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Human resource inequalities at the base of India's public health care system ☆

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ABSTRACT

This paper examines the extent of inequalities in human resource provision at India's Heath Sub-Centres (HSC)—first level of service provision in the public health system. 'Within state' inequality explained about 71% and 'between state' inequality explained the remaining 29% of the overall inter-HSC inequality. The Northern states had a lower health worker share relative to the extent of their HSC provision. Contextual factors that contributed to 'between' and 'within' district inequalities were the percentages of villages connected with all-weather roads and having primary schools. Analysis demonstrates a policy and programming need to address 'within State' inequalities as a priority.

1. Introduction

In developing countries, health systems under government authority are substantial providers of health care (WHO, 2006). While the private sector, both for-profit and not-for-profit, is also substantial and may represent an increasing proportion of overall provision in many countries, government services typically have a mandate to provide a minimum set of services on a basis of equity. This equity is expressed in policies and in programme documentation in terms of provision per population size. Although in many settings government health care services are not free at the point of use and access may require user fees or informal payments to providers, the service model is typically designed to address common and important health problems through preventive and curative services (Yates, 2009). In theory, substantial variation in extent of service delivery by geographic location or socioeconomic status of users should not occur. However, in practice, such variations are often considerable (Anand and Bärnighausen, 2004; Balarajan et al., 2011; De Costa et al., 2009; Prasad et al., 2006; Rao et al., 2011) and can mean the effective disconnection of large sections of the population from basic health care services.

A key component of the public health system's capacity to deliver services is human resources, and shortage of health workers may be an important barrier to achieving the Millennium Development Goals (WHO, 2006, 2008). In India, a national Ministry of Health mandated structure for public health services exists, with responsibility for implementation devolved to States in line with the country's federal governance structure. Primary health care services are provided through a network of Community Health Centres (CHC), Primary Health Centres (PHC) and Health Sub-Centres (HSC). These cater to a population of 80,000–120,000; 20,000–30,000; and 3000–5,000, respectively, in geographically accessible plain areas; different norms apply for mountainous terrain and tribal areas (WHO, 2007). Against these norms, according to 2007–08 survey of health facilities, the average sampled rural population served at the three levels of facility were 128,186, 49,193 and 8372, respectively, indicating relative under provision compared to policy norms (IIPS, 2010). National Rural Health Mission (NRHM), a programme designed to provide improved health services to rural populations, estimates that India would require 175,000 HSCs and 27,000 PHCs to meet population based norms (GOI, 2010). Clearly, this indicates the need for more health facilities in India and this conclusion is reflected in several studies (Satpathy and Venkatesh, 2006).

Health Sub-Centres are the first point of contact with the public health care system in India. For most of the rural population, this is

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the nearest and most accessible public health facility. Health Sub-Centres are required to provide a range of preventive, curative, and referral services to the local population. The HSC norm is to have one Female Health Worker/Auxiliary Nurse Midwife (ANM) and one Male Health Worker, known as Multi Purpose Workers, although the Indian Public Health Standards (IPHS) recommendation is two ANMs and one Male Health Worker (Government of India, 2006). Some HSCs also have a voluntary worker to assist the ANM.

As in many developing countries, the Indian public health system faces a number of challenges, prominent among which is the ability to deploy and sustain the required number and skill mix of staff across the entire system (Witter et al., 2011; Naryana, 2008; Beaglehole and Dal Poz, 2003; Hawkes et al., 2009). A policy brief prepared for the National Rural Health Mission (NRHM) explicitly states that 'there is indeed a major crisis in human resources for health in India and that this crisis could account for much of the poor performance of the health sector' (Sundararaman and Gupta, 2011). The NRHM which began in 2005 has an agenda of strengthening the rural health care system by improving its workforce (NRHM, 2005).

