Going Granular: Equity of Health Financing at the District and Facility Level in India

Urmila Chatterjee and Owen Smith
Poverty Global Practice and Health, Nutrition & Population Global Practice, World Bank, New Delhi, India

Abstract
Health financing equity analysis rarely goes below the state level in India. This paper assesses the equity and effectiveness of public spending on health in the state of Odisha. Using district-level public spending data for the first time, it sheds light on the incidence of public spending by geography and by type of services. There are three key findings. First, it identifies the weak link between district spending and district need, proxied by poverty rates or lagging sectoral outcomes, highlighting the potential for a more needs-based approach to public resource allocation. Second, the results indicate that at the household level health spending by the state is not pro-poor, especially in public hospitals, underscoring the need to improve access to care for the bottom 40% at these facilities. Third, an exhaustive analysis of micro-level treasury data brings into focus the importance of reforming public finance data systems to support evidence-based policy at the sub-state level. Significant district-wise variation in key health financing and equity indicators, combined with growing policy interest in the district level, underscore the utility of further empirical work in this area.

Introduction
There has been a rapid increase in health equity research in recent years. This trend can be attributed to several factors, including advances in methods, the popularization of tools, the development of rich databases for country comparison, and an elevation of the profile of health equity metrics in the context of international goals.1–4 Taken together, these factors are helping to make the case that equity considerations should figure prominently in national and international policy initiatives aimed at promoting the achievement of Universal Health Coverage (UHC).

Health equity matters in India. There is a wealth of data showing significant inequalities in all aspects of health, including risk factors, access to care and outcomes. This is true of socioeconomic inequality but also for gender, caste, religion, and other groups.5 At the same time, India matters hugely for the global pursuit of equitable UHC. It ranks 79th out of 111 countries in a comprehensive cross-national analysis of UHC achievement.6 Nearly one-quarter of all households suffering catastrophic health expenditures worldwide are Indian.7 In brief, India is probably the single most important country for the attainment of Sustainable Development Goal 3.8 which calls for the achievement of UHC globally.

Health equity is best analyzed at the sub-national level in India. The average population of an Indian state, at nearly 50 million, is larger than the global average for countries. The average population of an Indian district, about 1.9 million, is larger than almost 50 countries. The National Family Health Survey’s most recently released round was representative at the district level for the first time. The significance of district health systems is reinforced by the fact that 96% of outpatient care and 85% of inpatient care happens in the patient’s home district. But with few exceptions, health equity analysis seen through a financing lens rarely goes beyond the state level in India, largely due to the opaque structure of government budgets.8 This paper aims to address this gap. It highlights the challenges and possibilities of health financing equity analysis at the district level in India by presenting the methods and results of a benefit incidence analysis undertaken in the eastern state of Odisha.

The case for focusing on the district level is also supported by India’s federal policy environment. Health is a state subject under the constitution. In recent
years there has been greater devolution of general-purpose funds from the center to the states and greater discretionary spending powers in the hands of state governments, presenting an opportunity for state policymakers to recast policies and programs to address local needs. The need for policy localization also reflects a broader shift whereby the district has emerged as a key unit of policy focus. Led by NITI Aayog—the premier policy think tank in Government of India—India’s Transformation of Aspirational Districts Program, launched in 2018, aims to expedite socio-economic progress in approximately 115 priority districts nationwide. The goal is to support these lagging areas to implement core schemes across six priority sectors, through coordinated action that unites the districts, states, and the center in a common purpose. Odisha has 10 aspirational districts, the third most of any state.

