Health workforce in India: assessment of availability, production and distribution

Indrajit Hazarika

ABSTRACT

Background: India faces an acute shortage of health personnel. Together with inequalities in distribution of health workers, this shortfall impedes progress towards achievement of the Millennium Development Goals. The aim of this study was to assess health-workforce distribution, identify inequalities in health-worker provision and estimate the impact of this maldistribution on key health outcomes in India.

Materials and Methods: Health-workforce availability and production were assessed by use of year-end data for 2009 obtained from the Indian Ministry of Statistics and Programme Implementation. Inequalities in the distribution of doctors, dentists, nurses and midwives were estimated by use of the Gini coefficient and the relation between health-worker density and selected health outcomes was assessed by linear regression.

Results: Inequalities in the availability of health workers exist in India. Certain states are experiencing an acute shortage of health personnel. Inequalities in the distribution of health workers are highest for doctors and dentists and have a significant effect on health outcomes.

Conclusion: Although the production of health workers has expanded greatly in recent years, the problems of imbalances in their distribution persist. As India seeks to achieve universal health coverage by 2020, the realization of this goal remains challenged by the current lack of availability and inequitable distribution of appropriately trained, motivated and supported health workers.

Key words: Availability, distribution, health workers, inequalities, production

INTRODUCTION

In low-income countries, despite the availability of effective interventions for many priority health problems and enhanced developmental assistance, progress towards the health Millennium Development Goals is impeded by the shortage of trained, motivated and supported health workers. Health workers play a central role in ensuring the appropriate management of all aspects of the health system: From logistics and facility management to finances and health-care interventions. Furthermore, because a society's health and its development are strongly linked, health workers have an indirect but crucial role in the achievement of sustainable human and economic development. There have been efforts to expand the health workforce to meet demand. However, these efforts have been hampered by increases in factors such as population size, purchasing power for health services within communities, life expectancy and the prevalence of noncommunicable diseases and other chronic conditions.

India is a conglomeration of states with diverse levels of socioeconomic status, governance, health systems and health situations. As elsewhere, India has shortages and maldistribution within its health workforce that have contributed to inequities in health outcomes. India's health workforce is a combination of both registered, formal health-care providers and informal medical practitioners,
the latter being the first point of contact for a large proportion of the population.[6]

The country is unique because an expanding private for-profit sector is juxtaposed against a vast network of public sector health facilities, which compete for a common pool of health human resources. Moreover, despite an increasing shortage of local health professionals, India has emerged as the most important source country in the global health-workforce market. According to the 2006 World Health Report, India had 0.60 doctors, 0.80 nurses, 0.47 midwives, 0.06 dentists and 0.56 pharmacists, respectively, per 1000 population. In absolute terms, reversal of the country’s shortfall in health workers was estimated to require an investment of almost US$ 2 billion per year by 2015.[7]

In addition to the known shortage of health workers, there is a common perception that large in-country inequalities exist in their distribution. To date, the evidence to support this proposition has been limited, owing to a lack of reliable disaggregated data at the country level. This study therefore used the most up-to-date data available to assess the production, employment and distributional patterns of health workers in India. Inequalities in health-worker distribution at the state level and the impact of this maldistribution on key health outcomes were also assessed.

**DATA AND METHODS**

No ethics committee approval was required for this research

Although WHO defines health workers[7] as “all people engaged in actions whose primary intent is to enhance health”, the term “health worker” in this study was restricted to three categories: Doctors, dentists and nurses/midwives. Year-end data for 2009 on these health workers at the state level were obtained from the Indian Ministry of Statistics and Programme Implementation’s 2011 Report on Health and Family Welfare.[8] In this report, estimates on health-worker stock were derived from three databases: (i) allopathic medical practitioners registered with state medical councils; (ii) dental surgeons registered with the central/state dental councils; and (iii) information on registered nurses and midwives available to the Indian Nursing Council and Central Bureau of Health Information, Directorate General of Health Services, Government of India. In addition, national and state data on the number of educational institutions in medicine, dentistry and nursing/midwifery, as well as the number of admitted students, were extracted from the Medical Council of India (MCI), Dental Council of India (DCI) and Indian Nursing Council (INC) databases.[9,11] Ministry of Health and Family Welfare documents were used to assess the employment of health personnel and number of vacant health-worker posts.[12] This latter analysis was limited to the public sector, since data on private-sector employment were not available.