Several factors influence availability of human resources in public health facilities. The "pull" factors that attract and retain health professionals in a health facility are better living condition, educational facilities, and employment opportunities for spouse (Zurn et al., 2004). Thus, poor and less developed areas (e.g. states, districts) will have a lower share of health professionals than their public health facility share. In India, there is a significant north–south divide in socio-economic and demographic factors. For example, there is lower contraceptive use and higher fertility in the north compared to the south leading to higher proportion of women and children needing health services than in the south (IIPS and Macro International, 2007). Social indicators such as literacy and education are more favourable in the south than in the north. Further, women in the south are more educated and have higher social status than their counterparts from the north. Also, social sector services are better implemented in the south compared to the north. All the above conditions are likely to have significant impact on attracting and retaining human resources in the health sector, with significant impact on health services and outcomes. As the number of health professionals is set at a uniform level for each type of health facility, without morbidity or epidemiological considerations, a lower share of health professionals in certain health facilities generate inequalities in human resources and service provision. As the health facilities in poor areas require at least the same share of human resources as rich areas to provide same level of preventive and curative services, a lower share of health resources in poor areas would potentially lead to poor access to basic health services. This will disadvantage the poor most, especially the women and children, because the poor tend to use government health services more than the rich. The inequalities in the supply of health professionals in government health facilities may force the poor to seek health services from the private sector. This will have a direct impact on health spending and household economic productivity, and those who are unable to afford private health care may refrain from seeking health care, accumulating health risks and medical conditions. In consequence, the inequalities in health force and service provisions can have catastrophic impact on population health and wellbeing, particularly of the poorest poor (Castillo-Laborde, 2011).

We used quantitative tools to examine the extent of inequalities in human resource provision at this level in the health system. Overall national level inter-HSC inequalities were decomposed to examine 'between' and 'within' State and district inequalities to the overall inequality. In addition, regression analysis was used to examine the factors associated with inequalities in human resource provision at HSCs.

2. Data and methods

2.1. Data

Data were obtained from the health facility survey of HSCs carried out during 2007–08 in India as a part of the third wave of District Level Household Level Survey (DLHS-3) that included 18,068 HSCs. The primary objective of the facility survey was to assess district health care system in providing MCH services. The selection of HSCs for the survey was done using the following strategy: From each district in India (there were 611 districts in India as per 2001 Census), 50 primary sampling units (PSU) were selected using a Probability Proportional to Size (PPS) method. Each PSU (a PSU is typically a village) will be in the catchment area of one HSC and that particular HSC was selected for the facility survey. In some instances two or more villages (PSUs) were covered by a single HSC. Facility survey questionnaires were administered to a staff member of the HSC by a trained interviewer. The interviews were face-to-face and held at the premises of the health facility. The facility survey gathered information regarding the availability (yes or no answers) of Female Health Worker/Auxiliary Nurse Midwife (ANM); Additional Female Health Worker; Male Health Worker; and any Other Health Worker (no further detail of this category is available in public domain). If any of these positions were vacant for more than 3 months they were counted as 'not available' and those positions vacant for less than 3 months were counted as 'available'. As all HSC staff undertakes preventive and some curative care, they were grouped together and termed as 'health worker' in this paper. The number of possible health workers in a HSC ranges between 0 and 4. Further details on the methods of the survey including the questionnaire are described in detail elsewhere (IIPS, 2010). Owing to the structure of the survey design the findings can be considered generalisable at District and State level. The data from the DLHS is of optimal quality and studies in the past have found this data comparable with other large-scale surveys conducted in India (Roy and Ram, 2004). Furthermore, this dataset is used widely by the Ministry of Health & Family Welfare (MoHFW), Government of India for monitoring the performance of policies and programmes in India. A number of published papers have also used DLHS 3 data (Lim et al., 2010). The findings of health facility survey are similar to the findings from the other government statistics (GOI, 2010) confirming acceptable quality of facility survey data from the DLHS-3.