**Background on Odisha**

Odisha has a population of about 42 million as of the 2011 Census and a per capita gross state domestic product of about 1450 USD (2018–19). The urban share of the population is 17%, compared to 31% nationally. Between 2005 and 2012 (the latest available figure), absolute poverty fell from 59% to 33%, the fastest rate among all Indian states. The decline was sharp in both rural and urban areas. There was also significant progress in non-monetary indicators of well-being such as access to basic services including electricity, water and sanitation. But progress has been uneven across people and places. A poverty rate of 63% among the Scheduled Tribes (who account for one-fifth of the state population) is the highest in the country. Poverty is also concentrated in the south and west (Figure 1). Districts in Odisha are highly unequal. Using monthly per capita consumption expenditure, we find that 85% of the inequality in the state is explained by within-district inequality. The Gini coefficient varies from 0.14 in Malkangiri to 0.40 in Sundargarh, with a state-wide average of 0.33. There are also stark spatial differences within the state in health outcomes.

A striking feature in Odisha is the high reliance on publicly provided health services, even among the better off. The reliance on government health facilities is much higher than in the rest of India, particularly for outpatient care. The public sector accounts for 81% of all inpatient visits (compared to 45% in India) and 72% of all outpatient visits (25% in India). In this context, understanding who benefits from public spending in health, and by how much, is important.

Against a background of wide spatial inequalities, high reliance on public services and an increasingly local policy landscape, it is important to understand the link between public expenditures and sectoral outcomes including equity at the district level. While district-level data on key outcomes is typically available for many indicators and the associated spatial patterns are familiar to most state-level policy makers, there is far less knowledge of how sectoral expenditures vary at the

**Figure 1.** District population below poverty line, Odisha (%).
district level. Little is known about how health spending varies from one district to another, or how effective is public spending in reaching the poor. These are important policy questions that merit closer study through benefit incidence analysis (BIA).

Methods

This paper applies benefit incidence analysis to determine whether public spending in health is progressive (pro-poor) or regressive (pro-rich) along the welfare distribution of households. The objective is to assess the performance of the state’s public health system in delivering services to its citizens, especially the poor and vulnerable. The data collection required to conduct BIA can also serve to shed light on other aspects of health system performance, as described below.

The first step in standard BIA is to assign a value to public services. For this, we use the cost at which health services are delivered. The unit cost of providing a service is calculated as total government spending on a service divided by the number of users of that service (for example, total outpatient hospital spending per outpatient visit). The number of users can be estimated from either administrative sources or household surveys. The potential advantage of administrative data is that it is intended as a census of all users, whereas household surveys may be constrained by small sample sizes and low frequency. The use of household surveys is more common in developing countries as administrative data typically suffers from poor data quality and access issues. In Odisha, both administrative (Health Management Information System, HMIS) and household survey (National Sample Survey, NSS) data are available to identify users of public services. The administrative sources point to nearly 50% more inpatient cases at public health care facilities than in the NSS. We compiled three years of administrative data on patient visits namely, 2014–15, 2015–16 and 2016–17 and found that the numbers were quite stable over time and across districts. On balance, the administrative data appear more reliable than the NSS data for the purpose of calculating unit cost levels at granular levels, in part because despite pooling the state and central samples, the sample sizes are not always large enough for some districts to calculate unit costs by facility and type of service. The two approaches yield very different unit costs in absolute terms, but the distributional impacts using the two approaches are similar. The results using administrative data for estimating unit costs are presented here.

The next key step is to combine unit costs of public services or subsidies with users of these services. Information on the latter is typically obtained from household surveys that, in addition to data on utilization of public services by households, also provide information on out of pocket spending and income or consumption status. Users are then aggregated by income or consumption levels to compare how subsidies are distributed along the welfare distribution. In Odisha, 96% of outpatient care and 81% of inpatient care takes place in the patient’s home district, and therefore it can be reasonably assumed that service users are from the same district where the facility is located. The main exception is admission to medical college hospitals, of which there were only three across Odisha in the relevant year, and therefore these costs are excluded when calculating district-wise unit costs. The last step is to net out user fees by households to gain access to public services. In some contexts, households contribute substantially to service provision despite large government subsidies, and this contribution often varies by income group. However, in Odisha and in India more broadly, the cost recovery by government to cover service delivery costs tends to be low. For example, as presented below, about 85% of out of pocket spending for inpatient care is for medicines and tests not provided by the facility.