For state-wise analysis, population projections published by the Registrar General of India[13] were adjusted for differences in the projected and estimated populations from the 2011 census.[14] Densities of health workers were calculated from the workforce data described above and census data on populations. National time trends for health-worker densities were calculated for 2000–2009. Where subnational data were available, Lorenz curves and Gini indices were calculated to assess geographical inequalities in doctor, dentist and nurse/midwife densities. The Gini coefficient and Lorenz curve are measures of inequality and have been used in previous studies of health workforce inequality.[15,16] This inequality analysis was based on the density at the first administrative division below national level, which is equivalent to the state level in India.

Spearman’s rank correlation coefficient was calculated to assess the relation between health-worker density and gross domestic product (GDP) at the state level. GDP data were derived from Reserve Bank of India Handbook of Statistics on Indian Economy.[17] The relation between health-worker density and selected health outcomes was assessed by linear regression of data on infant mortality, maternal mortality, mortality in children younger than 5 years and measles immunization coverage from the 2010 Government of India Annual Report to the People on Health[18] against the density of health professionals. All variables were transformed into natural logarithms. Data analyses were done with STATA version 10.0.

**RESULTS**

**Health-worker availability**

Table 1 shows the absolute numbers and category-wise density (per 1000 population) of doctors, dentists and nurses including midwives at the national and state levels. In 2009, India had 761,806 doctors, 104,603 dentists and 1,650,180 nurses and midwives. At the national level, the aggregate density of doctors, nurses and midwives was 2.08 per 1000 population, which was lower than WHO’s critical shortage threshold of 2.28.[17] There were gross inequalities in the availability of these health workers at the subnational level. For example, states such as Bihar, Uttar Pradesh, Uttarakhand, Jharkhand and Chhattisgarh had especially severe shortages of health workers [less than 1 per 1000 population; Table 1].

The 1993 World Development Report[19] recommended that the ratio of nurses to doctors should exceed 2:1 as a minimum, with 4:1 or higher considered best for cost-effective quality care. In 2009 the ratio of nurses
to doctors in India was 1.5:1, while the ratio of nurses/midwives to doctors was 2.2:1. There was substantial variation at the state level, the ratio being lower than the national average in six out of the eight Empowered Action Group states [Table 1]. In the decade between 2000 and 2009, both the absolute numbers and the densities of doctors, dentists and nurses/including midwives have steadily increased. Figure 1 illustrates the trend in densities.

**Health-workforce production**

Review of the available data on training of health workers highlights three important developments. First, the rapid expansion in the training capacity of health workers. Between 1991 and 2013, the number of admissions to medical colleges increased from 22,438 to 49,508, i.e. by 121%, while within the same period admissions to dental institutions expanded from 3,100 to 17,921, i.e. by 596%. Similar increases occurred in nursing. In 1997, there were 659 General Nursing and Midwifery and 485 Auxiliary Nurse Midwifery institutes, which increased more than threefold to 2,487 and 1,307 institutes, respectively, in 2012. Likewise, the number of recognized nursing institutes offering the Bachelor of Science in Nursing (BSc) degree has increased from 165 in 2004 to 1,507 in 2012 [Table 2].

There were clear inequalities in the distribution of these training institutions among states. Although the Empowered Action Group states account for almost half of the country’s population, they house only approximately one-fifth of the medical colleges and a quarter of the dental and nursing institutes.

