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AN EMPIRICAL ANALYSIS OF HEALTHCARE SPENDING IN INDIA: EVIDENCES FROM MAHARASHTRA AND BIHAR

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ABSTRACT

This paper explores the impact of public spending on healthcare in Maharashtra and Bihar. This paper taken into consideration 62th Round of NSS held in 2004. This study employs a modified version of the Methodology of Benefit Incidence Analysis and Decomposition Analysis to identify the impact of healthcare spending in India. This study found the many insights into the pattern of utilization of public facility in Maharashtra and Bihar. Overall results indicate that public spending on healthcare in Maharashtra has become much more pro-poor in 2004. Public spending on health care in Bihar is not pro-poor for out-patient and maternity services. These changes is mainly due to the increased presence or absence of private sector, choice of women in lower quintiles for institutional deliveries and for public institutions and improved supply side changes in public facilities in Maharashtra. This study has some crucial policy implication. Most importantly, it demonstrates the utility of Benefit Incidence Analysis and Decomposition Analysis in carrying out policy analyses of public financing in healthcare. Such studies should be conducted more regularly and periodically at sub-regional and district levels, at various levels of facility and types of services. This will help district health/programme managers in assessing their performance and identify measures to improve over a period of time.

KEYWORDS

Heaalthcare Expenditure, Benefit Incidence Analysis, Decomposition Analysis.

INTRODUCTION

One of the challenges faced especially by developing countries are ones how to maximize needs from limited resources, and need to maximize the effectiveness of public expenditure on the delivery of social services such as education, health care and social safety net programmes, which are normally regarded as being the most important for enhancing the overall welfare of the population. Along with efficiency of social spending, it is also important to incorporate equity considerations to ensure that the expenditure in these sectors is pro poor and that the subsidies and services are well targeted to the poor to whom they are intended. Government spending on healthcare in India for the year 2001-02 constituted 0.94 per cent of GDP whereas the total spending on health was 4.6 percent of GDP. The gap was filled by private expenditure and external support. This translates into a per capita government expenditure on health of Rs.207 in the same year compared to a per capita private expenditure of Rs. 790. The per capita external support was Rs. 24[1]. Further, the National Health Accounts estimates by the Government of India indicate that only about 19.0 per cent of total health expenditure comes from the public exchequer with 6.4% from the Central and 12.6% from the State Government, Household expenditure accounts for about 72 per cent of total health expenditure.

REVIEW OF LITERATURE

In order to review the literature available on this methodology, it is necessary to look at the various methods of measuring benefit incidence and how they evolved. The literature on benefit incidence has three distinct periods. In the early literature (prior to 1975), benefits were allocated to households either on a per capita basis or in proportion to the income of the household. The early literature also attempts to allocate the entire budget for study including the benefits of so-called pure public goods, such as defense. Early work was done by Aaron and McGuire (1970) in developing a specific utility function for allocation of pure public goods to households. Such methods relied on arriving at the individuals own valuation of the goods which was extremely difficult to measure. Further, DeWulf (1975) criticized these methods for not accounting for different income elasticities of different public services as well as host of other inherent defects. The second wave of benefit incidence studies that were conducted after De Wulf's critique, were based on allocation of expenditure on specific goods and services to households and used micro level data on utilization of those goods and services by the households. Meerman(1979) in Malaysia and Selowsky(1970) in Colombia were the pioneers in developing these types of studies in developing countries. These studies, now commonly referred to as Benefit Incidence Analysis (BIA) differed from the studies of the first period in three ways:

1. Use of micro data from household surveys to arrive at the household level utilization of the specific public services that are being evaluated.
2. Recognizing the importance of accurate income measurement for the households and accounting for the size of the household as well as its income for categorizing households into income quintiles.
3. Disaggregation of the services within a social function *viz*. separate benefit incidence calculations are made for primary health care, hospital care and preventive care wherever data was available.

In view of inherent simplicity of the methodology wherever micro data on utilization is available, the BIA technique became the method of choice for benefit incidence studies of health and education in the late 70's and 80's.

One of the most effective ways of studying the empirical results and methodological issues of papers using the BIA technique has been through comprehensive reviews of such papers over various time periods and geographical areas published from time to time. As such, it is possible to trace the literature regarding this approach through the study of six such comprehensive reviews and compilations. The earliest such work is that of Seldon and Wasylenko(1992), which spells out the methodology of BIA in detail as well as problems in measurement of the various data requirements , ending with specific recommendations to make the technique as useful as possible in research. The study presents the results of incidence of government services in four developed countries including the United States , United Kingdom, Switzerland and West Germany carried out between 1960 and 1981. Benefits from government health spending, in the United States are typically found to bepro-poor in both dollar and percentage terms.(Gillespie 1965; O'Higgins and Ruggles, 198l b), though a number of studies taken up in the review do not report health benefits separately from other social services. In the United Kingdom, however, health care benefits are not pro-poor as the utilization levels in households in the lowest-income deciles (O'Higgins and Ruggles, 1981a) and in lower socio-economic groups (LeGrand, 1978) are relatively low. Health spending in Switzerland is found to be distribution-neutral (Leu et al., 1985). The review therefore observes that even in developed countries ,

[1]. Government of India (2006), *National Health Accounts India - 2001-02*, National Health Accounts Cell, Ministry of Health and Family Welfare, New Delhi.

specific social services were not as pro poor as expected. The paper also documents studies done using the BIA technique in nine developing countries in Central and South America and Asia in the period from 1969 to 1989. Here again, public health care is found to be pro poor in most countries studied, with the situation improving wherever time series studies have been done. Further, the studies taken up have repeatedly found that wherever different types of health care have been looked at, "inpatient care is less pro poor than outpatient care which in turn is less pro poor than preventive care". The authors have also commented that these findings have had policy implications on moving more government resources towards preventive and out patient primary care which are found to be more equitable. The consistent finding of the review that the burden of user fees in the countries studied is usually heavier on the poor also resulted in a re look at the policies on user fees and the way they are charged in many of the developing countries.

Filling a gap that no such systematic review has done in the past, Castro Leal *et al* in their study in 1999 presented estimates of the benefit incidence of public health spending in Côte d'Ivoire, Ghana, Guinea, Kenya, Madagascar, South Africa, and Tanzania using the BIA technique. Looking at these seven countries, the authors arrive at the conclusion that health spending in Africa is not pro poor. The share of the subsidy to the poorest quintile was significantly less than that to the richest 20 percent. The inequality was greater in some countries (notably Côte d'Ivoire, Ghana, Guinea, and Madagascar) than in others, but overall, the poorest 20 percent of the population received less than 20 percent of the subsidy. Moreover, the share received by the richest quintile was far in excess of 20 percent (except in South Africa, where the richer households rely on private care). The study however found that though health spending is not pro poor it is reasonably progressive; the subsidy to the poorest quintile amounts to a higher share of that group's total household expenditures than did the subsidy to the richest quintile. The report then goes on to study the factors for the pro rich nature of health spending in these countries judging it to be a combination of two inputs: higher budgetary allocation to tertiary health care services and overall poor utilization of all health services by the poor. It finally makes recommendations on the policy actions to be taken to address the causative factors for low utilization especially with respect to improving access and service quality and redesigning user charges. It also points to a need for encouraging private provision of services which could be used by the rich, freeing subsidized public health care to be used by the poor.