2.2. Methods

2.2.1. Inequality measures

The inequality measures used in this analysis are Gini and Theil *T*. The unit for computation of overall Theil T and Gini is HSC. Gini measures the aggregate level inequality and takes values between 0 and 1, with higher values indicating higher levels of inequality. Though Gini is a widely used inequality measure, it is non-decomposable (WHO, 2010). Theil *T* was included to provide decomposition of overall inequality measures. In Theil *T* the upper limit is unbounded but has zero as the lowest value indicating complete equality. Theil *T* can be decomposed into 'between' and 'within' inequalities (WHO, 2010). The first part of the following equation represents 'between' inequality and the second part 'within' inequality. The 'between' inequality values could be either 'negative' or 'positive' depending on the health workers' share in comparison with the share of HSC. A 'negative' value indicates lower

share of health workers compared to HSC share. The 'between' values are always positive. The combined value gives the net contribution of each administrative unit (State/District) to the overall inequality.

$$T = \sum_{i=1}^{m} s_i \ln\left(\frac{y_i}{\bar{y}}\right) + \sum_{i=1}^{m} s_i \ln\left(\frac{y_{ij}}{y_i}\right)$$

i is the state; j is the HSC; s_i is share of health workers in ith state with respect to total health workers in the country; $\bar{y}$ is the average number of health workers in the country; y_i is health workers in ith State, y_{ij} is health workers in jth HSC in ith State, and m is the number of States. In case of districts the same equation was used but states were replaced by districts.

2.2.2. State and district level contribution to overall inequality

In this paper we have examined contribution of districts and states separately to the overall HSC inequality. That is (1) to what extent 'within' and 'between' State inequalities contributed to the overall HSC inequality (2) to what extent 'within' and 'between' District inequalities contributed to overall HSC inequality. The net (within and between) contribution of each administrative unit could be negative or positive and the total of values is the overall Theil T which is always positive. The 'between', 'within' and 'net or total' values are plotted on a graph to illustrate the contribution of each state to the overall inter-HSC inequality. Districts inequalities are plotted only for two states: the highest and lowest HSC inequality states.

2.2.3. Regression analysis

This analysis is carried out only for districts. In order to understand contextual factors that might influence inequality in health worker provision 'within' and 'between' Districts, we fitted linear regression models. All the 611 districts were included in the analysis. In the model 'within' and 'between' inequality values were taken as dependent variables. Since 'between districts' inequalities can assume both negative and positive values, we transformed their values in order to have only positive values with minimum of zero. The higher the values of this transformed variable, the higher the health worker share. We utilised the following formula used in the transformation of 'dimension index' during the estimation of the human development index (UNDP, 2010) to rescale the inequality variable. The transformation of Theil T is not likely to affect the interpretation of 'between' and 'within' inequalities.

Theil Transformed = (actual value − minimum value)/(maximum value − minimum value).

The contextual variables used in the regression analysis were derived from the village questionnaire of the DLHS-3 that collected information regarding availability and accessibility of various facilities in the village. As indicated in the data section, these villages were the catchment areas of HSCs where facility surveys were carried out. Therefore, the village information relates to the catchment area of the HSC. The village level information was used to compute various district level variables. Thus, the unit of analysis is district. Using village level data we computed five district level variables—the percentage of villages within Districts that were connected with an all-weather road, the percentage of villages in Districts with electrification; the percentage of villages in the Districts with primary schools; the village population; and the percentage of villages in the District that are within a distance of 10 km to the District headquarters. Extant literature on 'push' and 'pull' factors related to distribution of human resources in health guided us while selecting these variables (Zurn et al., 2004; Gupta et al., 2011; Willis-Shattuck et al., 2008). We controlled for the geographic region of residence in the regression models to account for the substantial regional variations in the availability of health workers. All the analyses reported in this paper were carried out in Stata 11MP-2 (StataCorp, 2009).

Table 1
Availability of different types of staff in position in HSCs in India, 2007–08.

Category of health worker	Staff in position (%)
ANM/Female health worker	16,385 (90.7)
Male health worker	7102 (39.3)
Additional ANM	3610 (20.0)
Other staff	5620 (31.3)
Both male and ANM/Female health worker or additional ANM	6474 (35.8)
No worker	66 (0.4)
One worker	7426 (41.1)
Two workers	7087 (39.2)
Three workers	2839 (15.7)
Four workers	650 (3.6)

Note: Total number of Health Sub-Centres = 18,068.