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**Table 1: State-wise availability of doctors, dentists, nurses and midwives – 2009**

<table>
<thead>
<tr>
<th>States</th>
<th>Population (million)</th>
<th>Health-worker numbers*</th>
<th>Health-worker density per 1000 population</th>
<th>Ratio of nurses and midwives per doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Doctors</td>
<td>Dentists</td>
<td>GNMs</td>
<td>ANMs</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>83.11</td>
<td>62,349</td>
<td>6510</td>
<td>136,477</td>
</tr>
<tr>
<td>North-east states</td>
<td>49.78</td>
<td>19,328</td>
<td>944</td>
<td>20,285</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>70.28</td>
<td>25,662</td>
<td>2002</td>
<td>96,574</td>
</tr>
<tr>
<td>Bihar</td>
<td>100.94</td>
<td>36,559</td>
<td>2807</td>
<td>8883</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>24.85</td>
<td>27,461</td>
<td>407</td>
<td>3945</td>
</tr>
<tr>
<td>Goa</td>
<td>1.37</td>
<td>2716</td>
<td>687</td>
<td>N/A</td>
</tr>
<tr>
<td>Gujarat</td>
<td>58.76</td>
<td>45,058</td>
<td>2684</td>
<td>88,258</td>
</tr>
<tr>
<td>Haryana</td>
<td>24.41</td>
<td>4132</td>
<td>2059</td>
<td>17,821</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>6.72</td>
<td>705</td>
<td>772</td>
<td>8550</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>12.22</td>
<td>10,906</td>
<td>1090</td>
<td>N/A</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>32.06</td>
<td>2933</td>
<td>NA</td>
<td>1998</td>
</tr>
<tr>
<td>Karnataka</td>
<td>59.86</td>
<td>83,177</td>
<td>25,612</td>
<td>136,421</td>
</tr>
<tr>
<td>Kerala</td>
<td>32.90</td>
<td>37,835</td>
<td>6655</td>
<td>85,624</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>109.27</td>
<td>134,859</td>
<td>18,159</td>
<td>93,032</td>
</tr>
<tr>
<td>Orissa</td>
<td>41.20</td>
<td>16,734</td>
<td>537</td>
<td>63,167</td>
</tr>
<tr>
<td>Punjab</td>
<td>27.07</td>
<td>38,434</td>
<td>7348</td>
<td>45,801</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>66.42</td>
<td>27,654</td>
<td>364</td>
<td>37,667</td>
</tr>
<tr>
<td>Tamil Nadu*</td>
<td>71.20</td>
<td>84,525</td>
<td>11,609</td>
<td>186,972</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>192.62</td>
<td>55,355</td>
<td>5572</td>
<td>21,042</td>
</tr>
<tr>
<td>West Bengal</td>
<td>89.65</td>
<td>58,059</td>
<td>2054</td>
<td>48,470</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>9.82</td>
<td>3085</td>
<td>451</td>
<td>92</td>
</tr>
<tr>
<td>Delhi</td>
<td>15.83</td>
<td>8999</td>
<td>6203</td>
<td>26,547</td>
</tr>
<tr>
<td>India</td>
<td>1183.56</td>
<td>761,806</td>
<td>104,603</td>
<td>1,276,626</td>
</tr>
</tbody>
</table>

**Notes:**

*GNM=Governing Nursing Midwifery, ANM=Assistant Nursing Midwifery, N/A=data not available*

a. Population data and health-professional statistics for 2009 from references 9-14; binclude Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim; cinclude data from Chandigarh proportionate to state populations, dinclude data from Chandigarh proportionate to state populations, einclude data from Chandigarh proportionate to state populations, finclude data from Chandigarh proportionate to state populations, ginclude data from Chandigarh proportionate to state populations, hinclude data from Chandigarh proportionate to state populations, iinclude data from Chandigarh proportionate to state populations, jinclude data from Chandigarh proportionate to state populations, kinclude data from Chandigarh proportionate to state populations, linclude data from Chandigarh proportionate to state populations, minclude data from Chandigarh proportionate to state populations, ninclude data from Chandigarh proportionate to state populations, oinclude data from Chandigarh proportionate to state populations, pinclude data from Chandigarh proportionate to state populations, qinclude data from Chandigarh proportionate to state populations, rinclude data from Chandigarh proportionate to state populations, sireference 10.

