed pro-poor for all years, but the pro-poor inequality decreased from a CI of -0.217 to a CI of -0.070 in 2014. These findings on the distribution of financial benefits reflect underlying utilization patterns whereby after the removal of user fees, poorer women tend to use primary public and mission facilities, whereby least poor women are more likely to seek care at public hospitals (Chama-Chiliba *et al.* 2016).

Through the primary health care strategy, the majority of the population among the women have greater access to lower levels care at health centers than the hospitals. The hospitals are concentrated in urban areas where the majority of the least-poor population live. However, within the urban areas themselves, women in lower wealth quintiles have greater access to health centers. This access and coverage of maternal care services is further complemented by the additional services provided by the mission health facilities which serve mostly the poorer quintiles. As changes in health care financing policies were reviewed to be more pro-poor during the mid-part of 2000 e.g. through the adoption of a deprivation based allocation criteria for primary health care and elimination of user fees at low levels of care were likely to demonstrate distributional improvements to the poorer (Sialubanje *et al.* 2017), including the mission health facilities who are supported through government grants apart from their own sources of funding.

**Table 10: Benefit incidence of public spending on institutional delivery in Zambia**
Source: Authors' calculations DHS 2007, ZHHEUS 2014

| Year | 2007 | 2014 | Diff 2014-2007 |
|---|---|---|---|
| Health care provider | CI (SE) | CI (SE) | CI (SE) |
| Total public spending | 0.241*** | 0.120*** | -0.121*** |
| | (0.018) | (0.007) | (0.019) |
| Public Hospitals | 0.340** | 0.304** | -0.035* |
| | (0.03) | (0.022) | ( 0.041) |
| Public health centers | 0.181** | -0.037** | -0.219** |
| | (0.028) | (0.003) | (0.028) |
| Mission health facilities | -0.217** | -0.070** | 0.147** |
| | (0.070) | (0.054) | (0.088) |

**Note : CI= concentration index ; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

### 3.3.2 Benefit incidence of overall spending

Table 11 shows the distributional incidence of overall health spending which includes both public spending, donor spending and out-of-pocket expenditures. Our analysis excludes private facilities given that they are hardly used for delivery services. Overall spending exhibits a similar pattern to public spending, with values for total spending and hospital spending remaining pro-poor and values for public health centers and missing facilities becoming pro-poor by 2014. Again, this is likely to be the result of increased utilization of institutional delivery by the poor at lower levels of care, especially at mission health facilities (Chama-Chiliba *et al*., 2016), following the removal of user fees. The fact that CI values for overall spending largely reflect those of public spending also suggests that donor financing is similarly allocated towards benefitting the poorest and that public health centers and mission facilities manage to limit user charges. The fact that substantial investments have been made towards increasing hospital capacity over the last decades and the fact that the least poor continue to be the ones mostly seeking hospital delivery, largely explains the pro-least poor distribution of both public and overall spending observed at this level (Masiye and Chansa, 2019).

**Table 11: Comprehensive benefit incidence analysis of health spending on institutional delivery in Zambia**
Source: Authors' calculations DHS 2007, ZHHEUS 2014

| Year | 2007 | 2014 | Diff. 2014 – 2007 |
|---|---|---|---|
| Heath care provider | CI<br>(SE) | CI<br>(SE) | CI<br>(SE) |
| Total health spending | 0.051**<br>(0.022) | 0.116***<br>(0.007) | 0.066**<br>(0.023) |
| Public hospitals | 0.054**<br>(0.036) | 0.291**<br>(0.022) | 0.054*<br>(0.036) |
| Public health centers | 0.050*<br>(0.027) | -0.029**<br>(0.003) | -0.079**<br>(0.027) |
| Mission health facilities | 0.046**<br>(0.101) | -0.066**<br>(0.054) | -0.112*<br>(0.115) |