3. Results

3.1. Distribution of health workers at Health Sub-Centres

Table 1 provides information about various categories of health workers in place at surveyed HSCs in India which can be considered as a nationally representative sample as it followed a systematic sampling procedure explained in the data section and elsewhere (IIPS, 2010). Thus, nationally over 90% of the HSCs had an ANM or a Female Health Worker in place. About 20% of the HSCs had an additional ANM but only about 39% had a Male Health Worker. The norm, one male and female health worker each, was found in about 36% of the HSCs. In addition, about 31% of the HSCs had 'other staff'. Fewer than 1% of the HSCs in the country had no health worker. Thus, although most of the HSCs had at least one health worker of any category there was notable variation with regard to the total number of health workers available in each HSC.

3.2. Overall inequality

The overall inter-HSC inequality in health workers was 0.10269 indicating presence of overall inter-HSC inequality in health workers in India. This finding is also supported by the Gini coefficient which was 0.24124 (Tables 2 and 3).

Table 2
Decomposition of inter-HSC inequalities by State, 2007–08.

Inequality measure	Overall inter-HSC inequality	Between State inequality	Within State inequality	Between State inequality (percent of overall)	Within State inequality (percent of overall)
Theil T	0.10269	0.02986	0.07283	29%	71%
Gini	0.24124				

Table 3
Decomposition of inter-HSC inequalities by district, 2007–08.

Inequality measure	Overall inter-HSC inequality	Between district inequality	Within district inequality	Between district inequality (% of overall)	Within district inequality (% of overall)
Theil *T*	0.10269	0.04655	0.05614	45%	55%
Gini	0.24124				

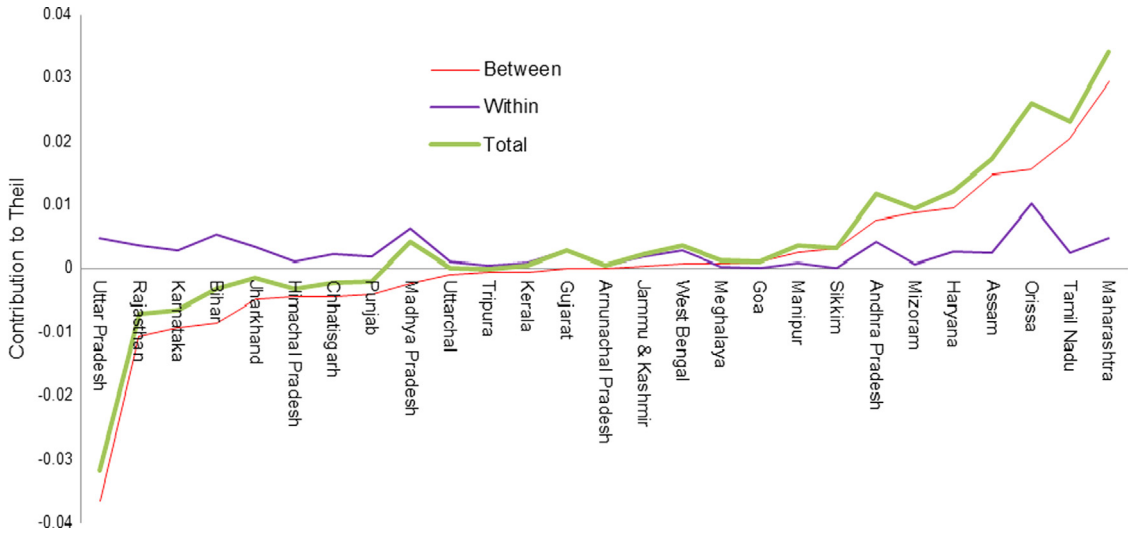

Fig. 1. 'Between', 'within' and 'total' inequalities in health workers, HSCs, States, India, 2007–2008.

3.3. Decomposition of Theil index

3.3.1. State level contribution to overall inequality

Table 2 also provides decomposition of overall inter-HSC inequality into 'within' and 'between' State inequalities. The 'between State' and 'within State' Theil *T* were 0.02985 and 0.07284, respectively indicating that 'between' and 'within' state inequalities contributed 29% and 71%, respectively, to the overall inequality.