The above paper was closely followed by the work of Sahn and Younger (2000) which studied the progressivity of social sector expenditures in eight Sub-Saharan countries of which six are common to the Castro Leal study. The analysis differs in as much as it uses dominance testing, complemented by extended Gini concentration coefficients to determine whether health expenditures redistribute resources to the poor. The results however confirm the findings in the Castro Leal study that all social services including health, while being progressive with respect to the highly skewed income distribution are poorly targeted in all the sub Saharan Africa countries taken up for study. The benefits associated with hospital care are more pro rich and less progressive than other services. On the methodological issues, the paper shows that while concentration curves are a useful way to summarize information on the distributional benefits of government spending, statistical testing of the differences in curves is essential to observe the differences. The analysis also makes use of use/no use indicators versus unit costs to determine benefit incidence. *The authors point out that unit costs may be used only when they are readily available in a disaggregated form and when there is a clear correlation between the welfare and the disaggregated variable for which unit costs are available.*

As the title suggests, Demery (2000) in his 'practitioner's guide' sets out the major methodological issues in carrying out a Benefit Incidence Analysis and proceeds to explain them using select country studies using this technique for various forms of social sector spending. Issues such as definition of quintiles, the need for disaggregation of unit subsidies, estimating health and education needs and average vs marginal benefit are discussed in the paper. In the case of health spending, the paper elaborates on the analysis done for three countries (Ghana, Bulgaria and Vietnam) and observes that the benefit incidence of health expenditures is poorly targeted in all the three countries with only 12-13% going to the poorest quintile. The causative factors for this finding are different in each of the countries, however, with the pro rich bias in Vietnam due to low allocation of funds to the commune based health centres that are more used by the poor. *The paper also makes a case for studying the presence and use of the private sector as well as carrying out the BIA based on gender and ethnicity, which are seen as reasons for the poor targeting in Ghana and Vietnam respectively*. The paper also goes on to identify the major weaknesses in the approach and offers suggestions to make it useful for policy analysis.

Though it is a single country study, the study of public services and subsidies in Peru by Younger (2000) in the same period, is significant because it examines the use of extensions of traditional benefit incidence methods to further understand the impact of public expenditures on the poor. Besides considering more detailed elements within a particular aspect of social sector spending (for instance, expenditure on textbooks in school education), the author also looks at timing of benefit capture based on the ideas developed by Ravallion and Lanjouw (1998) as well as the issue of marginal versus average benefit incidence. The findings of the paper reveal that there is evidence of 'late capture by the poor' in Peru proving that more comprehensive programmes are more targeted to the poor. Expansion of public services during the period of study has therefore helped to make most of the services in Peru more pro poor and progressive. The ideas developed in this paper bring out the value of carrying out benefit incidence analysis over periods of time to help in understanding how the design of various social spending programmes have affected their targeting and progressivity.

Another comprehensive review has been carried out by Chu et al (2000) which covers BIA studies from 1978 to 1995 in 38 countries as part of an IMF Working Paper. Public health expenditures were found to be pro poor in 21 out of the 38 countries and progressive in 30 countries. Among the 29 developing and transition countries covered in the review, health expenditures were well targeted in Asia and South America and poorly targeted in Sub Saharan Africa and the transition economies. Hospital related outpatient care was found to be the most pro rich, bearing out the findings of most other studies on the subject. The study also found that the targeting performance varies significantly with time and time series data would be required to understand the situation more completely.

After a brief review of the methodological issues of the BIA technique, Pearson (2002 while studying how benefit incidence studies could benefit understanding of the health system performance, refers to the results of the review by Chu et al (2000) mentioned above. Case studies are also presented in this paper for four states in India (using the NCAER data of 1995-96) and Bangladesh. Among the four states in India, Kerala is found to be significantly pro poor in all its services. The paper infers that this may also be due to the presence of a vibrant private sector in health care which caters to the need of the highest quintile. The performance of Bihar and Uttar Pradesh is clearly worse, with poor targeting of benefits for nearly all services. The data for Bangladesh covers various types of public health facilities and finds that except for in patient care at medical college hospitals which is pro poor, both the outpatient and inpatient care at nearly all the other types of facilities are pro rich. The paper also discusses the policy implications of these findings and the caveats to be applied when results from benefit incidence studies are interpreted.

Filmer (2003) presents data on the incidence of public spending in health and education from 26 countries, (as part of a background note for the World Development Report 2004), from published papers as well as World Bank country reports on the subject. However this is purely a compendium of tables and no conclusion has been drawn on the findings themselves. Many of the sources including Castro leal et al (1999), Sahn and Younger (2000) , and Mahal (2001) have already been discussed in this paper.

The methodological primer on benefit incidence analysis (BIA) for practitioners by Davoodi *et al* (2003) provides a comprehensive compendium of benefit incidence analysis of education and health spending covering 56 countries over 1960-2000.. The paper demonstrates the usefulness of BIA in many dimensions which have major policy implications. First, the paper finds, among other things, that overall education and health spending are poorly targeted with benefits from primary education and primary health care going disproportionately to the middle class, particularly in sub-Saharan Africa and transition economies; but targeting has improved in the 1990s. The only exception to this finding is in the developed countries of the Western Hemisphere where the rich and poor benefit equally from health expenditure. Spending on primary health care and health centers benefit the poor more than spending on hospitals, but is still not fully focused on the poor. The paper also examines the simple measures of association between the targeting of health and education funding and basis indicators of health and education outcomes. The results show that countries with a more pro poor incidence of education and health spending tend to have better education and health outcomes, good governance, high per capita income, and wider accessibility to information. The paper explores the policy implications of these findings.

Gasparini (2006) proposed that decomposition analysis should be attempted by carrying out benefit incidence analysis over a specified period of time. Using the example of Argentina, he established that this technique would be useful since it sheds light on the factors behind differences in targeting and progressivity over different regions and sectors.

In a recent paper, O'Donnell et al (2007) compare the benefit incidence of public health care in 8 Asian countries and 3 Chinese provinces, presenting the results as concentration curves whose dominance is tested against an equal distribution and Lorenz curves of those countries. This analysis reveals that the utilization of public health care is pro poor in Hong Kong, Malaysia and Thailand, neutral in Sri Lanka and pro rich in the rest of the developing countries including the regions of China. This establishes that while pro poor incidence is easier to reach at higher levels of national income, countries such as Thailand and Malaysia (which are medium income countries) have improved the targeting of health subsidies by protecting the poorest from user fees and building a wider network of health facilities. The authors also argue for substituting unit cost based subsidy data with raw use data on the lines argued by Sahn and Younger (2000), saying that the results on dominance in both cases are consistent, even when there is more sources of heterogeneity in unit subsidies.