**Note : CI= concentration index ; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

### 3.3.3 Heterogeneity and Geo-spatial analysis

In terms of the geo-spatial disaggregation of health spending, we observed a high heterogeneity of the distribution of financial benefits across urban and rural areas and provinces. In 2007, total public spending at all health facilities and public spending at public centers tended to benefit the pro-least poor in both urban and rural areas, and the inequality shifted to pro-poor in urban areas but stayed pro-least poor in rural area. Public spending at public hospitals tended to be pro-poor in 2007 in both urban and rural areas, but shifted to a pro-least poor distribution in both residence areas. Public spending at mission health facilities exhibited a pro-poor bias in both urban and rural areas and for all years, except in urban areas in 2007, where we observed a slight pro-least poor distribution. This distribution pattern of financial benefits at mission health facilities is associated to a higher concentration of mission health facilities located in the rural areas.

**Table 12. Benefit incidence of public spending on institutional delivery in Zambia**
**Urban *vs* rural heterogeneity**
Source: Authors' calculations DHS 2007, ZHHEUS 2014

| **Year** | **2007** | | | **2014** | | |
|---|---|---|---|---|---|---|
| | Urban | Rural | Diff | Urban | Rural | Diff |
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total public spending | 0.095*** (0.021) | 0.013 (0.019) | 0.081*** (0.028) | -0.007 (0.013) | 0.120*** (0.007) | -0.073** (0.015) |
| Public hospitals | -0.008* (0.032) | -0.008* (0.032) | 0.199** (0.052) | 0.304** (0.022) | 0.340** (0.035) | -0.219* (0.028) |
| Public health centers | 0.05** (0.025) | 0.034* (0.029) | 0.016* (0.038) | -0.037** (0.003) | 0.181** (0.028) | -0.035* (0.041) |
| Mission health facilities | 0.031* (0.071) | -0.180* (0.182) | 0.211* (0.196) | -0.070* (0.054) | -0.217** (0.070) | 0.147* (0.088) |

**Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Looking at overall health spending, we observe a similar high heterogeneity of the distribution of financial benefits across urban and rural areas. Overall health spending tended to benefit poorer women in urban areas and least-poor women in rural areas. Total health spending tended to be equal distributed in all years. Overall spending at public hospitals exhibited a slight pro-poor distribution pattern in 2007, but shifted to a slight pro-least-poor distribution in 2014 in both urban and rural areas. When we disaggregated overall health spending by health facilities in urban and rural areas, we observed great disparities in the distribution of financial benefits. Like for public spending, overall spending at public hospitals tended to be pro-poor in 2007, but shifted towards pro-least poor in 2014. A steady distribution pattern was observed at public health centers which tended to be pro-poor in urban areas and pro-least poor in rural areas in all years. The mission health facilities tended to be pro-least poor in both urban and

rural areas, except in urban areas in 2004 where the distribution shifted to a slight pro-poor inequality.

**Table 13. Comprehensive benefit incidence of health spending on institutional delivery in Zambia**
**Urban *vs* rural heterogeneity**
Source: Authors' calculations DHS 2007, ZHHEUS 2014

| **Year** | **2007** | | | **2014** | | |
|---|---|---|---|---|---|---|
| | Urban | Rural | Diff | Urban | Rural | Diff |
| Health care provider | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) | CI (SE) |
| Total health spending | -0.006 (0.021) | 0.027 (0.023) | -0.033 (0.031) | -0.058 (0.032) | 0.010 (0.015) | -0.069** (0.036) |
| Public hospitals | -0.047* (0.041) | -0.071** (0.039) | 0.024* (0.056) | 0.291** (0.022) | 0.054* (0.036) | 0.236** (0.042) |
| Public health centers | -0.006* (0.025) | 0.051** (0.029) | -0.058* (0.038) | -0.029** (0.003) | 0.050** (0.027) | -0.079** (0.027) |
| Mission health facilities | 0.225** (0.135) | 0.195* (0.169) | 0.029* ( 0.217) | -0.066** (0.054) | 0.046* (0.101) | -0.112* (0.115) |

**Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= concentration curve and line of equality cross**
***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Distributional patterns observed when stratifying data by location are largely a reflection of how hospitals, public health centers, and mission facilities are distributed in the country. While the former, absorbing mostly demand by the least poor, are located in the urban settings, the latter, absorbing mostly demand by the poorest, are located in the rural settings. Here again, similarly to what noted when appraising the findings from Burkina Faso and Malawi, differential utilization patterns between urban and rural areas may largely be driven by transport and indirect costs of care (De Allegri *et al*., 2015; Abiiro *et al*., 2014; Gabrysch and Campbell, 2009). These costs are not captured by our analysis, but need to be accounted for when appraising progress towards UHC in a comprehensive manner.

Geo-spatial analysis at the provincial level showed a less heterogeneous distribution than the analysis comparing rural and urban settings. For health spending at public health centers in 2007, all provinces except for Luapula showed a bias towards the least-poor women, especially in Central Southern and Northern provinces. In the other provinces, financial benefits benefited the poorer women, especially in Lusaka province. In 2014, health spending in Copperbelt, Lusaka and Northwestern provinces displayed a pro-poor distribution in health centers while the other provinces favored the least-poor.

In both 2007 and 2014, government spending at public hospitals favored mainly the least-poor in all provinces. For mission health facilities, the results are mixed with financial benefits showing a favor for the poor in some provinces and for the least-poor in others. Our findings are aligned with prior research indicating heterogeneity in the uptake of institutional delivery across provinces (Calson *et al*., 2015). Hence, our findings suggest that working towards closing gaps in utilization, across urban and rural settings, across provinces, and across women of different socio-economic status, may be the key to ensuring that more resources reach poorer women.