The contribution of 'between', 'within' and 'total' State inequalities in health workers to the overall inter-HSC inequalities in India is presented in Fig. 1. The 'between State' inequality is expressed in negative and positive values. The group of States on the left hand side of Fig. 1 starting from Uttar Pradesh had lower health worker shares relative to their HSC share. The majority of the States lying on the left hand side are located in the Northern and Central regions of the country. On the other hand, states on the right hand side of Fig. 1 starting from Maharashtra had higher health worker shares relative to their HSC share. Interestingly, the majority of these states are in the Southern and Eastern regions. The States in the middle of the Figure, with values very close to zero, have equitable shares of health workers in relation to their HSC share. The majority of these states are in the North-Eastern part of the country. These findings clearly depict the very substantial regional inequalities in the availability of health workers at the HSCs across the country.

Notable 'within State' inequalities in health worker distribution across HSCs were also observed. Overall, the States that had higher 'between state' inequality (negative or positive) also had higher 'within State' inequality. Thus, the states on the left hand side of Fig. 1 with negative 'between State' inequalities had higher 'within State' inequalities compared to those states in the middle of the graph. Similarly, States on the right hand side of the graph with positive 'between State' inequalities had higher 'within State' inequalities compared to States in the middle of the graph. Thus, three typologies of health worker distribution are observed. The first typology includes those States, mainly belonging to the Northern region, that are doubly disadvantaged with not only lower shares of health workers but also high 'within' inequality measures. The second typology includes mostly Southern and Eastern States that had higher shares of health workers but also high 'within' inequality. The third typology includes States that have equitable distribution of human resources.

3.3.2. District level contribution to overall inequality

Table 3 provides Theil *T* for Health Sub-Centres and its decomposition into 'within' and 'between' District inequalities. The 'between' and 'within' District Theil *T* values were 0.04655 and 0.05614 respectively, thus indicating that 'between' and 'within' district inequalities contributed 45% and 55%, respectively, to the overall inequality.

As there are more than 611 districts in India it is not possible to present District level inequalities for all Districts in a single figure. Contrasting illustrative findings are presented for district level inequality values from Uttar Pradesh, with the lowest share of health workers, and Maharashtra with the highest share of health workers relative to their HSC share (Figs. 2 and 3 respectively). It may be emphasised here that the 'within' and 'between' Theil *T* values are derived from the analysis of all the 611 districts (i.e. all districts in India) but the results are presented only for the two states.

Fig. 2 shows that all the districts in Uttar Pradesh had lower shares of health workers relative to their HSC share. However, there is notable District level variation in contribution to the overall inter-HSC inequality. In general, Districts on the left hand side of the graph had a lower health worker share. A majority of the Districts had 'within' inequality, irrespective of the level of 'between' inequality. As the 'between' District inequality was much greater than the 'within' District inequality, the overall

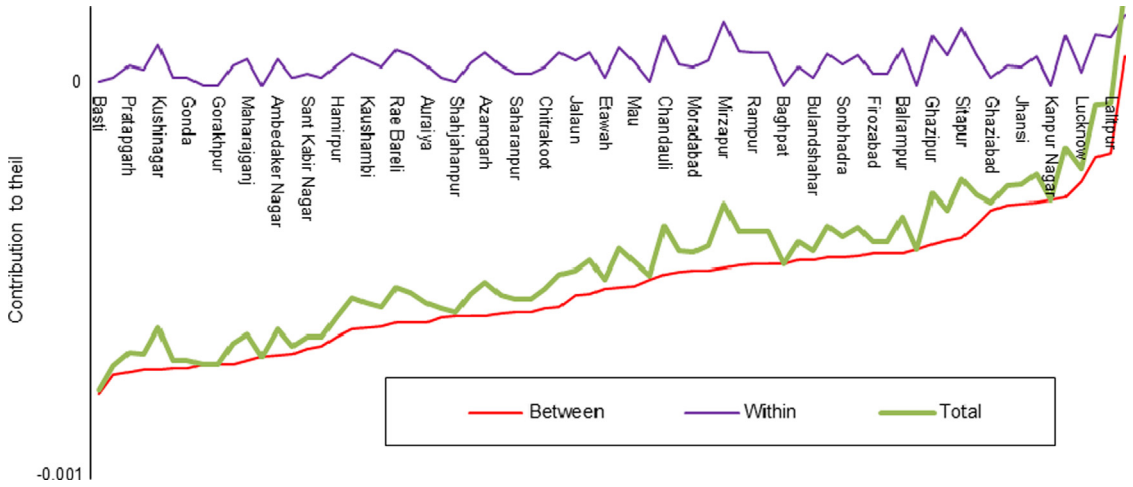

Fig. 2. 'Between', 'within' and 'total' inequalities in health workers, Uttar Pradesh, 2007–2008.

