

# **HRH Technical Report # 1**

## **INDIA'S HEALTH WORKFORCE SIZE, COMPOSITION AND DISTRIBUTION**

Krishna D Rao, Public Health Foundation of India, New Delhi  
Aarushi Bhatnagar, Public Health Foundation of India, New Delhi  
Peter Berman, World Bank, New Delhi  
Indrani Saran, Public Health Foundation of India, New Delhi  
Shomikho Raha, World Bank, New Delhi

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## EXECUTIVE SUMMARY

The extent to which health systems provide quality health services in an equitable and efficient manner influences the level of health achieved in a population. The responsibility of delivering health services falls primarily on the health workers, making them critical for any well functioning health system. The ability of health workers to provide services to different socioeconomic groups and geographic regions, their technical competence and motivation with which they perform their jobs – all contribute to improving health system performance and population health. Recent studies have shown that greater availability of health workers is associated with better service utilization and health outcomes such as immunization coverage, outreach of primary care and infant, child and maternal survival<sup>1</sup>. Thus, information about the health workforce is important for planning and in addressing labor market failures which result in the geographic and compositional mal-distribution of health workers. Yet, in many developing countries like India, information on the health workforce is typically inaccurate, fragmented and unreliable.

The main objective of this study is to estimate the size, composition and distribution of the health workforce across states in India using a variety of data sources to produce a set of ‘best available estimates’. The study also explores the association between availability of health workers and key service utilisation and health outcomes.

The study uses data from the 2001 Census of India, the National Sample Survey Organisation (NSSO) 2004-05 on Employment and Unemployment, a nationally representative household survey, and official statistics from the Government of India. Health workforce estimates from the different sources are triangulated to generate a set of ‘preferred’ estimates. The association between health outcomes and health worker density is estimated using median splines.

Results indicate that there are substantial differences between officially reported statistics and estimates from the Census and NSSO. Importantly, there is better agreement between the latter two sources. Moreover, the health workforce density in India is below the 2.5/1000 population

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<sup>1</sup> WHO 2006, JLI 2004, Anand and Barnighausen 2007

norm, though there is considerable inter-state variation. Further, doctors, female doctors, and nurses are concentrated in urban areas. Alarming, the density of female health workers is very low in India, especially in the rural areas. Moreover, the majority of the health workforce works in the private sector in both urban and rural areas. Higher worker density improves performance on measles immunization, infant mortality and attended deliveries.

This study shows that a variety of data sources available in many developing countries can be used to provide useful information on the health workforce and evaluate its reliability. At the same time, health workforce estimates reported by the Government and other agencies need strengthening in terms of comprehensiveness, reliability and ability to report current information on the health workforce. As the estimates obtained suggest that the density of health workers is less than the WHO norm of 2.5 workers/ 1000 population India needs policy measures to increase density of health workers, especially in rural areas and certain economically poor states.

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## 1. INTRODUCTION

The extent to which health systems provide quality health services in an equitable and efficient manner influences the level of health achieved in a population. Individuals, families, and health workers are all important providers of health care. However, the responsibility of delivering health services falls primarily on the health worker making them central to the health systems capacity to delivery health services. Issues concerning the health workforce such as its capability to cover different socioeconomic groups and geographic regions, the technical competence and skills of individual health workers and motivation with which they perform their jobs – all contribute in important ways to improving health system performance and population health.

Having an adequate health workforce in terms of numbers and skill mix is critical for countries like India which hope to make significant progress towards achieving the Millennium Development Goals for health. Recent studies show that greater availability of health workers is associated with better service utilization and health outcomes such as immunization coverage, outreach of primary care and infant, child and maternal survival (WHO 2006, JLI 2004, Anand and Barnighausen 2007). In addition to numerical strength, the effectiveness of the health workforce is influenced by the skill mix, quality and geographical distribution of health workers, a work environment and infrastructure which enables them to effectively use their skills, adequate remuneration and opportunities for upgrading and refreshing skills. Information on these factors is a basic requirement for policy makers and planners to better manage the health workforce and make it more effective.

Information on India's diverse health work force is surprisingly fragmented and unreliable, despite recent efforts at quantifying it (WHO 2007, GOI 2005). The World Health Organisation (WHO) defines health workers as “all people primarily engaged in actions with the primary intent of enhancing health” (WHO 2007). In India's context this encompasses a great diversity of workers in terms of their skills, qualification, the system of medicine practiced and the sector (public or private) in which they are employed.