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

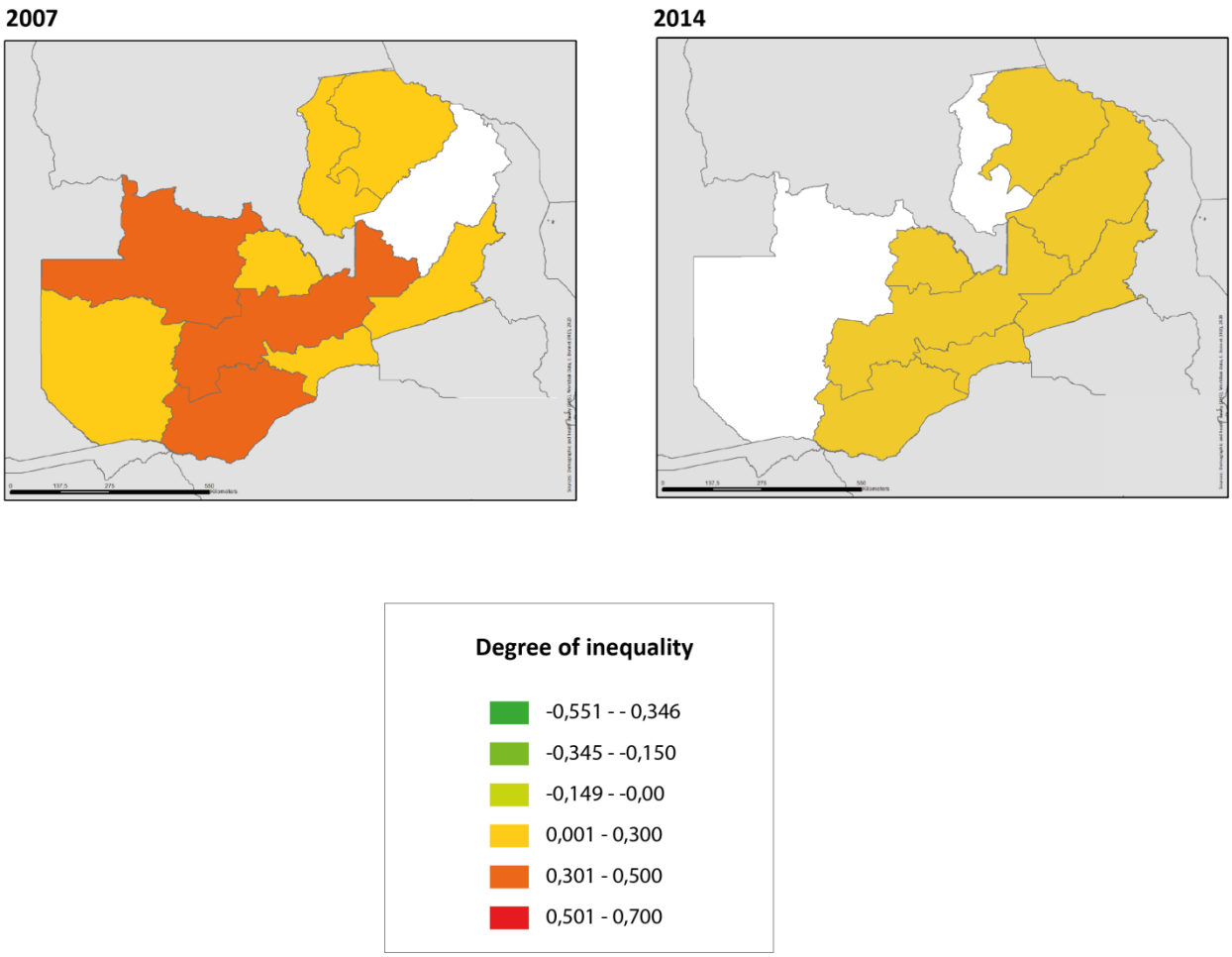
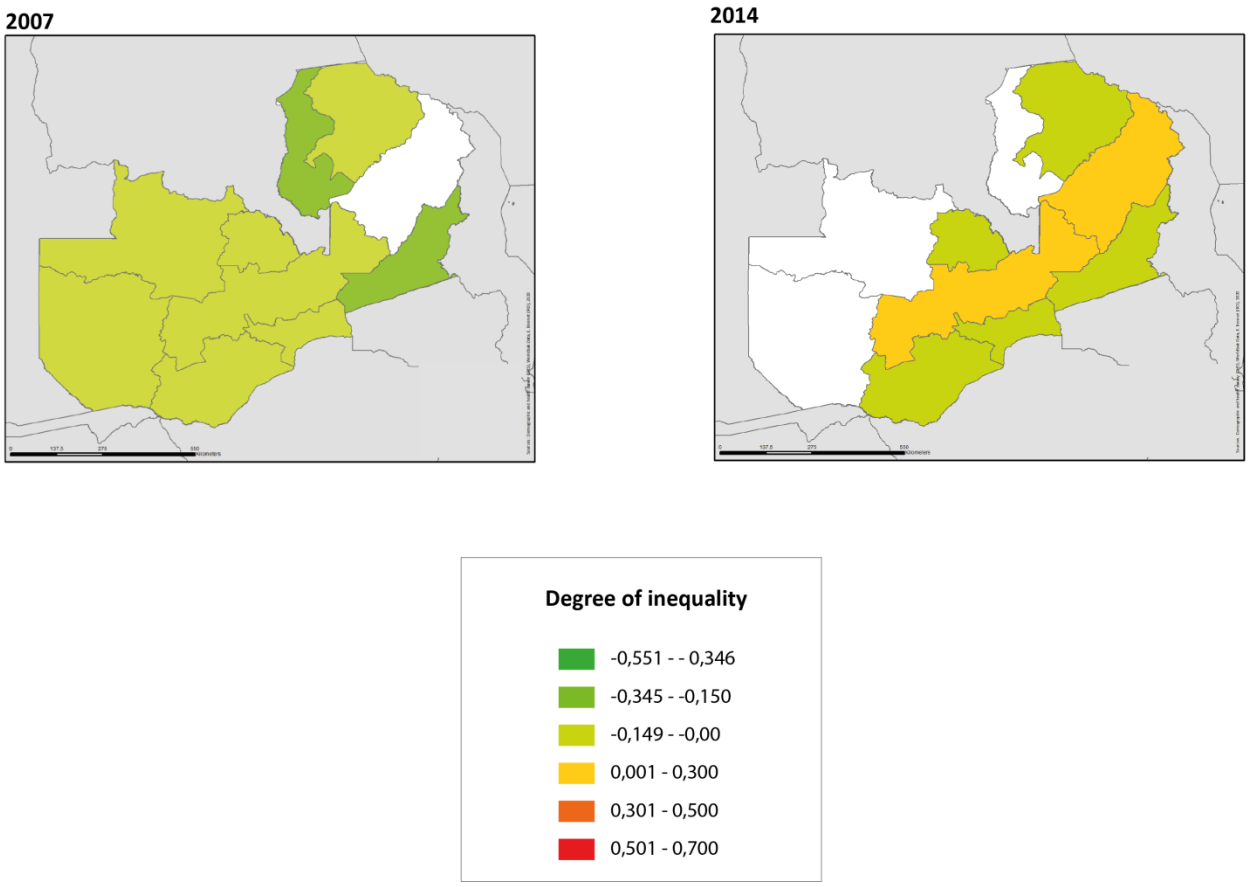