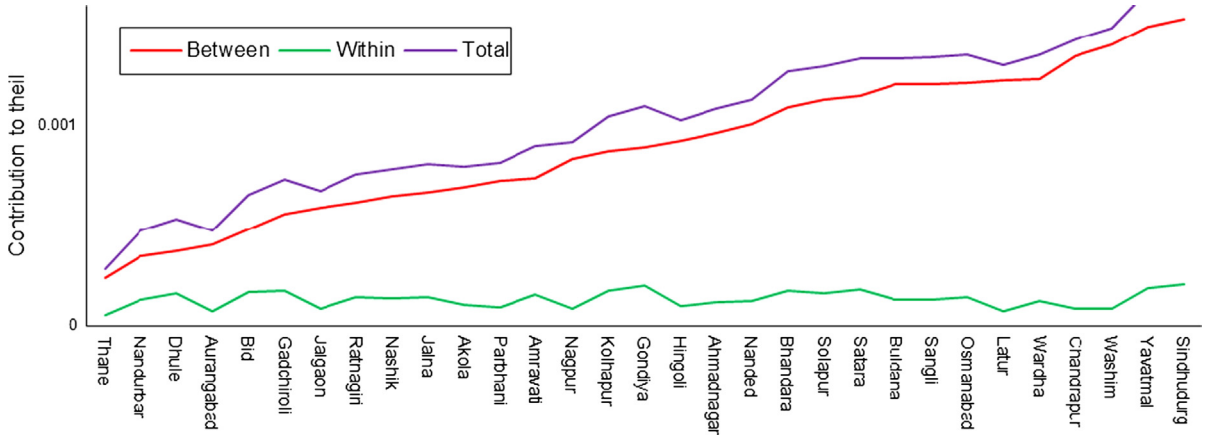

Fig. 3. 'Between', 'within' and 'total' inequalities in health workers, Maharashtra, 2007–2008.

inequality for all Districts was negative and close to the 'between' inequality line. Because the 'between' inequalities had both negative (when the health worker share is lower than HSC share) and positive values (when the health worker share is higher than the HSC share) their overall contribution to the inter-HSC was lower than the 'with' inequality contribution.

Similarly, Fig. 3 illustrates that all Districts in Maharashtra had a positive 'between district' contribution to overall inter-HSC inequality indicating a higher share of health workers relative to HSC share. However, there are notable variations between Districts in their contribution to the overall inter-HSC inequality. Districts on the right hand side of the graph have much higher 'between district' inequalities. The 'within district' inequalities were noted in all districts but there was very little variation between the districts. As both 'within' and 'between' inequalities were positive the 'total' inequality of each district was also positive.

4. Contextual factors influencing inequality in health workers

The objective of this section is to explore contextual factors influencing 'within' and 'between' inequalities in human resources at HSCs that contribute to overall inter-HSC inequalities. This analysis is restricted to district level 'between' and 'within' inequalities in human resources as the number of districts (611) is good enough to allow robust statistical analysis.

4.1. 'Between' and 'Within' District inequality in health workers

Linear regression modelling identified two factors as significantly associated with measures of 'between' District inequalities (Table 4). Districts having a higher percentage of villages connected with all weather roads were likely to have a higher share of health workers and a similar effect was seen for the percentage of villages with a primary school in a district. Distance to the District headquarters, availability of electricity in the village, and village size were non-significant when adjusted for other variables. The only factor statistically associated with within District inequality in health workers was the percentage of villages in the district with primary schools (Table 4).