The methodology of Benefit Incidence Analysis was first applied for India by Mahal *et al* (2001) using data on utilization and out of pocket expenditure on health care from the 52nd round of National Sample Survey (NSS) data (1995-96) and budgets of 16 major states of India. The results indicated that health expenditures/ subsidies were not well targeted to the poor. The poorer states and people living in rural areas seemed to be specifically deprived of the benefits of public subsidies. The same data has been used in the paper by Pearson (2002) referred to above to present and analyse results of four Indian states in detail arriving at the same conclusions.

Mahal (2005) further examined distribution of health and education subsidies in the state of Karnataka in India using the NSS data of 1995-96 as base. Using the method of average benefit incidence, the distribution of public expenditure was studied by economic rank, residence, and gender. The allocation of subsidies seemed to be unequal in this case. Even with increasing average income in the state economic equality is found to have worsened.

Sundar (1995) studied utilisation of health facilities based on data from a 1993 survey of 19,000 households by the National Council of Applied Economic Research. Considering three classes of household income groups, she found that the share of public services in illness episodes requiring outpatient treatment was inversely linked to income.

A study Visaria and Gumber (1994) examined the utilisation patterns of selected health care services in two states- Maharastra and Gujurat, using the National Sample Survey data. They found that the number of births reported at government hospitals as proportion of all hospital based births declined with the per capita expenditure.

RESEARCH METHODOLOGY

The Indian government has traditionally assigned a high priority to promoting equity in health whether measured as health outcomes, or as access to public health care and subsidized inputs in various health policy statements, starting from the recommendations of the Bhore Committee of 1946 through various Plan documents.

The government's use of population based norms in setting up primary health facilities is one indicator of its efforts to ensure equitable access to ambulatory care for the Indian population. Moreover, its provision of highly subsidized or free health services is often viewed as a means of providing insurance to those unable to afford the high costs of hospitalizations, and health care in general. However, often the intended beneficiaries do not access public healthcare for various reasons. In this study, an attempt is made to assess the utilisation and distribution of services among different socio-economic groups.

METHOD (APPROACH TO BIA)

BIA is usually carried out through the following four steps.

1. Rank all individuals (or households) by an appropriate measure of socio-economic status such as current income per capita or consumption expenditure per capita. The measure could also specify whether a person belongs to a specific social group. We propose to use consumption expenditure per capita. Expenditure per capita also serves as a proxy for permanent income.
2. Link each individual with the amount of public health services he/she uses. The unit of measurement depends on the type of care used. For example, inpatient days can be measured in terms of number of days spent in a health facility; similarly for outpatient treatment, number of visits to the doctor/ facility.
3. Estimate the net per unit cost of service provision to the government and multiply it by the number of units of publicly provided care utilized by each individual. We propose to adopt facility costing method to estimate the unit cost and link it to the services utilized.
4. Analyze the distribution of net government health spending by expenditure quintiles.

DATA AND ANALYTICAL DESIGN

The National Sample Survey Organisation (NSSO) was set up in 1950 to promote a continuous system of multipurpose surveys designed to collect data required for socioeconomic planning and development. For the present study the primary source of data on socioeconomic characteristics and health variables of 60th rounds of the National Sample Survey(NSS), undertaken in the years of 2004-05.

60TH ROUND OF SURVEY

In the Sixtieth round of NSS, data was collected through a survey on the subject of 'Morbidity and Health Care'. In the survey on Morbidity and Health Care, the following main aspects were covered:(i)Morbidity and utilisation of health care services including immunisation and maternity care,(ii) Problems of aged persons, and(iii) Expenditure of the households for availing the health care services. The enquiry on morbidity was conducted with a reference period of 15 days. All spells of ailment suffered by each member, both present as well as the deceased, of the sample household, during the 15 days preceding the date of enquiry, whether or not the patient was hospitalised for treatment, were covered in the survey. For hospitalised treatment, however, information was collected for every event of hospitalisation of a member, whether living or deceased at the time of survey, during the 365 days preceding the date of enquiry. Total numbers of households surveyed in the rural and urban areas were 47,302 and 26,566, respectively in all India level. In case of Maharashtra, 2540 rural households and 2599 urban households were covered. While in Bihar, 2094 rural and 560 urban household were covered in the survey.

SAMPLE DESIGN

The sample design adopted for the survey was essentially a two-stage stratified design, with census villages and urban blocks as the first-stage units (FSUs) for the rural and urban areas respectively, and households as the second-stage units (SSUs). The survey period, January - June 2004, was split up into two sub-rounds of three months each. The rural and urban samples of FSUs were drawn independently in the form of two sub samples and equal numbers of FSUs of each sub-sample were allocated for the two sub-rounds.

DESCRIPTION OF VARIABLES

In 60th rounds, information on the following variables is collected from the Schedule 25, which exclusively deals with morbidity details of respective NSSO surveys. The variables, which are used for the benefit incidence analysis, are defined as per the standard definition from the instruction given to the investigators before the NSSO survey data collection. In some of the cases the given information are used for the final calculation of a health variable of our interest i.e. NumhospIppublic, DurstayhospIPpublic, MDhome, MDpublic and MDprivate.

Household: A group of persons normally living together and sharing a common kitchen.

Consumption expenditure: The household monthly consumption expenditure is the sum of (1) expenditures on food items, fuel and electricity in the one month prior to the survey; and (2) other non-food items including clothing and footwear, education, medical expenses, durable goods in the year preceding the survey.

MPCE (in Rs.): It is defined as consumption expenditure per head. However, MPCE is calculated by dividing the total household expenditure by the household size.

Hospitalisation: One is considered hospitalised if one has availed of medical services as an indoor patient in any hospital. Hospital here refers to any medical institution having provision for admission of sick persons as indoor patients (inpatients) for treatment. Hospital covers public hospitals, community health centres and primary health centres (if provided with beds), private hospitals, nursing homes etc.

NumhosplPpublic: The variable represents number of times hospitalised means the cases of hospitalisation for a person treated in public facilities. Here public facilities include Public hospital, Primary health centre and public dispensary.

DurstayhosplppublicI(Duration of Stays in Public Hospital): Duration of Stays is defined as the number of days spent by a patient till the date of discharge. The duration of stay in public facilities includes public hospital, primary health centre, and public dispensary etc .

TotalcostIPpublic: This variable is derived as the multiplication of total number of days spent by each patient in the hospital with the facility cost of the inpatient admissions from the costing exercise.

Maternal Delivery: Maternal delivery refers the birth of children in public hospital, private hospital and home.

MDhome (Maternal Delivery at Home): The place of birth for each pregnant mother is her home.

MDpublic(Maternal Delivery in Public Hospitals): It is defined as the number of deliveries occurred in public facilities, where a public facility is defined as public hospital, primary health centre and public dispensary etc .