The Government collects information on the number of health workers employed in the public sector and reports on doctors, dentists and nurses registered with their respective state professional councils. In principal, this information covers the main health workers working in the public and private sectors. However, information on registered doctors, dentists and nurses from their respective state councils is likely to be inaccurate. There are several reasons for this including double counting of workers due to their being registered in more than one state, non-adjustment for health workers leaving the workforce due to death, migration and/or retirement. Further, various categories of health workers like physiotherapists, registered medical practitioners, health administrators, medical technicians and faith healers are not recorded in official statistics. In sum, the size and composition of the health workforce in the private sector, which employs the majority of health workers, is not reliably known. This has important consequences on the reliability of the information on India's health workforce as a whole.

Recent data sources on India's population offer an important opportunity to estimate the size of India's health workforce and evaluate the reliability of these estimates. The overall aim of this study is to estimate various dimensions of India's health workforce, in particular, the number, composition and geographic distribution of health workers. Three different data sources are used to derive workforce estimates - the Census 2001, the National Sample Survey (2004-05), and human resource in health estimates reported by the Government of India. The first part of this study compares mainly national level workforce estimates from these three sources. Health workforce estimates from these different sources are triangulated and evaluated. The second part of this study focuses on the geographical and sectoral distribution of the health workforce. The third part of the study explores the association between availability of health workers and key service utilization and health outcomes.

This report is structured as follows. Section 2 describes the different data sources used in this study. Section 3 provides a brief description of the methods used in estimating the size of the health workforce. Section 4 presents results from the analysis. A discussion of the results follows in Section 5. Various appendices at the end of the report provide detailed estimates of the health workforce.

## **2. DATA SOURCES**

### **Census of India**

The 2001 Census collected information on the self-reported occupation of all individuals in the country. A sample drawn from this population was used by the Census to generate estimates of the health workforce in the country. From each district of the country, 20% of the rural and 50% of the urban enumeration blocks (EB) were selected using systematic sampling. An EB consisted of 600 and 750 individuals in the urban and rural areas, respectively. In the 11 smaller states and union territories (< 2 million population) all EBs were selected, making the total sample size roughly 300 million individuals. The sample estimates were then inflated by a factor of 5 for rural and 2 for urban to get population totals.

Each individual in a selected EB was classified as a “Main Worker” if he/she worked for 6 months or more in the past year, “Marginal Worker” for less than 6 months and “Non-Worker” if he did not work at all in the past year. This study presents results for main workers.

### **National Sample Survey Organisation (NSSO)**

Data was from the 61<sup>st</sup> round (July 2004-June 2005) of the National Sample Survey (NSS) on ‘Employment and Unemployment’, a multi-stage stratified cluster sample survey covering the entire country was used to estimate health workforce totals. The survey was spread over 7,999 villages and 4,602 urban blocks covering 1, 24,680 households and 602,833 persons: 398,025 in rural areas and 204,808 in urban areas.

Based on majority of time spent during the 365 days before the survey, the usual principal activity of the sampled individuals was classified as: ‘Employed’, ‘Unemployed’ (job seekers, domestic duties, etc.) and ‘Not in Labor Force’ (students, pensioners, etc.). Information on the self-reported economic activity of employed individuals was recorded. Subsidiary economic activities of individuals were also recorded, if at least 30 days in the past year were spent on

economic activity. This study presents the results of the usual principal activity of employed individuals.

### **Government of India**

The Ministry of Health and Family Welfare (MOHFW), Government of India reports on certain aspects of human resources in the health sector through the Central Bureau of Health Intelligence and various official periodicals such as Health Information of India and the Bulletin of Rural Health Statistics. These sources include estimates of health workers employed by the public sector such as the number of doctors, specialists, multipurpose workers, other allied health workers and registered AYUSH practitioners. Government publications also report on the total number of doctors, dentists and nurses in the country, which is sourced from the Medical Council of India (MCI), the Dental Council of India and the Indian Nursing Council (INC), respectively. These councils compile the reported number of registered practitioners from their state counterparts. While the respective professional councils are autonomous institutions, the health workforce estimates reported by them have been included under the 'Government of India' category since they are reported in MOHFW publications.

### **3. METHODOLOGY**

#### **3.1 Classification of Health Workers**

The NSSO and the Census use the National Industrial Classification (NIC) and National Occupational Classification (NCO) codes to classify worker occupations. For example, in the NIC classification, health workers are grouped as those involved in hospital activities, medical and dental practices and other human health activities. On the other hand, the NCO classifies health workers according to their specific occupation such as doctors, nurses, homeopaths, ayurvedic practitioners, medical assistants etc. Therefore the NCO classification provides a finer differentiation between occupations compared to the NIC. As a result, this study uses the NCO classification to identify categories of health workers.