5. Discussion

Health Sub-Centres (HSCs) whose health worker provision was examined in this study are the grass-root level health facilities providing basic primary health care services to the rural population as well as the link between the public health system and the community. Although a majority of the HSCs are staffed by at least one health worker, only about a third actually had both female and male workers; consistent with other studies (Balarajan et al., 2011; Government of India, 2006; Rao et al., 2011), the overall picture is of shortage of health workers especially men. An explanation may be that while Auxiliary Nurse Midwives (ANMs) are funded by the Central Government, Male Health Workers are a State government

Table 4
Contextual factors associated with 'between' and 'within' district inequality, 2007–08.

Contextual factors	Between		Within	
	Parameter estimates[a]	*P*-values	Parameter estimates[a]	*P*-values
% of villages connected with all weather roads	0.09069 (95% CI: 0.0079–0.1734)	0.032	−0.00001 (95% CI:-0.0000–0.0000)	0.626
% of villages having primary school	0.16401 (95% CI: 0.0204–0.3075)	0.025	0.00008 (95% CI: 0.0000–0.0001)	0.019
% of villages electrified	0.05139 (95% CI: −0.0166–0.1194)	0.138	−0.00001 (95% CI: −0.0000–0.0000)	0.533
% of villages within 10 km from district headquarters	0.05341 (95% CI:-0.0703–0.1771)	0.397	−0.00005 (95% CI: −0.0001–0.0000)	0.074
% of villages with population <3000	0.03422 (95% CI: −0.0250–0.0934)	0.257	0.00002 (95% CI: −0.0000–0.0000)	0.128

[a] All the regression estimates are adjusted for the effect of region of residence. Region of residence was coded into six categories, including north, central, east, northeast, west and south.

responsibility and there may be a perception that their role in disease surveillance and public health monitoring is less of a priority, with consequent reluctance to maintain funding (Lal, 2001). Although some of the constraints in appointing Male Health Workers may be overcome through current National Rural Health Mission (NRHM) interventions, a constraint is that NRHM focuses on providing additional ANMs in HSCs rather than providing a 'female–male' team. An approach such as revision of the job profile and building teams of 'male–female' workers at HSC level is required. With the emerging trend of low fertility in many parts of India the focus of HSCs as providers of maternal and child health will need to be re-balanced with a focus on emerging public health challenges such as heart disease and diabetes.

The analysis clearly showed that both 'between' and 'within' Sate inequalities in human resources contributed to overall inter-HSC inequalities. However, the within qualities contribute to about 71% of the overall HSC inequalities highlighting the need to address within State inequalities. Strategies to reduce inter-HSC inequality should focus primarily on States that contribute most to overall inequality. The States of Karnataka, Rajasthan, Uttar Pradesh, Madhya Pradesh, and Bihar have lower health worker shares relative to their HSC share. They have higher 'within' inequality. In these States more health workers are required, at least to match with their HSC share. These are the states where maternal and child health services are still lagging behind (IIPS and Macro International, 2007) and are also characterised by the highest fertility levels in the country. In addition, as the disease burden in these States is higher compared to rest of the States, low levels of human resources may further deepen the overall adverse health situation in these states. This finding supports the classic observation that people with greatest health need have the greatest difficulty in receiving health services (Balarajan et al., 2011). Almost four decades ago, Hart (1971) noted that the availability of good medical care varied inversely with the need for it in the population served. Unfortunately, the findings suggest that this remains still valid today. These States, except Karnataka, typify the north Indian region. In this group of states, the lack of an adequate supply of health care workers is the real problem. The governments in these states must strive to appoint more health care workers to meet the norm for HSCs.

The states from Southern and Eastern regions (namely, Maharashtra, Tamil Nadu, Andhra Pradesh, Orissa, West Bengal, and Assam) typically have more health workers than their share of HSCs. But these states also have high 'within' inequality. In these States policies should aim at bringing in more equitable distribution of health workers across HSCs. Having a higher share of health workers, however, does not necessarily imply that health needs are met or that they do not need more health workers. It does imply that health policies in these States are influencing allocation of human resources among HSCs. These findings are very similar to findings from developed countries where there is an overall excess of health workers but with substantial 'within' inequalities (Cash and Ulmann, 2008; Dumont et al., 2008; Ricketts et al., 2000).