We make three key contributions to the methodology on BIA in India. First, we use district-level public spending and utilization data for the first time. By doing so we reveal the geography of incidence within the state that is often masked by regional aggregation. Previous inequality and BIA studies in India have a national or state focus. Those with a state-level focus assume the same unit cost for service delivery across the entire state. Such an approach overlooks the heterogeneity within states—between the state capital and other districts, between villages and cities. Second, we calculate unit costs and incidence by type of service. Specifically, we look at incidence by both type of care (inpatient or outpatient) and facility (primary health care/community health care center or public hospital). This is important to account for heterogeneity in the consumption of health care by socioeconomic status. The third contribution is to document the complex process of compiling fund flows within the state. This is useful both to identify ways in which the state government can strengthen how public spending data are compiled and disseminated to support evidence-based policymaking and to create a roadmap for other researchers wishing to conduct similar analysis in other states.

It should be noted that benefit incidence analysis has a number of limitations. First, the term “benefit” implies a certain level of quality of care during service delivery such that the patient’s condition improves, which might not be the case. It is sometimes called “expenditure
incidence” as a result. Second, standard BIA reveals average benefit incidence—based on the entire stock of public spending—whereas a more policy-relevant metric is often marginal benefit incidence—that is, which population groups would benefit from the additional rupee spent on the margin. Third, BIA does not illuminate any model of demand behavior that explains why a particular pattern is observed.\textsuperscript{18} Other caveats are noted in the data section.

**Data**

BIA requires administrative data on public spending at a granular level and household survey data showing utilization patterns. In India, information on public spending within states is complex and opaque due to fragmented financing streams and nonstandard accounting and Public Finance Management (PFM) structures. Moreover, the concept of a district budget does not exist, making the estimation of local spending an arduous task. A detailed description of how public spending data were compiled at granular levels can be found in a background note.\textsuperscript{19} A brief summary is provided here.

There are two main sources of district-level public spending data in Odisha: state treasury transactions and Centrally Sponsored Schemes (CSSs). The state treasury maintains an account of all government fund receipts, transfers and expenditure across all districts through a system of Drawing and Disbursing Officers (DDOs). There are nearly one thousand DDOs mapped to the 168 treasuries in Odisha. The DDOs operate at different administrative levels and act as the main financial intermediaries within the sub-national public finance structure. In recent years, the Integrated Financial Management System (IFMS) portals allows public access to granular spending data. However, data in the IFMS portal in Odisha were found to be incomplete and the documentation limited. A more complete dataset comprising of DDO-level public spending data organized by detailed budget heads obtained directly from the Finance Department of the state for the financial year 2015–16 is the source of granular public spending data for this study. Capital spending is not included due to significant data gaps. The year 2015–16 was chosen to align closely with the year of household survey data collection, which was 2014. Public spending data for 2014–15 were missing for some districts.

The CSS are the second source of public spending data. These schemes are the primary vehicle through which the Union government finances and manages social policy spending in India. While the aggregate CSS spending at the state level is available from the treasury, the district-wise breakup is not. These are captured in a separate information system known as the Public Finance Management System (PFMS). The PFMS and the treasury data are not linked. The district-level CSS data from the PFMS was sourced from the line departments and then merged with the treasury data. For health, the National Health Mission (NHM) is the main CSS, accounting for one-third of the total health spending in Odisha. NHM spending is assigned to the primary care level, although we recognize that some is incurred as community-level care for which no service delivery volumes could be obtained.

The data collection exercise, which entailed scraping data from the publicly available IFMS portal, accessing detailed budgetary data directly from the Finance Department, and augmenting with CSS data from the line departments, was lengthy and cumbersome. The budget codes for health spending are organized by location of delivery of health services (rural or urban) and the systems of medicine (allopathy or traditional systems). Mapping this to spending by health facilities or by type of service (inpatient or outpatient) is challenging. An approach that combined information on the DDOs with the object-head level treasury data was adopted to classify spending by health facility. Altogether, about 22,000 treasury entries for health were analyzed and nearly 86% of the revenue expenditures were classified by health facility. Information on health spending by type of service—inpatient or outpatient care—within a facility type is not available in any budgetary data. We refer instead to a costing study done for government facilities in the state of Punjab to arrive at expenditure ratios by type of care in Odisha.\textsuperscript{20} It is also notable that the above approach was also attempted in Maharashtra and Rajasthan, but could not be completed due to data limitations, highlighting that states differ in their PFM systems.