#### **3.2 Comparability of the Census and NSSO Health Workforce Estimates**

Several adjustments were made to make the NSSO and Census estimates comparable. These relate to the period of data collection and the different NCO classification codes used. The Census estimates of the population and health workers reflect the situation as on March 2001. The NSSO survey was conducted between July 04-June 05 and the health workforce estimates reflect the situation in this period. To make health workforce totals from these two data sources and time periods comparable, the Census estimates of the total number of health workers was inflated by 8% to reflect the growth in the general population between 2000 and 2005. This upward adjustment assumes that the growth in the health workforce follows that of the general population.

The NSSO and the Census used different NCO code series to classify health workers. While the Census used the NCO-2004 codes, the NSSO used the NCO-1968 codes. The NCO-68 classification codes were converted to the NCO-2004 codes with little loss of information. To further improve comparability between the two data sources, certain health worker categories were merged together. The final set of health worker categories for which estimates were

produced include - allopathic physicians & surgeons, dentists, AYUSH practitioners, nurses & midwives, dentists, pharmacists, others (dietitians, opticians, dental assistants, physiotherapists, medial assistants and technicians and other hospital staff) and other traditional practitioners. The type of health worker included in each category is shown in Annex 1.

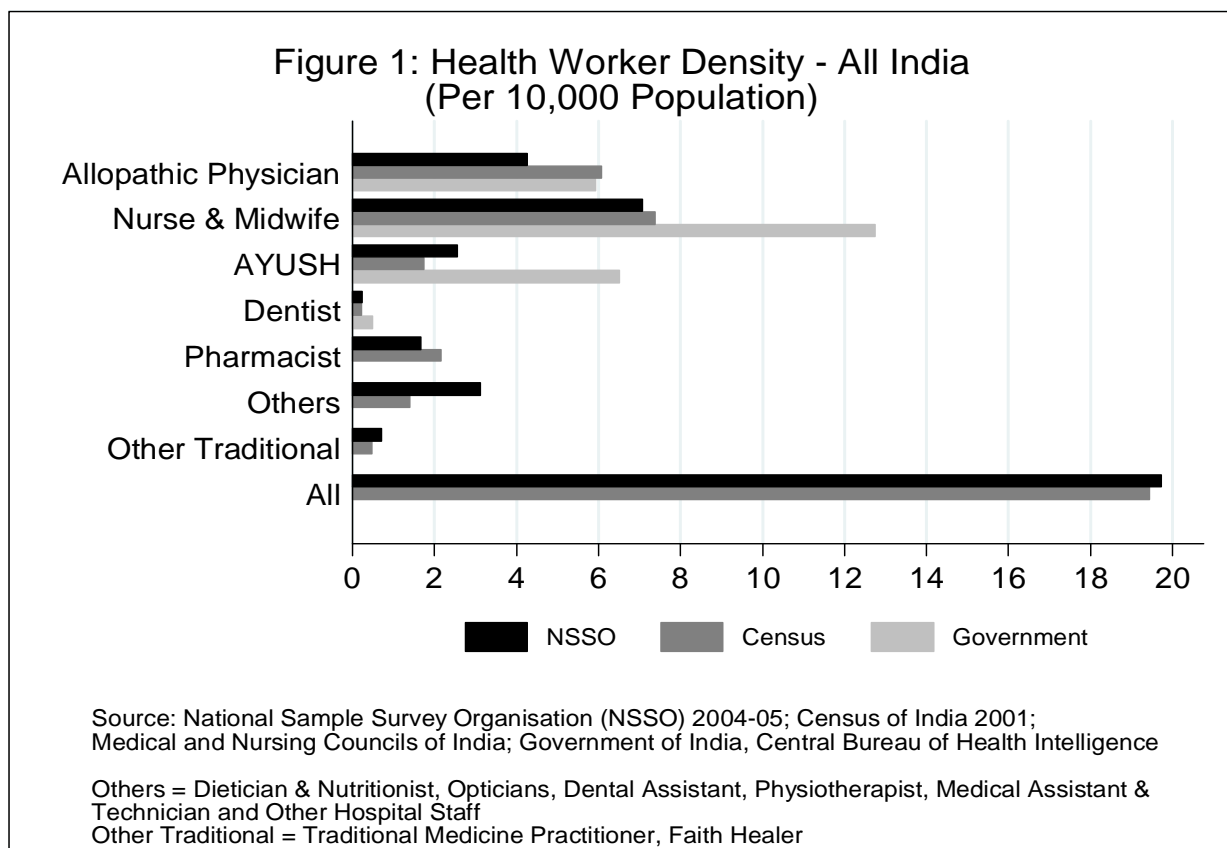
The method of identifying individuals in the workforce differs between the Census and the NSSO and in some cases this could lead to the NSSO overestimating the number of health workers. The Census classified each individual as a “Main Worker” if he/she worked for 6 months or more in the past year, “Marginal Worker” for less than 6 months and “Non-Worker” if he/she did not work at all in the past year. The NSSO used a different approach - based on majority of time spent by an individual during the 365 days before the survey, the individual’s usual principal activity was classified as: ‘Employed’, ‘Unemployed’ (job seekers, domestic duties, etc.) and ‘Not in Labor Force’ (students, pensioners, etc.). The analysis of occupation codes is limited to ‘Main Workers’ in the Census and to the principal activity of employed persons in the NSSO. In some cases this difference in classification between the Census and the NSSO can lead to overestimation by the NSSO. For example: if a health worker is employed in the labour force for 5 months, unemployed for 4 and not in the labour force for 3 months, the NSSO would record his or her usual principal activity status as ‘employed’ whereas the Census would consider him only a “marginal worker”. This hypothetical individual will be included in the NSSO estimate as belonging to the health workforce (if he or she was a health worker) but would be excluded in the Census estimate. However, in the vast majority of cases both the NSSO and the Census classify individuals similarly.