**Figure 10: Regional heterogeneity in distributional incidence of overall spending over time in Zambia**




## 3.4 Sensitivity analysis: seasonality adjustment

As mentioned in section 2.7.4, as sensitivity analysis, we adjusted our BIA findings to take into account seasonality patterns in utilization of institutional delivery as a sensitivity analysis. For Burkina Faso, we use monthly average of institutional deliveries recorded in HMIS between 2014-2018; and for Malawi, we use monthly institutional deliveries recorded in 2015 HMIS. For both countries, we did not find any significant changes in our findings, indicating homogeneous patterns of use of institutional delivery across months over the year. We did not perform the seasonality adjustment in Zambia due to lack of appropriate data.

# Conclusion

Our paper presents a quasi-longitudinal comparative analysis of the distributional incidence of public and overall health spending on facility-based delivery 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 targeting maternal care on inequality in health spending.

The findings reveal a high heterogeneity in the distribution of health spending across study countries and across facility types (within countries) over time. Overall, inequality declined over time for both public and overall spending, although the decrease in inequality was different across healthcare providers. The trends observed suggest that the implemented UHC reforms, such as public subsidies and user fee removal policies, have been effective in increasing the proportion of health financing resources reaching poorer women. The analysis across healthcare providers revealed a more significant decrease in inequality at primary levels of care (e.g. health centers) compared to secondary and tertiary levels of care (*e.g.* hospitals) and for public health spending compared to overall health spending. The results mirror the health service utilization patterns in the study countries whereby the poor seek care mostly at nearly primary health facilities – normally located in rural areas - while the least poor have the means to seek treatment at hospitals – normally located in urban areas. As noted earlier, additional measures, such as strengthening of referral systems and the provision of free of charge emergency transport, ought to be implemented to ensure that even poorer women can access higher levels of care in urban settings when in need for more complex care. Efficacy of referral systems and availability of emergency transport are pivotal elements of the emergency obstetric care provision model to that women have access to the care they need and as such, reduce maternal and neonatal mortality (WHO, 2009).