Availability and access to granular data on households is an additional challenge. The National Sample Surveys (NSS) on Health and Social Consumption are the standard source for household and individual-level data on utilization and out of pocket spending on health services in India. The central statistical agency, Ministry of Statistics and Programme Implementation (MoSPI), conducts sample surveys that provide national and state level estimates. The central sample is usually not large enough to conduct in-depth district-level analysis. The Directorate of Economics and Statistics (DES)—the nodal statistical agency of a state—administers the same surveys at the state level and the data from both the surveys is pooled to generate robust district-level estimates. There are often lengthy delays in processing the state sample data. The pooled NSS data from 2014 is
the key source of household data in this paper. A more recent NSS round was completed in 2017–18, but only the central sample has been released, and the questionnaire no longer distinguishes between utilization at the PHC/CHC level versus hospitals.

Results

Government Health Spending at the District Level

Public spending on health was 4.8% of total government spending in Odisha in 2015/16, or 1.1% of state GDP. While low by international standards, this is similar to what the central and other state governments in India spend on health. The analysis revealed that two-thirds of this spending is on outpatient care, mostly at Primary Health Care (PHC) and the Community Health Care (CHC) centers. Inpatient care accounts for 19% of the total (Table 1). These shares are broadly similar across most districts, with the main exceptions being the three districts with medical colleges, Cuttack, Ganjam and Sambalpur. Overall, the spending pattern reveals the relative prioritization of primary care and a comparatively modest share for hospitals, suggesting good allocative efficiency.

Table 1. Composition of government health spending by type of care, Odisha, 2015–16.

| Type of Care         | Total Spending (INR) | % of Total |
|----------------------|----------------------|------------|
| Outpatient—PHC/CHC  | 13,380,000,000       | 49         |
| Outpatient—Public hospital | 4,970,000,000   | 18         |
| Inpatient—PHC/CHC   | 2,540,000,000        | 9          |
| Inpatient—Public hospital | 2,790,000,000   | 10         |
| Others               | 3,730,000,000        | 14         |

The average cost of service delivery is not uniform across districts. For inpatient care, the unit cost is about 2,600 INR per visit at a PHC/CHC center compared to 1,600 INR per visit at a public hospital, reflecting lower volumes at the PHC/CHC level. (PHC and CHC spending is combined to align with NSS data, which does not make a distinction between the two, although their service profiles differ with CHCs providing more inpatient care). While unit costs for outpatient care vary widely by district, they do not vary much by facility type. The unit costs for outpatient care at a PHC/CHC center are similar to those at a public hospital (Figure 2).

What explains the wide variation in public spending across districts in Odisha? One candidate is the degree of urbanization and its impact on service delivery costs and/or the cost of living. However, using population density as a proxy for urbanization, we find that this relationship is weak. The spatial variation could also be linked to varying district needs, as more public resources may be directed to places with higher poverty levels or worse health outcomes. However, this is not the case. Public spending on health is poorly correlated with poverty and key health outcomes such as the infant mortality rate (Figure 3). Mirroring the spending pattern, the number of doctors and beds per 1,000 population also varies significantly by district but is not correlated with health needs. These findings suggest weak targeting, as fewer public resources are flowing to those districts with the greatest need.