Other data adjustments for imputing missing values and to make NSSO and the Census estimates comparable are described in Annex 2. In almost all cases, health worker categories were grouped together because the broad categories were more comparable between the Census and the NSSO. However, nurses and midwives were grouped together because they have overlapping job functions.

**4. SIZE AND COMPOSITION OF THE HEALTH WORKFORCE IN INDIA: TRIANGULATING RESULTS FROM DIFFERENT DATA SOURCES**

**4.1 Size and Composition of the Health Workforce**

Estimates of the number health workers by category in India according to the NSSO and Census are shown in Figure 1. All estimates are for the year 2005. The NSSO and the Census estimates of total health workers are remarkably similar (Figure 1). Both these sources estimate that India has around 2.2 million health workers, which translates into a density of approximately 20 health workers per 10,000 population. The Government estimate of the total number of health workers was not available.



Health workers were classified into the following broad categories - allopathic physicians (including surgeons), nurses and midwives, AYUSH physicians, dentists, pharmacists, Others (includes dieticians, nutritionists, opticians, dental assistants, physiotherapists, medical

assistants, medical technicians and other hospital staff) and Other traditional health care practitioners (includes traditional medical practitioners and faith healers). Size and density estimates of health worker types within the Others and Other Traditional category is shown in Annex 3 and 4.

Amongst different health worker types estimates from the Census, NSSO and the Government differ, and in some cases, these differences are quite substantial. In general, however, except for Allopathic Physicians and Others, estimates from the NSSO and Census are quite similar. The density of allopathic physicians according to the Census (6.07 per 10,000 population) is similar to that of the Government (5.93), but substantially higher than that of the NSSO (4.28). In 1961, the Mudaliar Committee recommended a doctor-population ratio of 1:3000, which translates into around 3 physicians per 10,000 population (GOI 2005). Despite the current doctor density being higher than this recommended level, it is low in comparison to more developed countries in North America, Western Europe, Australia and others such as China and Cuba (GOI 2005).

The difference between the Government estimates and those of the Census and NSSO are more dramatic for the Nurses and Midwife category. Nurse and midwife density according to the Census (7.39) and NSSO (7.09) are very similar, but are about half as much as that reported by the government (12.77). The nurse density in India is low in comparison with more developed countries in North America, Western Europe, Australia and others such as China, Thailand and Cuba (GOI 2005).

The relative share of allopathic physicians and nurses & midwives in the health workforce indicates that there is approximately 1.2 nurses and midwives per allopathic physician (Census estimate). If only nurses are considered, then there are approximately 0.81 nurses per allopathic physician in India, suggesting that there are more doctors than nurses. From a health systems point of view, the ratio of nurses to doctors is very low. According to the 1993 World Development Report, as a rule of thumb, the ratio of nurses to doctors should exceed 2:1 as a minimum with 4:1 or higher considered more satisfactory for cost-effective and quality care (World Bank 1993). However, certain countries like Cuba, China and Sri Lanka which have impressive health indicators have low nurse-doctor ratios (GOI 2005). Though there is no gold

**Box 1: What Is A Doctor?**

The Census and the NSSO classify worker occupations based on self-reported occupation descriptions. This procedure of identifying and classifying health workers can over estimate the number of qualified health professionals. For example, individuals with a range of qualifications practice as allopathic doctors in India. These include specialists, general practitioners, rural medical practitioners, and others with no formal training or certification in medicine. A study conducted in Udaipur district of Rajasthan in 2003 found that 41% of private practitioners who called themselves doctors had no medical degree, 18% had no medical training at all and 17% had not even graduated from high school (Banerjee, Deaton and Duflo 2003).