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**Figure 1:** Density of health professionals per 1000 population – 2000–2009

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[Image of Figure 1]
Second, there has been a notable increase in the private sector’s involvement in medical education. Prior to 1991, there were 144 medical colleges in India, 101 (70%) of which were public colleges. By 2013, the number of institutions recognized or approved by the MCI had increased to 371. There has been a disproportionate increase in the number of nongovernment colleges; 152 (67%) of the 227 new institutions are private.\(^8\) A clear understanding of the health-workforce situation is critical to the development of effective policies to develop and manage a responsive workforce. Human resource shortages hinder scale-up of health services and limit the capacity to absorb additional financial resources.\(^24\)

The primary data used in these analyses are the numbers of health personnel registered with the respective professional councils and therefore have several limitations. These councils do not maintain live registers, except for doctors in Delhi. The information they provide may be inaccurate owing to nonadjustment for deaths, migrations and retirements, or double counting of workers registered in more than one state. Furthermore, not all state councils follow the same procedure for registration, which may lead to the same procedure for registration, which may

### Distribution of health workers

Intra-state differences in health-worker availability, which may be associated with the urban–rural divide and corresponding economic disparities, could not be assessed owing to lack of access to district-level data. The analysis was therefore limited to inter-state inequalities in availability of doctors, dentists, nurses and midwives in 2009. Overall inter-state inequalities were very high, with Gini coefficients of 0.424 for doctors, 0.569 for dentists and 0.412 for nurses (note that these Gini coefficients are calculated across population groups – states with an average population of 33 815 979 individuals – rather than across individuals themselves).

There was a positive correlation between state GDP and density of doctors, dentists, nurses and midwives (Spearman's rho = 0.353; \(P = 0.116\), implying that low-income states are disadvantaged in terms of concentration of health workers.

Table 4 presents the regression results of selected national health outcomes and worker density. The results indicate that the density of doctors, nurses and midwives is associated with the variation in rates of maternal mortality, infant mortality, under-5 mortality and measles immunization. The effect of increased density was greater in reducing maternal than in reducing child mortality.

### DISCUSSION

As India strives to achieve universal health coverage, improvement in health-care delivery through the availability of skilled and motivated health workers is essential.\(^\) A clear understanding of the health-workforce situation is critical to the development of effective policies to develop and manage a responsive workforce. Human resource shortages hinder scale-up of health services and limit the capacity to absorb additional financial resources.\(^24\)

The primary data used in these analyses are the numbers of health personnel registered with the respective professional councils and therefore have several limitations. These councils do not maintain live registers, except for doctors in Delhi. The information they provide may be inaccurate owing to nonadjustment for deaths, migrations and retirements, or double counting of workers registered in more than one state. Furthermore, not all state councils follow the same procedure for registration, which may