Average out of pocket spending on health for those that seek inpatient care at a public facility is about 6800 INR, or 10% of total annual household consumption

Figure 2. (a) Unit costs for inpatient care, PHC/CHC; (b) Unit costs for inpatient care, public hospitals; (c) Unit costs for outpatient care, PHC/CHC; (d) Unit costs for outpatient care, public hospitals.
expenditure. But this varies widely by quintile. The largest share is spent on medicines followed by tests (Figure 4). For outpatient care, the average cost per visit is about 600 rupees, almost all of which is spent on medicines. The standard approach in BIA is to net out cost recoveries to government or user fees to calculate net benefits. While out of pocket spending on health for families using public services is significant, a very small share of this appears to accrue to government as the bulk is spent on medicines and diagnostics. Doctor fees are less than 10% of total spending. Thus, the difference between gross and net subsidies is likely to be very small. Benefit incidence results using gross subsidies are presented below.

**Benefits from Public Spending on Health**

The first-generation approach to calculating subsidies in health in the Indian literature was to apply the state-level unit cost to everyone seeking health care. Under this approach, the incidence results are driven by differences in utilization rates in the household survey. This paper instead uses granular information on public spending by type of health facility (PHC/CHC or public hospital) and service (inpatient or outpatient). We find that unit costs differ significantly across these categories (Tables 2 and Tables 3). A simple delineation of inpatient and outpatient care helps, but still misses out important differences across facilities. On average, unit costs are higher at PHC/CHCs than at public hospitals, possibly because
patient volumes are much higher at hospitals and therefore greater economies of scale can be realized.

When unit costs are combined with household utilization patterns, it is apparent that the distribution of

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**Figure 4.** Decomposition of OOP for inpatient care.

**Table 2.** Unit costs by service type, Odisha.

|                   | Total       | Inpatient  | Outpatient |
|-------------------|-------------|------------|------------|
| Total Public Spending (INR) | 27,417,420,259 | 5,081,812,863 | 19,201,398,200 |
| No. Visits        | 41,217,549   | 2,483,522  | 37,067,451 |
| Unit cost (INR per visit) | 665         | 2046       | 518        |

**Table 3.** Unit costs by facility and service type, Odisha.

| Facility Type   | Inpatient PHC/CHC | Inpatient Public Hospital | Outpatient PHC/CHC | Outpatient Public Hospital |
|-----------------|--------------------|---------------------------|--------------------|---------------------------|
| Total public spending (INR) | 2,870,182,629      | 2,211,630,234             | 15,093,800,000     | 4,107,598,200             |
| No. visits      | 1,122,032          | 1,361,490                 | 28,097,585         | 8,969,866                 |
| Unit cost (INR per visit) | 2558             | 1624                      | 537                | 458                       |

**Figure 5.** (a) Concentration curve for distribution of inpatient subsidies, PHC/CHC. (b) Concentration curve for distribution of inpatient subsidies, public hospitals.
Figure 6. (a) Concentration curve for distribution of outpatient subsidies, PHC/CHC. (b) Concentration curve for distribution of outpatient subsidies, public hospitals.

Figure 7. (a) Concentration Index: Subsidies for inpatient care at PHC/CHCs. (b) Concentration Index: Subsidies for inpatient care at public hospitals.
subsidies in Odisha is not very progressive (pro-poor), especially at the hospital level. On a state-wide basis, the results are similar to those attained from the first-generation approach. However, additional insights are gained at a more granular level. Combining data on service and facility type reveals that inpatient care at PHC/CHCs is less regressive than at public hospitals (Figure 5). The bottom 40% receive 48% of the subsidies on inpatient care at PHC/CHCs in contrast to just 22% at public hospitals. We find similar results for outpatient care, but at public hospitals this is not as regressive as inpatient care (Figure 6). The bottom 40% receive 50% of the subsidies at PHC/CHCs and 33% at public hospitals.

Lastly, there is also wide variation in the incidence of public spending at the district level. Government spending at public hospitals is regressive in most districts for both inpatient and outpatient care (Figure 7 and Figure 8). Interestingly, in some districts public spending at government hospitals is more regressive for outpatient care than for inpatient care. However, further analysis indicated that there are few significant correlations between spending levels and inequality of access at the district level. A better understanding of why some districts are more unequal than others could help to identify tailored policy interventions.