The 61<sup>st</sup> round (July 2004-June 2005) of the National Sample Survey (NSSO) on ‘Employment and Unemployment’ collected information on the self-reported occupation, educational and technical qualifications of respondents. This makes it possible to cross-check the technical qualification of individuals classified as allopathic doctors (Table B1). A total of 75% of the individuals classified as doctors had some medical training, which means that 25% of those identified as doctors had no technical training in medicine at all. However, individuals with an undergraduate diploma or certificate in medicine cannot be considered as a qualified doctor by any standard. A total of 63% of the individuals classified as ‘doctors’ had either a technical degree or a post graduate diploma or certificate in medicine are included as doctors, which means that 38% of the identified doctors did not have adequate training in medicine.

Table B1 Technical Qualification of Individuals Classified as Allopathic Physicians in the NSSO.

<b>Technical Qualification</b>	<b>Urban (%)</b>	<b>Rural (%)</b>	<b>All (%)</b>
Technical Degree in Medicine	52	16	38
Diploma or Certificate (below graduate level) in medicine	5	21	12
Diploma or Certificate (above graduate level) in medicine	28	21	25
No technical degree, diploma or certificate in medicine	15	42	25
	100	100	100
	(282,224)	(194,471)	(476,695)

Note: Figures in parenthesis is the total number of individuals classified as allopathic physicians.

The fairly large percentage of less-than qualified allopathic doctors suggests that the NSSO (and Census) estimates of the number of allopathic doctors in India should be interpreted with caution. The number of qualified allopathic physicians could be between 25% to 38% lower than the estimated number of allopathic physicians.

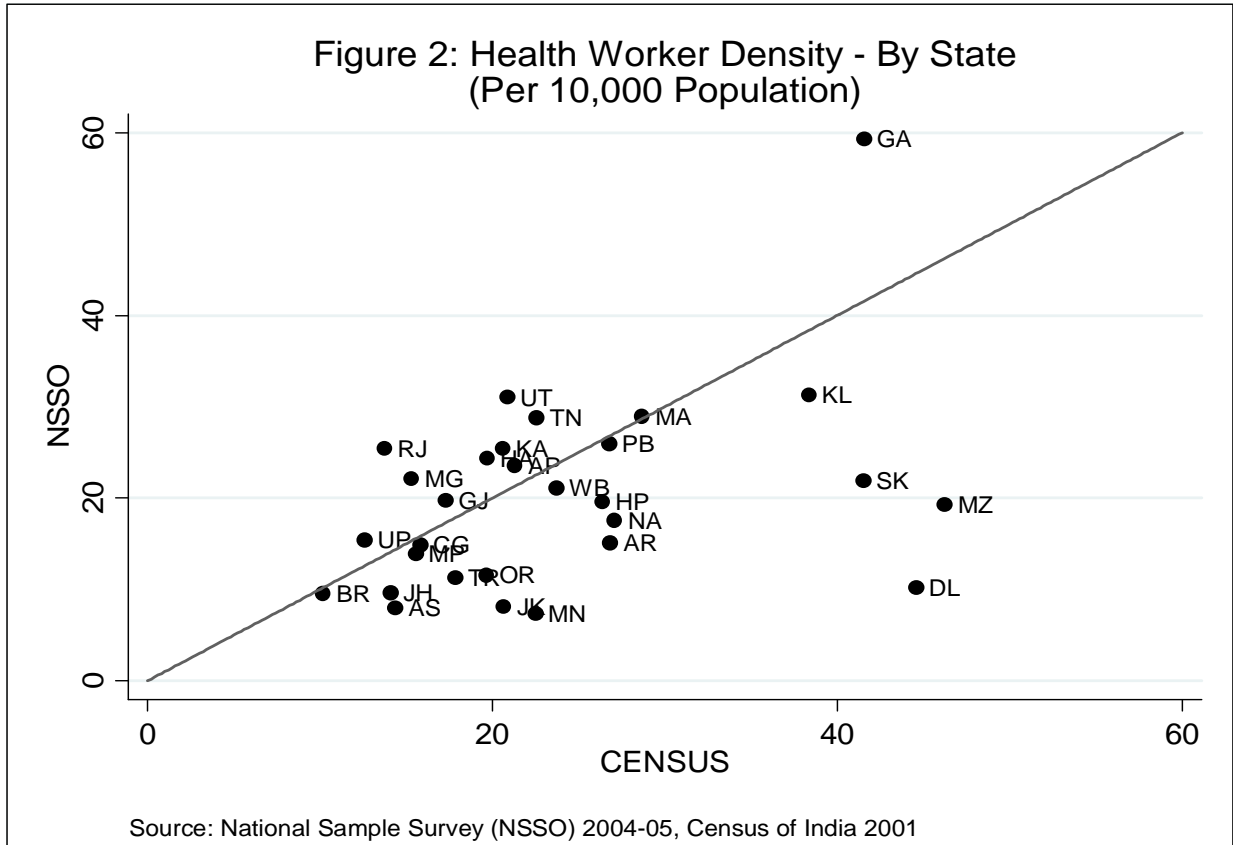
standard for a nurse-doctor ratio, a higher ratio is preferred because nurses can deliver many of the basic clinical care and public health services, particularly at the community level, at a lower cost than trained physicians.