RESULT AND DISCUSSIONS

The distribution of population is classified across two categories: rural and urban. In Maharashtra, the percentage of rural and urban population in the total population is 64.86 and 35.14 respectively. In Bihar, the percentage of rural and urban population accounts for 88.14 and 11.85 respectively. The information on population is given in Table 1.1 for 60th round of NSSO Survey. As the sampling design differs from the census, the absolute number of population in census and NSSO differs. The weightage for the samples are given accordingly.

Formation of Quintiles: Formation of quintiles constitutes a major part in the Benefit incidence analysis. In the present study, monthly Percapita consumption is used for ranking of Individuals. The formulations of quintiles are based on the MPCE of the individuals in the survey.

The difference in cut-off points for rural and urban area can be observed from Table 1.3. For Maharashtra in the rural area, the cut-off points for the first quintile and fifth quintile are 338 and 640 rupees respectively, while that in the urban area are 500 and 1300.

In rural Bihar, the cut-off points for the first and fifth quintiles are 220 and 438.71 rupees respectively. In urban Bihar, the cut-off points for the first quintile and fifth quintile are 425 and 800 rupees respectively.

DISTRIBUTION OF HOSPITALISATION (PUBLIC AND PRIVATE)

Here the number of hospitalisation cases are related to the in-patient days of stay. The distribution of the hospitalisation cases or no. of in-patient days is assumes importance from the point of view of benefit incidence of the services. Information on hospitalisation are given in Table 1.4.

Maharashtra

In the rural area, total no. of hospitalisation (per lakh of population) increased from 1934 in Q1 to 12366 in Q5. But in urban areas, the distribution is more or less even with high concentration of hospitalisation towards first four quintiles but total no. of hospitalisation is high in the fifth quintile itself. However, in the urban area, the difference of hospitalisation is quite evident from the total figure of Maharashtra.

Bihar

In case of Bihar, the distributional pattern is equal in both rural and urban area. In the rural area, for the first quintile the hospitalisation number is 1647. But the numbers do not differ significantly for the third and fourth quintiles. For the aggregate data, the difference in hospitalisation cases is quite clear; with increase in the quintiles, the hospitalisation cases increases significantly.

DISTRIBUTION OF IN-PATIENT DAYS

A person is regarded as having been hospitalised if he/she has availed of medical services as an inpatient in any medical institution. However, hospitalisation of female members for child-birth is not considered to be hospitalisation for the survey.

Maharashtra

In the rural area, 13.38% of the total duration of hospital days across public facilities goes to the first quintile of the population, whereas for the fourth quintile, the figure is 29.15%. But for fifth quintile, the shares of in-patient days are 16.20. There are five million in-patients days used by people from across socio-economic groups in the state.For the urban areas, the distribution is quite equal across quintiles. The percentage distribution of in-patient days for the first quintile is 26.62% and second, third and fourth quintiles share an equal distribution. The fifth quintile accounts for 6.90% of in-patient days.

Bihar

In rural Bihar, the distribution percentages of in-patient days are highly inequal across quintiles. The distribution of in-patient days in public facilities is more uneven in rural areas than the urban areas. Table 2.5 shows that the top quintile accounts for 27.60% in comparison to 8.95% of the lowest quintile, while in the urban area the distribution is evenly distributed across quintiles. In aggregate the difference is significant, as 27.6% goes to the fifth quintile, whereas the lowest quintile gets 8.80% of total inpatient days.

DISTRIBUTION OF MATERNAL DELIVERY IN PUBLIC FACILITIES

In Maharashtra, the distribution of childbirth in public facilities is quite even in rural area in first three quintiles, while the highest quintiles account for 14.56% and 6.78% in comparison to 26.73% and 35.17% of lowest quintiles indicating less utilization of public facilities by the higher income group compared to the lower income one. In urban Maharashtra, the distribution is pro-poor, with higher level of utilisation from the first quintile to the fourth quintile whereas the utilisation figures are very low for the fifth quintile. In rural Bihar, the distribution of maternal delivery in public facilities is inequal with first quintile accounting for 16.16% compared to 35.46% accounted in the fifth quintile. The distribution of deliveries in the public facilities in the urban area is more equal compare to the rural area.

TABLE 1.1: DISTRIBUTION OF POPULATION ACROSS QUINTILES (figures are given in 00,000)

State	Sector	Q1	Q2	Q3	Q4	Q5	Total	Percentage
Maharashtra	Rural	77.5	76.2	76.1	76.2	76.4	382.4	66.82
	Urban	38.0	38.0	38.0	38.0	37.9	189.9	33.18
	Total	115.5	114.2	114.1	114.2	114.4	572.3	572.3
Bihar	Rural	51.9	51.4	51.7	51.8	51.3	258.1	86.45
	Urban	8.1	8.1	8.1	8.1	8.1	40.4	13.55
	Total	60.0	59.5	59.7	59.9	59.4	298.5	298.5

TABLE 1.2: MEAN PER-CAPITA EXPENDITURE BY QUINTILE (RURAL, URBAN & TOTAL) PER MONTH (Figures are given in Rupees)

State	Sector	Q1	Q2	Q3	Q4	Q5	Total
Maharashtra	Rural	183.32	245.68	292.47	354.44	520.95	319.25
	Urban	221.72	327.01	413.01	526.32	975.30	574.84
	Total	192.56	263.15	323.24	406.17	683.43	373.48
Bihar	Rural	157.92	204.66	243.00	294.91	421.99	264.43
	Urban	214.44	300.86	390.92	502.45	803.04	442.11
	Total	160.99	210.91	254.62	315.34	500.34	288.51

TABLE 1.3:CUT-OFF POINTS USED FOR FORMATION OF QUINTILES (RURAL, URABN & TOTAL) (Figures are given in Rupees per month)

State	Sector	Q1	Q2	Q3	Q4	Q5
Maharashtra	Rural	219	267	317.5	399	>399
	Urban	287.66	366	459	612.5	>612.5
	Total	234.5	291.2	358.16	465.33	>465.33
Bihar	Rural	185.71	222.5	267	330.83	>330.83
	Urban	263.83	343	441.5	574.5	>574.5
	Total	190	230.16	281.11	359.71	>359.71

TABLE 1.4: NUMBER OF PUBLIC & PRIVATE HOSPITALISATION PER 100,000 PERSONS (for Rural and Urban)

State	Sector	Q1	Q2	Q3	Q4	Q5	Total
Maharashtra	Rural	810	1288	1443	1947	4023	1900
	Urban	1705	1979	2140	2292	3663	2356
	Total	1105	1518	1676	2062	3904	2051
Bihar	Rural	288	757	1037	1050	3033	1230
	Urban	1060	1400	1403	1708	1813	1476
	Total	392	844	1086	1139	2867	1264

TABLE 1.5: PERCENTAGE OF IN-PATIENT DAYS ACROSS QUINTILES (Figures are given in percentages)