**Discussion**

Equity is a core objective in the pursuit of universal health coverage, in India and globally. The Odisha benefit incidence results presented here suggest there is ample scope for improvement in this regard by revisiting prevailing health financing arrangements with a sharper focus on equity objectives to help better reach the poor.

One policy implication relates to the equity of public spending and resource allocation at the district level. Spatially, with fewer public resources flowing to districts with higher poverty rates and worse health outcomes, public spending in health appears to be delinked with population need. The weak correlation between spending and key outcomes at the district level is in part...
a reflection of historical input- or norm-based budgeting. Health spending is based largely on the number of facilities in a district, and the number of doctors, nurses and other staff who (are willing to) work at those facilities. There is minimal use of evidence on population needs (e.g., disease burden) or demand when resources are allocated across districts. A gradual shift toward needs-based resource allocation formulas—common in many health systems but not prevalent in India—to inform fund flow to the district level could help mitigate this mismatch. The expansion of still nascent demand-side financing initiatives, according to which money follows the patient, could also help.

But the district perspective is only part of the story. There is extensive socioeconomic inequality within districts. A second policy implication is that there is significant room to improve the targeting of public spending to the poor and vulnerable with a special emphasis on government hospitals, which are disproportionately used by the better off. These results suggest that accessibility is a key factor determining health care use at public hospitals. Barriers to access could include physical distance to reach district hospitals (including transport costs), social barriers to care-seeking at certain facilities, or preexisting knowledge of the financial costs to attaining care (including drugs and lab tests) that are typically higher at hospitals. Although it is currently not participating in the national Pradhan Mantri Jan Arogya Yojana (PM-JAY) program launched in 2018, Odisha has recently expanded its own investments in targeted government-sponsored health insurance schemes covering hospitalization for the poor, including the Biju Swasthya Kalyan Yojana. On a pan-India basis, eligibility under these schemes, even with imperfect targeting, indicates a more pro-poor gradient than the benefit incidence of government subsidies at the hospital level as shown here. Other measures, such as targeted interventions to address socioeconomic barriers to access, including transport subsidies or better availability of medicines and diagnostics at government hospitals (for which high OOP is often incurred), could...
also help. More broadly, out-of-pocket expenditures for households could be reduced if governments spend more on health.

Finally, the paper also makes a case for strengthening public finance data systems, and the state’s statistical architecture more broadly. At present, gaining insights on the level and distribution of public spending at the local level and by type of service is extremely cumbersome due to data challenges. Straightforward questions such as how health spending varies by district and how much is spent on PHCs are not readily answerable without an exhaustive analysis of an elusive dataset as was done here. In a complex federal structure and fund flow system, data should be an aid, not a bottleneck, to public policy. Simple steps could be taken to improve public finance data management with the aim of supporting evidence-based policy making. First, a unique geographic code could be institutionalized in the computerized treasury system to allow for easier tracking of fund flow at the local level and to facilitate spatial analysis. Local authorities could also benefit from PFM system data. Second, the treasury and PFMS systems could be integrated to allow for improved coordination and expenditure monitoring across line departments and with centrally sponsored schemes. Third, citizen access to treasury data should be enhanced. Together these steps could significantly enrich the possibilities for health financing equity analysis at a granular level.

**Conclusion**

India’s quest to achieve pro-poor UHC should be supported with robust health financing equity analysis. Given the country’s size and diversity, such work is best undertaken at a granular level to generate more nuanced and policy-relevant findings. To our knowledge, this paper presents the first benefit incidence analysis in India that aims to unpack spending patterns at both the district and facility level. Further empirical work in this direction would be valuable in other states, and this study identifies simple PFM data system changes that could make such exercises much easier to implement in the future. The findings highlight the need for ongoing health financing reforms, both on the supply-side and demand-side, to make government health spending more pro-poor.
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Disclosure of Potential Conflicts of Interest

No potential conflict of interest was reported by the author(s). The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank Group and its affiliated organizations, or those of the Executive Directors of the World Bank Group or their governments.

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