The density of AYUSH practitioners differs among the three data sources (Census 1.76, NSSO 2.58; Govt. 6.52) but the difference is the largest for the Government estimates. For dentists, the density estimates of the Government (0.50) are twice that of the Census (0.21) and NSSO (0.24), the latter being close. Density estimates of pharmacists are similar in the Census (2.15) and the NSSO (1.68). In the 'Others' category, which mainly includes technicians, assistants and allied health workers, the NSSO estimates are almost twice that of the Census. Density estimates for Other Traditional workers, which mainly includes traditional healers, for both the Census (0.46) and the NSSO (0.73) are very similar.

Overall, the health workforce estimates from the Census and NSSO tend to correspond well with each other at the aggregate level. This is seen both in the total health worker density and, barring few exceptions, in the densities of individual health worker categories. Government estimates tend to be substantially higher than the Census and NSSO estimates.

#### **4.2 Size of the Health Workforce across States**

State level health workforce density estimates from the Census and NSSO are shown in Figure 2. There is considerable variation in the density of health workforce across the states in India (Figure 2 and Annex 7). These range from a low of 10 per 10,000 in Bihar (BR) to a high of 42 in Goa. However, most states tend to cluster in the range of 10 to 30 per 10,000.



In Figure 2, states lying on or close to the diagonal line have very close correspondence in their health workforce density estimates from the Census and the NSSO. States whose NSSO density estimates are higher than the Census lie above the diagonal, while states whose Census density estimates are higher than the NSSO lie below the diagonal. While many states tend to lie on or close to the diagonal line indicating good correspondence between the Census and NSSO estimates, the majority of states lie below the diagonal line, indicating that the Census estimates of health worker density are generally higher than those of the NSSO. Disaggregated results for allopathic doctors and nurses & midwives also show a similar pattern of higher Census estimates (results not shown).

State level comparisons have been limited to the Census and NSSO and excluded the Government density estimates for the following reasons. Government estimates of health worker densities at the state level are available for certain types of health workers like doctors and nurses. Therefore state level estimates are possible only for certain health worker categories

which prevents estimating total health workforce densities. Second, estimates of the full range of states are not possible given that information on some states is missing or states have been grouped together. For example, doctors seeking registration in any of the north eastern states register themselves with the State Medical Council of Assam. Furthermore, Government estimates may not always be accurate as doctors registered with a particular state council may be working in other states.

### **4.3 Triangulation and Selection of the “Preferred” Estimate**

The previous sections provided a comparative analysis of the health workforce estimates from the Census, the NSSO and the Government. In general, there is a higher degree of correspondence between the Census and NSSO estimates compared to those of the Government. In selecting a preferred data source for health workforce estimates, several criteria need to be kept in mind. These include, the reliability and validity of the estimates, the sample size on which they are based (in the case of the Census and NSSO), and the comprehensiveness of the information in terms of the number of health worker categories and states covered.

Government estimates of the health workforce are important because they can potentially provide the exact number of different types of health workers available in the country or state at a given point in time and on an ongoing basis. These estimates are based on a variety of sources including internal information systems for health workers employed by the public sector and from the various professional councils such as the medical, dental, nursing and AYUSH councils for the total number of registered doctors, dentists, nurses and AYUSH practitioners.