Comparing the distributional pattern of health spending between the study countries, a more significant decrease in inequality of both public and overall health spending was observed in Burkina Faso. The inequality in financial benefits in Burkina Faso significantly declined over time from a high pro-least-poor inequality in 2003 through a moderate pro-least-poor inequality in 2010 to near equality 2017. This impressive decline is most likely due to the SONU policy first and the *gratuité* policy afterwards. A higher pro-least-poor trend in both public and overall health spending was observed at public hospitals compared to public health centers. A more nuanced picture of the distribution of health spending emerged in Malawi and Zambia. In Malawi, public health centers benefited the poor, and the public and CHAM hospitals benefited the least-poor in 2004 and 2010, but the inequality declined and moved towards equality in 2015 at all these health facilities. CHAM and private facilities remained equally distributed for all years. In Zambia, public hospitals tended to be pro-least-poor, whereas public health centers and mission health centers tended to be the least poor for public health spending in 2007 and 2014. The overall spending was in general pro-least-poor in 2004 at both public and mission facilities and shifted to pro-poor in 2014 at public health centers and mission facilities, but

remained pro-least-poor at public hospitals. However, a more explicit comparison between study countries is challenged by the fact that not only did the reforms implemented differed, but time points and data structures also varied substantially across settings.

Our findings also reveal a high heterogeneity of financial benefits distribution across rural and urban areas as well as across provinces, districts and regions. In Burkina Faso, the distribution of financial benefits tended to be pro-poor in urban areas and pro-least-poor in rural areas, whereas, in Zambia, it tended to be pro-poor in both urban and rural areas. More considerable heterogeneity was observed in Malawi where financial benefits were either pro-poor or pro-least-poor across urban and rural areas at different facility typologies. While national level analysis reveals increased equality in the distributional incidence of health spending over time, geo-spatial analysis reveals that this pattern has not been consistent across regions and that disparities persisted in spite of national level progress. This suggests that the different administrative units might have made different use of the resources received and/or that poor women within different administrative units might have been more or less enabled to access delivery services. Future studies should analyze the disparities at sub-national level by using disaggregated health expenditure allocated to these levels, generating evidence to design policies and interventions to overcome such disparities across regions. 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, 2009).

Last, we need to note that albeit innovative, our work falls short of fully addressing inequities in health spending on institutional delivery services, since the methodology captures the distribution of financial resource consumption by utilization patterns, but does not account for differential healthcare needs (horizontal equity) across socio-economic groups 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 1a. Proportion of annual visits by quintile and related unit subsidy and unit cost (CFA) of overall spending in Burkina Faso (2003-2010)**

| | 2003 | | | | | | | 2010 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population quintile | Pop. share (%) | Public hospitals | | | Public health centers | | | Pop. share (%) | Public hospitals | | | Public health centers | | |
| | | Share of annual visits (%) | Public and donor unit subsidy | OOPE Unit cost | Share of annual visits (%) | Public unity subsidy | OOPE Unit cost | | Share of annual visits (%) | Public and donor unit subsidy | OOPE Unit cost | Share of annual visits (%) | Public and donor unity subsidy | OOPE Unit cost |
| 1 (Poorest) | 23.71 | 8.47 | 168,042.45 | 128.03 | 15.04 | 7,320.48 | 18.29 | 19.17 | 4.72 | 2,462.180 | 61.46 | 12.10 | 12,132.231 | 16.92 |
| 2 | 15.62 | 4.24 | 168,042.45 | 64.09 | 14.31 | 7,320.48 | 17.40 | 19.24 | 8.49 | 2,462.180 | 110.55 | 15.82 | 12,132.231 | 22.12 |
| 3 | 19.28 | 4.48 | 168,042.45 | 67.72 | 16.25 | 7,320.48 | 19.76 | 19.75 | 20.75 | 2,462.180 | 270.21 | 19.60 | 12,132.231 | 27.40 |
| 4 | 20.20 | 14.28 | 168,042.45 | 215.85 | 27.13 | 7,320.48 | 32.99 | 21.02 | 26.42 | 2,462.180 | 344.04 | 25.48 | 12,132.231 | 35.63 |
| 5 (Least poor) | 21.20 | 68.52 | 168,042.45 | 1035.74 | 27.26 | 7,320.48 | 33.14 | 20.82 | 39.62 | 2,462.180 | 515.93 | 27.00 | 12,132.231 | 37.75 |

Note: There is no donor subsidy to public health centers in 2003.