The study also revealed 'between' and 'within' District inequalities in human resources to the overall inter-HSC inequalities. However, the share of 'within' and 'between' inequalities were almost equal for the overall inter-HSC inequality. Each state government should take steps to allocate human resources equitably in all the HSCs. It was clear from the analysis that even in States such as Uttar Pradesh that had the lowest share of health workers relative to their HSC share had greater 'within' district inequality in human resources. This highlights the need to address inequalities within districts in every State. Addressing 'between' district inequalities would require each State government taking steps to reduce inequalities in human resources through appropriate policies and practices that enable governments to recruit sufficient number of health workers and to retain them in HSCs.

Recently scholars have grouped the factors affecting choices of location for health professionals in rural and remote areas into 'push' and 'pull' factors (Zurn et al., 2004, WHO, 2004). These together make up a better socio-economic environment and include better living conditions, access to education for children and availability of employment for spouses. The present study for the first time documents the role of these factors in explaining the inequality of health workers in Indian context using a large-scale and representative dataset. Factors that significantly contribute to inter-HSC inequality in human resources are connectivity of villages with an all-weather road and availability of primary schools. This variable impacts on both the 'between district' and 'within district' inequality as significant differences in health worker distribution between villages with primary schools and without primary schools in a district was evident. Our findings, although limited due to data constraints, clearly suggest that the availability of health workers does depend on better connectivity and better access to other facilities like schools. This is supported by a recent study which demonstrated the role of connectivity with all-weather roads in village development (Singh et al., 2008). Moreover, if a village is connected by an all-weather road, it increases mobility among its populace which in turn can facilitate a variety of other activities to promote education, employment, and other opportunities. Our findings indeed suggest statistical association between area level (district) deprivation and uneven distribution of health workers.

This analysis highlights the importance of region- or State-specific policies reflecting the typology of inequalities in health worker provision. For example, the states belonging to the central and northern regions such as Uttar Pradesh, Madhya Pradesh and Chattisgarh must make efforts to recruit more health workers and must also strive to allocate them in districts that have the greatest need in terms of their share of HSCs. In the absence of such efforts, it is possible that interventions like NRHM will only increase 'within' inequality as is observed in the case of states coming from the southern and eastern regions of India. On the other hand,

states belonging to the Southern and Eastern regions must focus more on equitably allocating already existing human resources across HSCs. We suggest that financial incentives and awards are not likely to be enough. Effective interventions must recognise the set of key determinants for retaining health professionals in remote areas, and will need to address local contextual factors along with financial incentives. As HSCs are designed to provide basic health services to the rural population, equitable human resource distribution may be considered a justifiable aim without reference to prevalent disease patterns or other socio-economic considerations.

The limitations of the study must also be noted. First, the study only describes the inequalities in the distribution of health workers across the 18000 odd HSCs spread across the 611 districts of India. However, the Theil T and Gini do not directly correspond to deviations from the HSC norm regarding the distribution of health care workers. But a close look at Table 2 reveals that about 16% and 4% of the HSCs had three and four health workers, clearly above the two workers norm. On the other hand, about 41% of the HSCs had only one health worker. These statistics indicate that Theil T and Gini in a way do indicate towards the deviation from the HSC norm regarding distribution of health care workers. Second, we could only include those 'push' and 'pull' factors that were available in the DLHS 3 survey. We could not include variables like work environment including work overload, availability of employment for spouses, insecurity, etc. into our regression model due to unavailability of those in the DLHS 3 survey.

It can be concluded that a lack of an adequate supply of health care workers is not the only problem, but the distribution of available health care workers is also a serious problem in India. There are states that have adequate supply of health care workers but they have problems with the distribution of health workers across the HSCs. On the other hand, there are states that have problems of—both adequate supply and uneven distribution of health care workers. Our study clearly identifies regional patterns in the availability and distribution of health care workers in India. Findings clearly suggest that state level policies and programmes are likely to pay higher dividends than national level programmes like 'National Rural Health Mission' in addressing key issues related to the distribution of health care workers at the HSC level. State governments must be given more liberty to choose the best policy for them than just implementing the nationally sponsored programmes.

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