One set of issues concerning Government data is its comprehensiveness in terms of the health worker categories, geographic distribution and states covered. For example, there is no information on certain health worker categories in the private sector like medical technicians, pharmacists and practitioners of traditional medicine. This prevents estimating the size of the entire health workforce in India. Further, it is only possible to estimate the urban-rural distribution of certain health worker categories and not for the entire health workforce. All states

are also not included in the Government reported data. For instance, doctors working in the north-east are registered in the Assam Medical Council, which prevents estimating the number of doctors in each of the seven north eastern states of India.

The reliability of Government reported data is also important. The various state councils record the number of registered practitioners in their field on an ongoing basis. However, it is not clear how and if these estimates are adjusted for professionals leaving the state due to death, retirement or migration (internal and external). Not adjusting to this attrition leads to overestimation of the number of health workers due to double counting of the same worker in two states, and counting of health workers who are not in the workforce because they have passed away, retired or migrated out of the country. Further, it seems that not all states follow the same registering procedure which raises issues of comparability. For example, the Delhi Medical Council requires doctors practicing in Delhi to register themselves every five years, a practice which is not followed in other state medical councils.

The Census and NSSO estimates of the health workforce have several attractive features which overcome the problems in Government reported data. As they are based on population counts in each state, they avoid the problem of double counting, cover a large variety of health workers, are available for all states in India, provide geographic estimates and have fewer comparability issues because they are based on standard occupational codes like the NCO and NIC. However, they have their own set of problems too. For one, both the Census and NSSO estimates are based on self-reported occupations and it is quite likely that some unqualified health workers are also counted among the qualified ones, resulting in an overestimation of qualified medical workers (see Box 1). Secondly, and this pertains only to the NSSO, the small sample size prevents robust disaggregated estimates at the state level and by health worker type. A third issue concerns the frequency of data collection. The NSSO survey on Employment and Unemployment repeats itself every five years while the Census is carried out once in ten years. Therefore these data sources cannot provide health workforce estimates on an ongoing basis, which might be important to planners and policy makers.

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Overall, the Census appears to be the preferred source on which to base estimates of the health workforce. An important reason behind this is the sheer size of its sample which covered every district in the country and, within each district, both urban and rural areas. This allows for robust estimates of the health workforce across health worker categories, states and geographical areas. Further, the Census estimates have been shown to have good correspondence with the NSSO estimates indicating good reliability.

## 5. DISTRIBUTION OF INDIA’S HEALTH WORKFORCE ACROSS STATES : CENSUS ESTIMATES

The previous section of this report described the size and composition of India’s health workforce using different sources of data. In this section, the distribution of all health workers, doctors, nurses & midwives and female health workers across states and between urban and rural areas is examined using the “preferred” estimate, i.e. the Census.

The distribution of the health workforce across states of India is illustrated in Figures 8 to 11. In these figures, states were ranked from lowest to highest according to the relevant health workforce density and then divided into quartiles, each quartile containing approximately 25% of the states. States were then colour coded according to the quartile which they belonged.