### Table 2: State-wise production capacity of nurses and midwives – 2012

<table>
<thead>
<tr>
<th>States</th>
<th>Number of institutions or schools</th>
<th>Annual production capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GNM</td>
<td>ANM</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>249</td>
<td>46</td>
</tr>
<tr>
<td>North-east states(^a)</td>
<td>53</td>
<td>29</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>201</td>
<td>115</td>
</tr>
<tr>
<td>Bihar</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>29</td>
<td>66</td>
</tr>
<tr>
<td>Goa</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Gujarat</td>
<td>79</td>
<td>60</td>
</tr>
<tr>
<td>Haryana</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Karnataka</td>
<td>543</td>
<td>44</td>
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<tr>
<td>Kerala</td>
<td>225</td>
<td>16</td>
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<tr>
<td>Maharashtra</td>
<td>119</td>
<td>347</td>
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<tr>
<td>Orissa</td>
<td>51</td>
<td>80</td>
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<tr>
<td>Punjab</td>
<td>181</td>
<td>129</td>
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<tr>
<td>Rajasthan</td>
<td>185</td>
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<tr>
<td>Tamil Nadu</td>
<td>196</td>
<td>17</td>
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<tr>
<td>Uttar Pradesh</td>
<td>160</td>
<td>112</td>
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<tr>
<td>West Bengal</td>
<td>54</td>
<td>58</td>
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<tr>
<td>Uttarakhand</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Delhi</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Union Territories(^b)</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>India</td>
<td>2487</td>
<td>1289</td>
</tr>
</tbody>
</table>

\(\text{GNM}\) = General Nursing and Midwifery, \(\text{ANM}\) = Auxiliary Nurse Midwifery, \(\text{BSc}\) = Bachelor of Science.

\(\text{Sikkim}\) and \(\text{Kashmir}\) are not included.

Data source: Indian Nursing Council, 2012
Table 3: State-wise production capacity of doctors and dentists – 2013

<table>
<thead>
<tr>
<th>States</th>
<th>Medical – Number of institutions</th>
<th>Annual production capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government</td>
<td>Private</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>15</td>
<td>27</td>
</tr>
<tr>
<td>North-east states</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bihar</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Goa</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Gujarat</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Haryana</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Karnataka</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>Kerala</td>
<td>7</td>
<td>18</td>
</tr>
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<td>Maharashtra</td>
<td>20</td>
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</tr>
<tr>
<td>Orissa</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Punjab</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Tamil Nadu</td>
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<td>20</td>
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<tr>
<td>Uttar Pradesh</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>West Bengal</td>
<td>14</td>
<td>2</td>
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<tr>
<td>Uttaranchal</td>
<td>2</td>
<td>2</td>
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<td>Delhi</td>
<td>6</td>
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<tr>
<td>Union Territories</td>
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<td>7</td>
</tr>
<tr>
<td>India</td>
<td>176</td>
<td>195</td>
</tr>
</tbody>
</table>

*aIncludes only recognized, approved or permitted institutes; *bIncludes Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Arunachal Pradesh and Sikkim; *cIncludes Chandigarh, Puducherry, Daman and Diu, Lakshwadeep, Andaman and Nicobar and Dadar Nagar Haveli; dIncludes societies, trusts, municipal corporations, Universities and private enterprises. Source: Medical Council of India; Dental Council of India, 2012.

Table 4: Linear regression for maternal, infant and under-5 mortalities and for measles vaccination coverage by health-worker density

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Maternal mortality</th>
<th>Infant mortality</th>
<th>Under-5 mortality</th>
<th>Measles vaccination coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>$t$</td>
<td>$P&gt;</td>
<td>t</td>
</tr>
<tr>
<td>Density of doctors</td>
<td>-1.01</td>
<td>-2.92</td>
<td>0.009</td>
<td>-0.89</td>
</tr>
<tr>
<td>Density of nurses and midwives</td>
<td>-1.60</td>
<td>-3.38</td>
<td>0.004</td>
<td>-0.36</td>
</tr>
<tr>
<td>Combined density of doctors and nurses</td>
<td>-1.32</td>
<td>-3.58</td>
<td>0.002</td>
<td>-0.87</td>
</tr>
</tbody>
</table>

compromise direct comparisons. Data for health workers in some states (e.g. north-east India) are not available because there are no state-specific professional councils.\(^{[6]}\) In addition, the analyses were limited to the supply or availability of health workers and do not examine the factors such as the quality or adequacy of services provided. Nevertheless, the data used provide the most up-to-date information on India’s health workforce, are maintained by the WHO Global Atlas\(^{[25]}\) and have been used extensively for both intra-country and cross-country comparisons.