State	Sector	Q1	Q2	Q3	Q4	Q5	Total (00,000)
Maharashtra	Rural	7.17	12.81	43.56	14.67	21.79	46.85
	Urban	21.38	18.77	26.06	12.36	21.44	22.99
	Total	10.07	34.63	16.97	16.97	21.37	69.84
Bihar	Rural	1.93	8.21	16.22	12.18	61.46	35.25
	Urban	21.79	17.12	20.84	21.21	19.04	5.09
	Total	3.39	12.02	15.45	14.56	54.58	40.34

TABLE 1.6: PERCENTAGE OF DELIVERY IN PUBLIC FACILITIES ACROSS QUINTILES (Figures are given in percentages)

State	Sector	Q1	Q2	Q3	Q4	Q5	Total (00,000)
Maharashtra	Rural	20.23	20.64	24.78	21.95	12.39	251715
	Urban	27.49	29.68	22.36	13.09	7.39	120825
	Total	22.59	23.57	24.00	19.08	10.77	372540
Bihar	Rural	7.32	6.50	40.60	28.49	17.08	54552
	Urban	7.55	19.98	32.04	26.17	14.27	30754
	Total	7.40	11.36	37.52	27.65	16.07	85306

RESULTS FROM CONCENTRATION CURVES AND CONCENTRATION INDEX

In this section we use the *concentration curve*, and *concentration index*, to assess the degree of income-related inequality in the distribution of a health utilization variable like no of inpatient admissions in public hospitals, inpatient cost in public hospitals[2], duration of stay in public hospitals and maternal deliveries. It's worth noting here that the public hospital variable in the 60th round survey comprises of all types of hospitals. There is no distinction, for instance, between a primary health care centre and a community health centre or a district head quarters hospital. Hence we use the simple average cost per admission obtained from our survey to calculate total cost in public hospitals by multiplying the former with no of inpatient admissions. The outpatient cost or utilization is not considered in this study because of two reasons. First, the outpatient variable in the 60th round survey includes hospitalization too. With regard to maternal deliveries we have considered three variables i.e., MD public (deliveries in public hospitals), MD private (deliveries in private hospitals) and MD home (deliveries at home). To sum up the purpose is to assess whether govt. expenditure on health care are better targeted towards the poor or whether utilization of health services are more equally distributed to the advantage of the poor.

THE CONCENTRATION CURVE DEFINED

The two key variables underlying the concentration curve are: the health variable, the distribution of which is the subject of interest; and variable capturing living standards, against which the distribution is to be assessed. The data could be at individual level (e.g. raw household survey data), in which case values of both the health variable and the living standards variable are available for each observation. Alternatively, the data could be grouped, in which case, for each living-standard group (e.g. income quintile), the mean value of the health variable is observed. The ranking of the groups (which group is poorest, which group is second poorest, and so on), and the percentage of the sample falling into each group (e.g. 20% in each) is known.

The concentration curve plots the cumulative percentage of the health variable (y-axis) against the cumulative percentage of the sample, ranked by living standards, beginning with the poorest, and ending with the richest (x-axis). So, for example, the concentration curve might show the cumulative percentage of health subsidies accruing to the poorest *p*% of the sample. If everyone, irrespective of his living standards, has exactly the same value of the health variable, the concentration curve will be a 45 degree line, running from the bottom left-hand corner to the top right-hand corner. This is known as the *line of equality*. If, by contrast, the health sector variable takes higher (lower) values amongst poorer people, the concentration curve will lie above (below) the line of equality. The further the curve is above the line of equality, the more concentrated the health variable is amongst the poor. If the variable takes on smaller values amongst the poor, the concentration curve will lie below the line of equality.

GRAPHING CONCENTRATION CURVES

In the grouped-data case, the required data and the corresponding charts are easily produced in a spreadsheet program such as Microsoft Excel. The curve is constructed in Excel using the *XY (scatter)* chart-type with the '*scatter with data points connected by smoothed lines*' option. The first series graphs the *line of equality*, the x-values and the y-values both being the cumulative percentage of the sample. The *no-marker* option is selected for the *line of equality*. The second series graphs the concentration curve, the x-values being the cumulative percentage of the sample, the y-values being the cumulative percentage of the health variable. It is important to include a 0% in both series. Both the x axis and the y-axis need to be restricted to the range 0% to 100%.

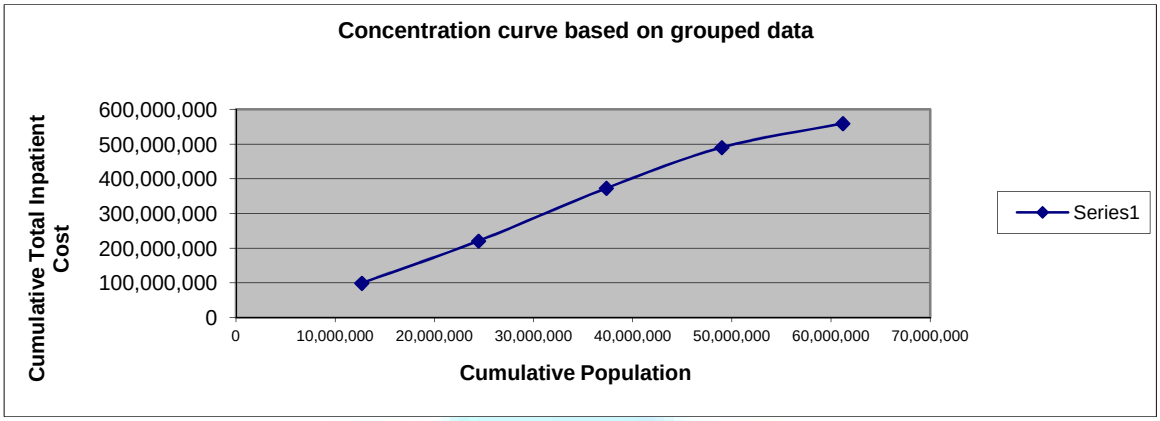
For example in our case for Maharashtra we plot the concentration curve for inpatient cost based on 60th round survey data of NSSO.

[2] We arrive at this figure by multiplying the number if inpatient admissions with unit cost obtained from our study on costing facilities in public hospitals.