**1b. Proportion of annual visits by quintile and related unit subsidy and unit cost (CFA) of overall spending in Burkina Faso (2017)**

| | 2017 | | | | | | |
|---|---|---|---|---|---|---|---|
| Population quintile | Population share (%) | Public hospitals | | | Public health centers | | |
| | | Share of annual visits (%) | Public & donor unit subsidy | OOPE | Share of annual visits (%) | Public & donor unity subsidy | OOPE |
| 1 (Poorest) | 20.01 | 18.73 | 203,069.95 | 280.12 | 19.28 | 15,793.57 | 6.14 |
| 2 | 20.04 | 17.82 | 203,069.95 | 266.51 | 19.98 | 15,793.57 | 6.36 |
| 3 | 19.96 | 19.94 | 203,069.95 | 298.22 | 20.18 | 15,793.57 | 6.42 |
| 4 | 20.02 | 16.31 | 203,069.95 | 243.93 | 20.53 | 15,793.57 | 6.54 |
| 5 (Least poor) | 19.97 | 27.19 | 203,069.95 | 406.65 | 20.03 | 15,793.57 | 6.38 |

**Appendix 2a. Proportion of annual visits by quintile and related unit subsidy and unit cost (MKW) of overall spending in Malawi (2004-2010)**

| | 2004 | | | | | | 2010 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population quintile | Population share (%) | Public hospitals* | | Public health centers | | | Population share (%) | Public hospitals | | | Public health centers* | |
| | | Share of annual visits (%) | OOPE Unit cost | Share of annual visits (%) | Public & donor unity subsidy | OOPE Unit cost | | Share of annual visits (%) | Public & donor unit subsidy | OOPE Unit cost | Share of annual visits (%) | OOPE Unit cost |
| 1 (Poorest) | 19.74 | 16.72 | 57.72 | 22.08 | 7,164,85 | 19.68 | 21.05 | 13.40 | 3,552.24 | 62.11 | 23.81 | 0.80 |
| 2 | 20.41 | 15.95 | 103.11 | 21.13 | 7,164,85 | 34.01 | 20.68 | 18.57 | 3,552.24 | 74.16 | 21.08 | 1.53 |
| 3 | 21.15 | 16.74 | 52.93 | 21.18 | 7,164,85 | 18.17 | 20.26 | 20.65 | 3,552.24 | 35.05 | 22.37 | 0.76 |
| 4 | 20.69 | 17.47 | 76.87 | 18.79 | 7,164,85 | 32.34 | 20.60 | 20.87 | 3,552.24 | 52.96 | 15.49 | 1.71 |
| 5 (Least poor) | 18.01 | 33.13 | 54.31 | 16.82 | 12.06 | 46.90 | 17.41 | 26.51 | 3,552.24 | 56.12 | 17.24 | 2.03 |

**Appendix 2b. Proportion of annual visits by quintile and related unit subsidy and unit cost (MKW) of overall spending in Malawi (2015)**

| | 2015 | | | | | |
|---|---|---|---|---|---|---|
| Population quintile | Population share (%) | Public hospitals* | | | Public health centers* | |
| | | Share of annual visits (%) | Public & donor unity subsidy | OOPE Unit cost | Share of annual visits (%) | OOPE Unit cost |
| 1 (Poorest) | 18.37 | 17.61 | 5,240,09 | 165.16 | 26.70 | 22.74 |
| 2 | 18.98 | 20.21 | 5,240,09 | 228.00 | 25.64 | 39.71 |
| 3 | 19.57 | 16.78 | 5,240,09 | 148.24 | 19.27 | 27.93 |
| 4 | 20.83 | 18.73 | 5,240,09 | 214.18 | 16.19 | 52.39 |
| 5 (Least poor) | 22.25 | 26.67 | 5,240,09 | 197.51 | 12.20 | 92.84 |

* Note: There is no donor subsidy to public health centers in NHA 2015.

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