Notwithstanding these limitations, this analysis has highlighted some key issues that the Government of India and development partners should consider when addressing the health human resource crisis. There is gross inadequacy of the current stock of health workers available and significant inequalities in their distribution between the different states. Poorly performing states, in terms of health outcomes, have a greater shortfall in the number of health workers. These shortages highlight the need to develop and implement high quality, evidence-based, costed workforce plans, especially in the poorest and most fragile states.

In the past two decades, there has been tremendous progress in increasing the training capacity. This
analysis suggests three key findings regarding workforce production. First, the increase in training capacity has been largely because of the growth in private-sector involvement in medical education. This trend seems likely to increase, since incentives and regulation relaxations have been introduced to encourage private investment in medical education. While privatization of medical education has helped to overcome the shortcomings resulting from inadequate expansion of the training capacity in the public sector, it has also raised questions on the quality of medical training. An example of an initiative to standardize the quality of medical education is the MCI's decision to introduce a single National Eligibility and Entrance Test for undergraduate admissions at all government and private medical colleges. This test has not yet been implemented and there is scepticism as to how it might be transparently and fairly applied to the 800,000 students who would take the test each year. Second is the gross inequality in the distribution of the training institutes among the different states. These institutes are primarily clustered in states with high GDPs, where the issues related to shortages of health workers are relatively less acute. Third is the increased mismatch between health-worker production and vacant staff posts in the public-health systems. This finding suggests that increases in the production and overall supply of medical graduates will not necessarily address the public sector shortages. Other strategies will need to be introduced to encourage health workers to serve in the public sector.

These findings highlight major inequalities in the distribution of health workers between the states. The imbalances in the distributions of doctors and dentists were found to be higher than those for nurses. Our estimates of the inter-state inequality in the health-worker distributions were similar to previously reported estimates. The Gini index for doctors was 0.424 and for nurses and midwives was 0.412, while in a previous report it was estimated to be 0.4365 and 0.5271, respectively. These findings suggest that over a period of almost a decade there has been minimal improvement in the distribution pattern of doctors, despite rapid increases in production. The current estimates do however suggest an improvement in the distribution of nurses and midwives.

Economically disadvantaged states had both lower densities of workers and less-educated workforces. These inequalities in the availability of health workers possibly explain the inequities in health outcomes across the states, as demonstrated in the regression results. Since less-developed states are likely to have lower levels of investments in health and health systems, training, recruitment and retention of skilled health workers will remain a persistent challenge.

These findings suggest the need to trial alternative service delivery mechanisms. Some states have already experimented with the provision of doctors with lower levels of training. While the effectiveness of this cadre of health workers and the quality of care provided remains to be formally evaluated, the central government has expressed plans to expand the model. It has been proposed that a new cadre of rural health workers will be trained through a course that is an abridged version of the traditional medical degree, with a focus on core competencies such as disease prevention, health promotion and rehabilitation. This Bachelor of Rural Medical Science has been advocated as innovative move to address the country's rural health-care challenges.

The observed shortages in health workers also suggests the need to strengthen further the available alternative workforce such the Accredited Social Health Activists (front-line health workers introduced under the National Rural Health Mission) and the Ayurvedic, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) doctors. Both of these providers can play a vital role in enhancing access to basic health-care services, especially at the community level.

In conclusion, while production of health workers has greatly expanded in recent years, this has been at the cost of increased privatization of medical education in India. The rapid growth in the production of health workers such as doctors, dentists, nurses and midwives has not helped fill vacant positions in the public-health system. Further, the problems of imbalances in the distribution of these health personnel persist, with certain states remaining at a disadvantage. These findings suggest that mere increase in production capacity is unlikely to resolve the issues related to health-worker availability or distribution. There is an urgent need to adopt sustained and innovative actions to address India's current health-workforce crisis.

REFERENCES