TABLE 1.7

Quintile	Population	Cum. Pop.	Cum. Total cost IP public	Total cost IP public
1	12,677,244	12,677,244	99,586,927	99,586,927
2	11,770,616	24,447,860	221,247,618	121,660,691
3	12,886,633	37,334,493	373,044,915	151,797,297
4	11,633,091	48,967,584	490,628,277	117,583,362
5	12,213,926	61,181,510	559,885,485	69,257,208

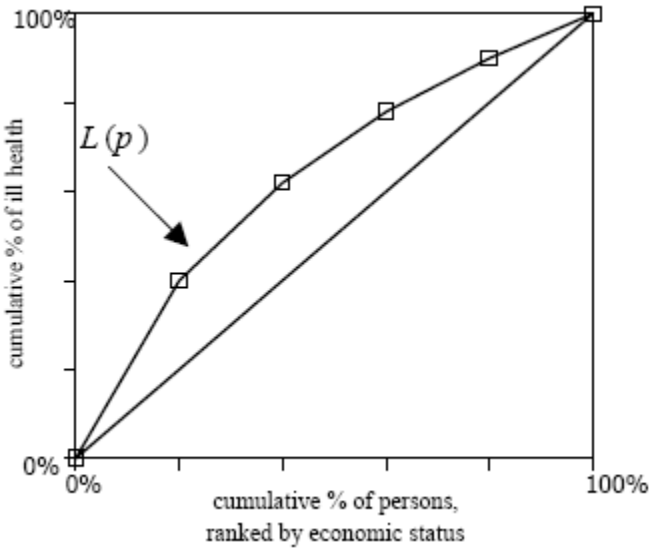
FIG. 1



THE CONCENTRATION INDEX DEFINED

The concentration index is defined with reference to the concentration curve, which graphs on the *x*-axis the cumulative percentage of the sample, ranked by living standards(for example MPCE in our case), beginning with the poorest, and on the *y*-axis the cumulative percentage of the health variable corresponding to each cumulative percentage of the distribution of the living standard variable. The figure below(taken from O'donell) provides an example of a concentration curve, where the health variable is ill-health, which in this example is higher amongst the poor than amongst the better-off. The concentration index is defined as twice the area between the concentration curve, $L(p)$, and the line of equality (the 45 degree line running from the bottom-left corner to the top-right). So, in the case where there is no income-related inequality, the concentration index is zero. The convention is that the index takes a negative value when the curve lies above the line of equality, indicating disproportionate concentration of the health variable among the poor, and a positive value when it lies below the line of equality. If the health variable, is a 'bad' such as ill health, a negative value of the concentration index means ill health is higher among the poor.

FIG. 2



The index is defined formally as

$$C = 1 - 2\int_0^1 L_h(p)\,dp$$

. The index is bounded between -1 and 1. For a discrete living standards variable it can also be written as $C = (2/N\mu)\left[\sum_{i=1}^{n} h_i r_i - 1\right] - (1/N)$, where h_i is the health sector variable, μ is its mean, and $r_i = i/N$ is the fractional rank of individual, i in the living standards distribution, with i=1 for the poorest and i=N for the richest. For computational convenience one can use the following formula in terms of covariance between the health variable and the fractional rank in living standards distribution (see Jenkins 1988, Kakwani 1980, Lerman and Yitzhaki 1989), $C = (2/\mu)\,\mathrm{cov}(h,r)$. It's worth noting that the concentration index depends on the relationship between the health variable and the rank of the living standards variable only. The index does not depend on the variation in the living standards variable.

ANALYSIS OF 60TH ROUND

For the aggregate data of Maharashtra i.e. rural and urban taken together the inpatient admission only is pro poor as indicated by a negative CI significant at 5% level. The duration of stay though bearing a negative CI, is not significant. Among the maternity variables except private both public and home are pro poor with negative and significant CIs. In urban Maharashtra inpatient admission and duration of stay in hospitals are pro poor since the Concentration index (CI) is negative and significant at 1% level for both. The same is reflected in the plot of concentration curves (CC) as the curves lie above the equality line. The maternal delivery in public hospitals is also pro poor but the CI is significant at 5% level. Deliveries in private hospitals and at home though pro poor are not statistically

significant. For rural Maharashtra both inpatient admission and duration of stay are pro rich since the CIs are positive. However, The CI for inpatient admission is significant at 5% level whereas that of duration of stay is not significant. The maternal deliveries in public hospitals and home are pro poor in nature whereas that in private hospitals are pro rich.

In Bihar for the aggregate data we find inpatient admission and duration of stay to be pro rich as revealed by the negative and significant (at1%) CIs. Among the maternity variables deliveries at home is pro poor but that in public and private hospitals are pro rich. We find the inpatient admission and duration of stay to be pro rich and pro poor respectively for urban Bihar. However, the CIs are not statistically significant in either case. In case of maternity variables all are pro poor but deliveries at home alone is statistically significant. For rural Bihar both inpatient admission and duration of stay are pro rich since the CIs for both these variables are positive and significant at 1% level. The delivery variables for public and private though pro rich are not statistically significant.

CONCENTRATION INDEX FOR MAHARASHTRA FOR TOTAL POPULATION (RURAL AND URBAN)

Facility	Concentration Index	P-Value
MD public	-.24272099	0.000
MD private	.12058114	0.136
MD home	-.50638791	0.002
IP admission	-.04704279	0.049
IP duration	-.03082151	0.295
IP cost	-.04704279	0.049

FIG. 3

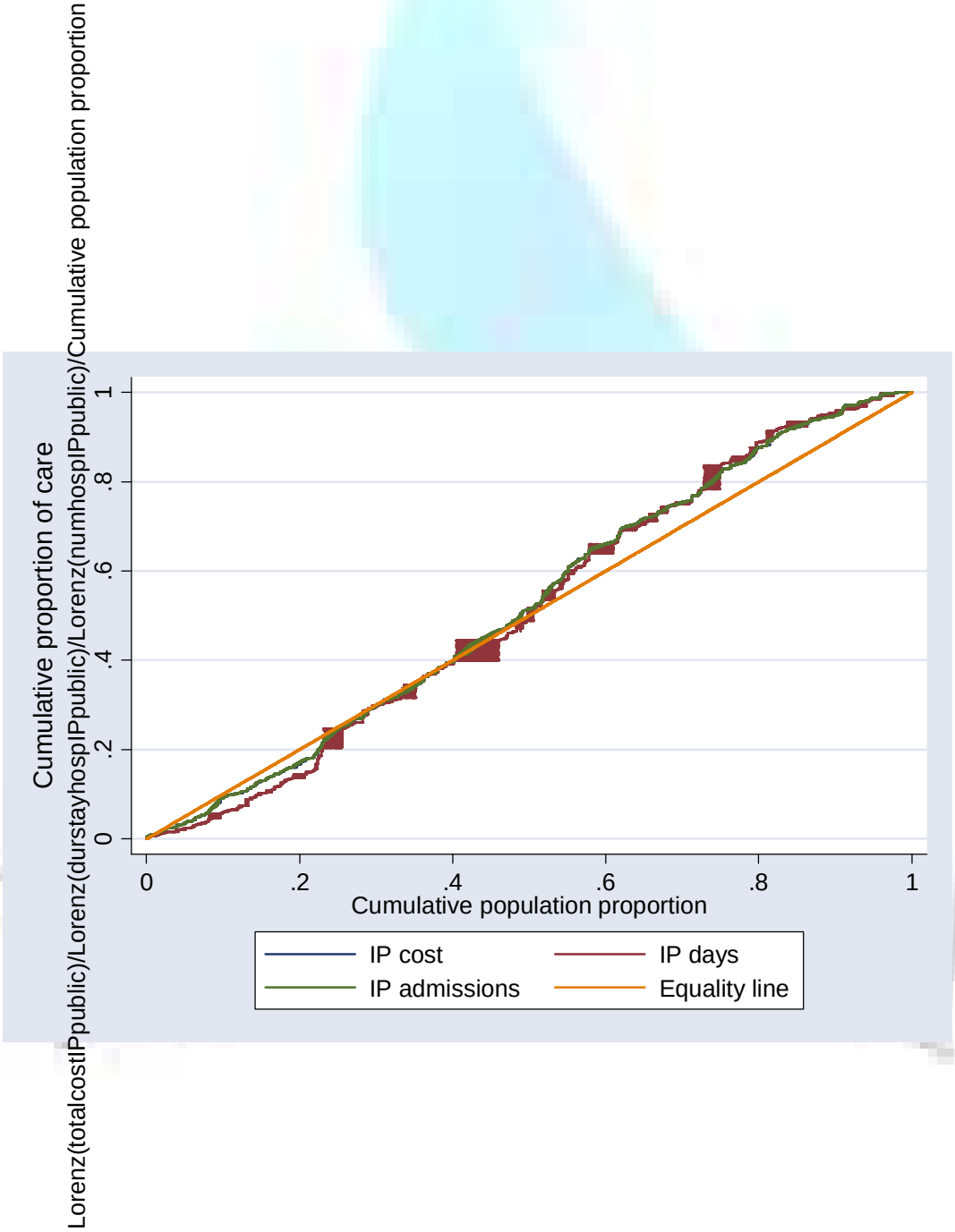
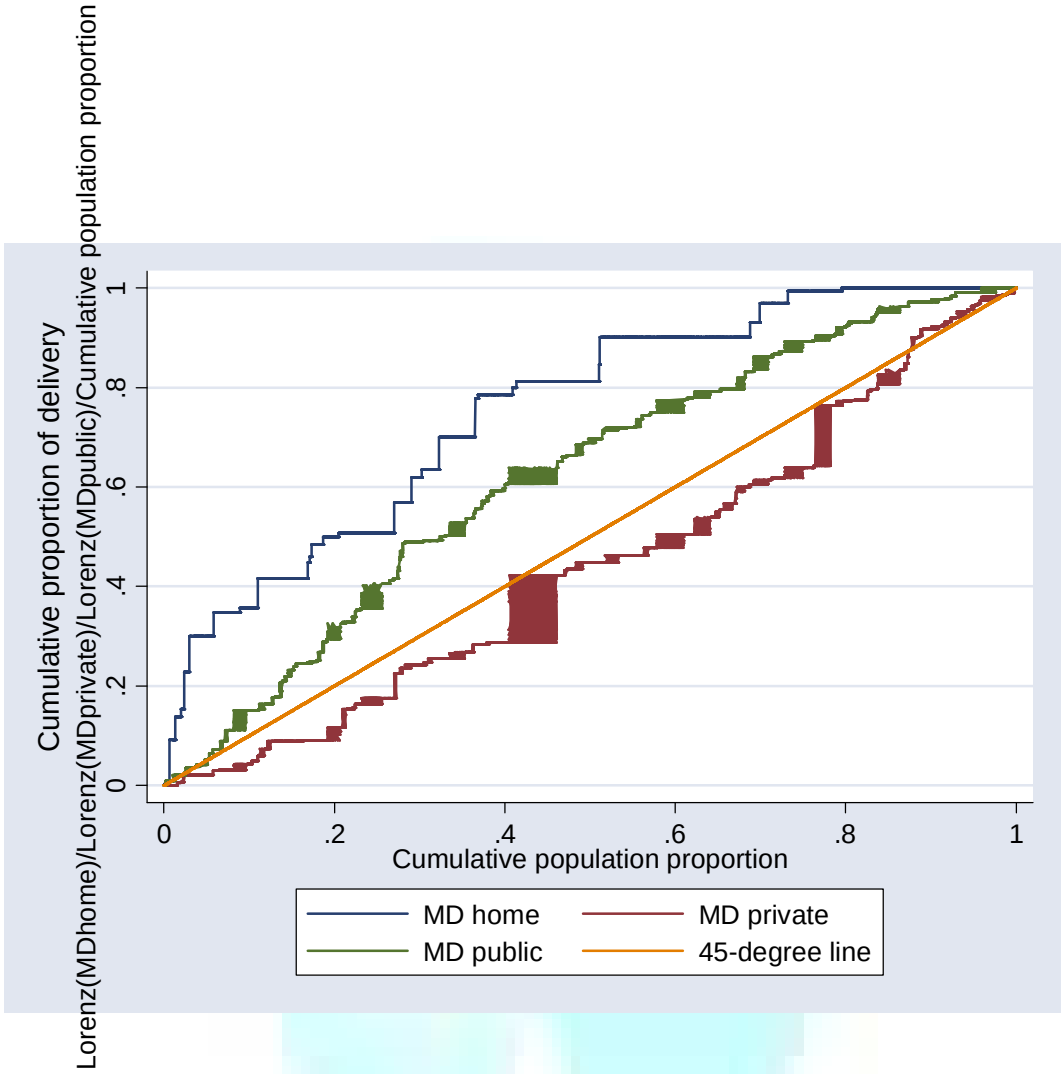


FIG. 4



CONCENTRATION INDEX FOR BIHAR FOR TOTAL POPULATION (RURAL AND URBAN)

TABLE 1.8

Facility	Concentration Index	P-Value
MD public	.18245898	0.078
MD private	.23723229	0.213
MD home	-.34622346	0.000
IP admission	.17275971	0.000
IP duration	.188906	0.000
IP cost	.17275971	0.000

FIG. 5

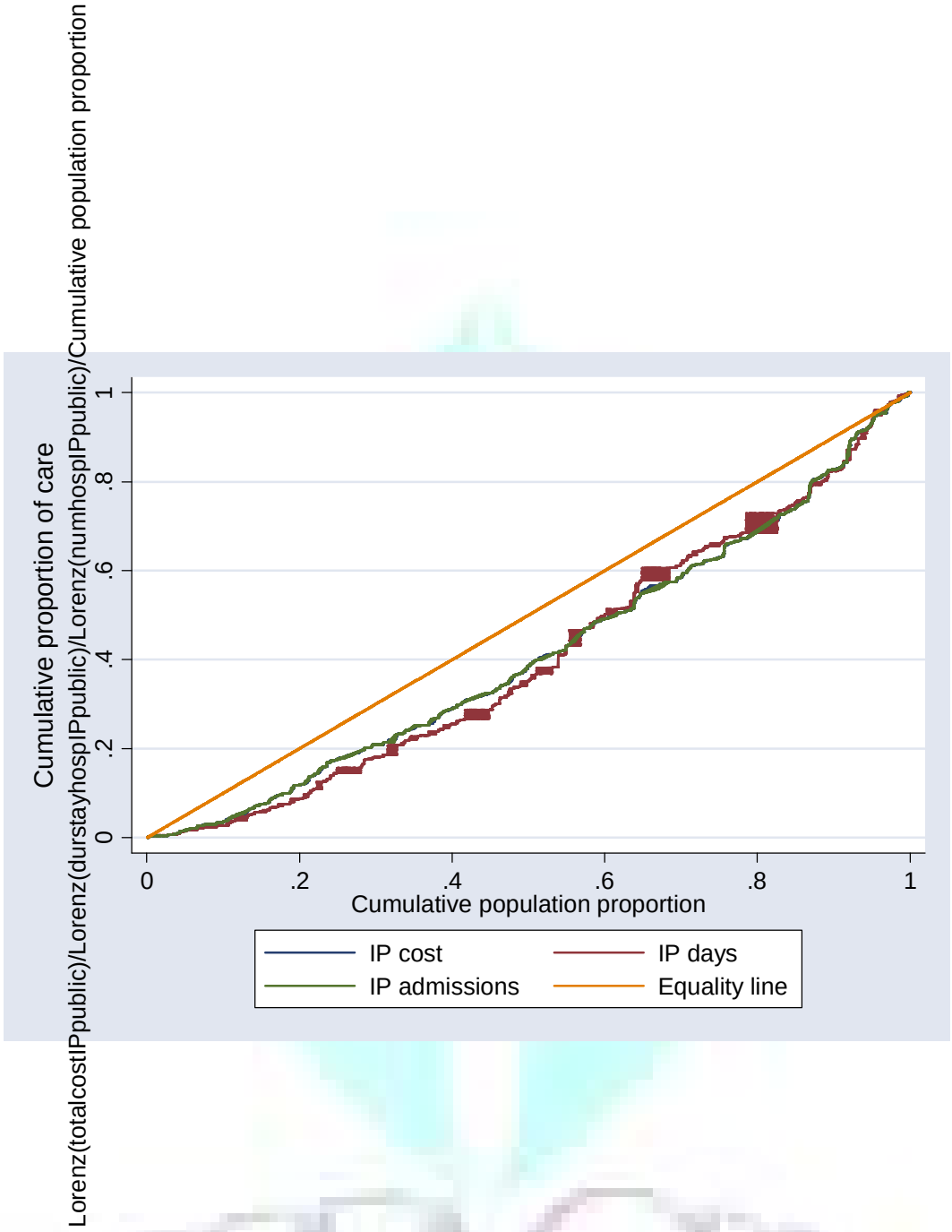
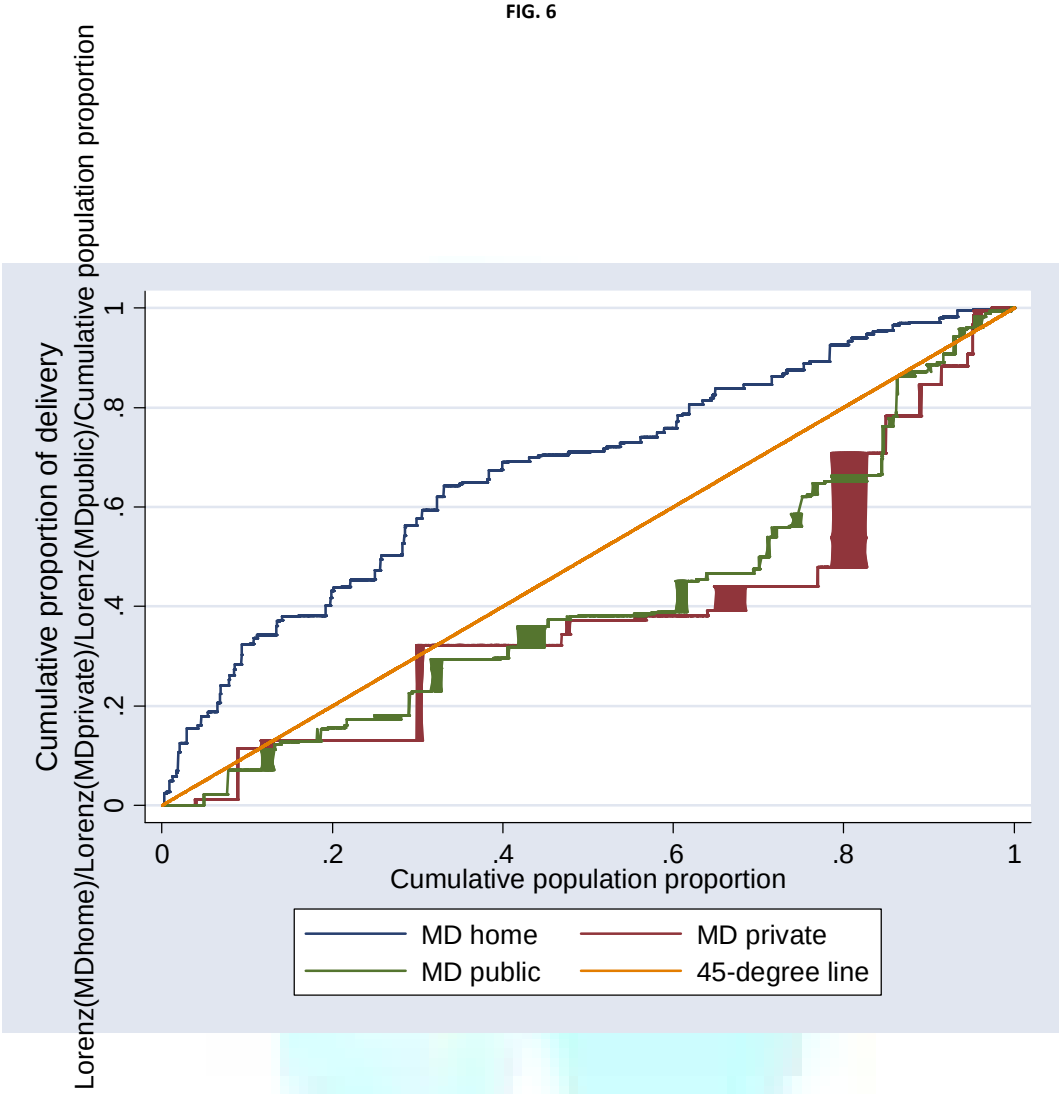

Cumulative proportion of care
Lorenz(totalcostIPpublic)/Lorenz(durstayhospIPpublic)/Lorenz(numhospIPpublic)/Cumulative population proportion
0
.2
.4
.6
.8
1
0
.2
.4
.6
.8
1
Cumulative population proportion
IP cost
IP days
IP admissions
Equality line

FIG. 6



CONCLUSION

This study found the many insights into the pattern of utilization of public facility in Maharashtra and Bihar. Overall results indicate that public spending on healthcare in Maharashtra has become much more pro-poor in 2004. Public spending on health care in Bihar is not pro-poor for out-patient and maternity services. These changes is mainly due to the increased presence or absence of private sector, choice of women in lower quintiles for institutional deliveries and for public institutions and improved supply side changes in public facilities in Maharashtra.

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