### 5.1 All Health Workers

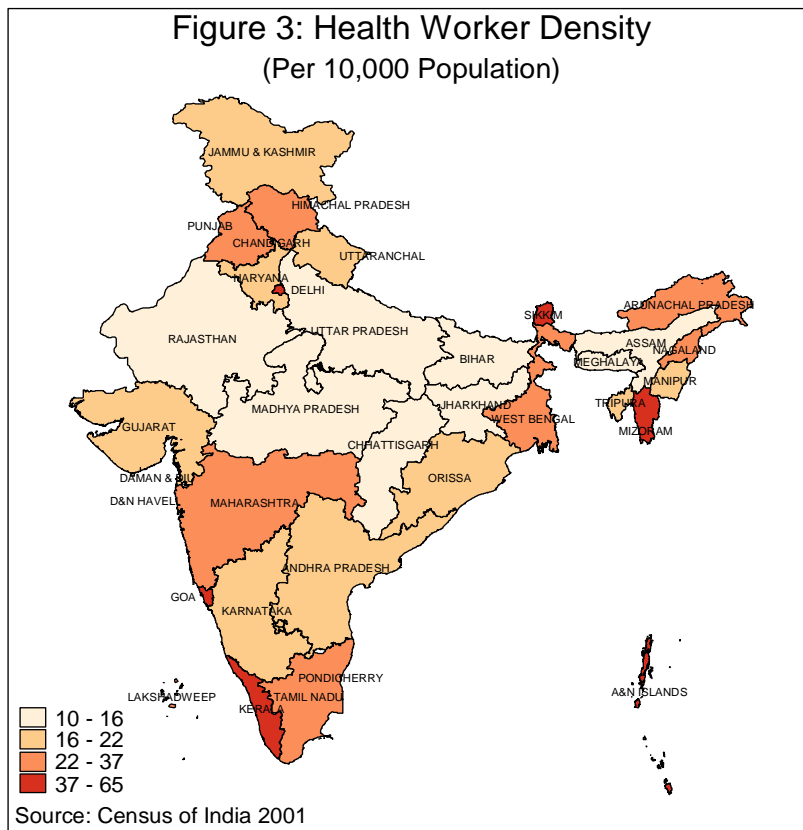
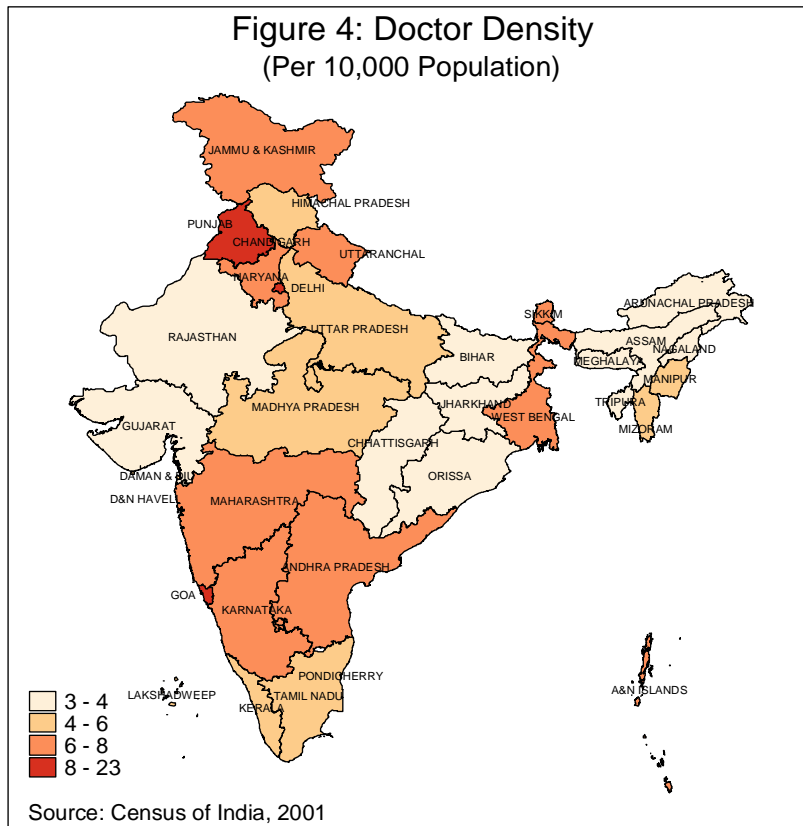


Figure 3 shows the distribution of India’s total health workforce across different states. States with low health workforce density, which are present in the bottom density quartile (10 - 16 workers per 10,000 population), tend to cluster in the belt running across north-central India. This spans the states of Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Assam and Meghalaya. These states are

also amongst the poorest in the country. States which are in the second quartile (16 – 22 workers

per 10,000 population) include Jammu & Kashmir, Haryana, Uttaranchal, Orissa, Andhra Pradesh, Karnataka, Manipur and Tripura. States with higher workforce densities i.e. those in the top two quartiles, includes the states of Punjab, Himachal Pradesh, Maharashtra, Goa, Kerala, Tamil Nadu, West Bengal, Mizoram, Nagaland and Arunachal Pradesh,. Some of the high health worker density states like Goa (41) and Kerala (38) have up to four times as many health worker densities as the low density states like Bihar (10) and Uttar Pradesh (13).

## 5.2 Allopathic Doctors and Surgeons



The distribution of allopathic physicians across different states is shown in Figure 4. States with low doctor density, which are present in the bottom two density quartile (3 to 6 doctors per 10,000 population), tend to cluster in the belt running across north-central India. This spans the states of Gujarat, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Orissa, Assam and the rest of the north-eastern states of India; which

are also amongst the poorest in the country. Other low doctor density states include Himachal Pradesh and, surprisingly, Kerala and Tamil Nadu. States with higher doctor densities i.e. those in the top two quartiles, tend to cluster in northern and southern India. These include the states of Jammu & Kashmir, Punjab, Haryana, Uttaranchal, Maharashtra, Goa, Karnataka and Andhra Pradesh. There is considerable disparity between physician densities between states in the top

and bottom quartiles; states like Goa (11) and Kerala (6) have doctor densities up to three times as high as the low density states like Orissa (3) and Chhattisgarh (4).

### 5.3 Nurses and Midwives

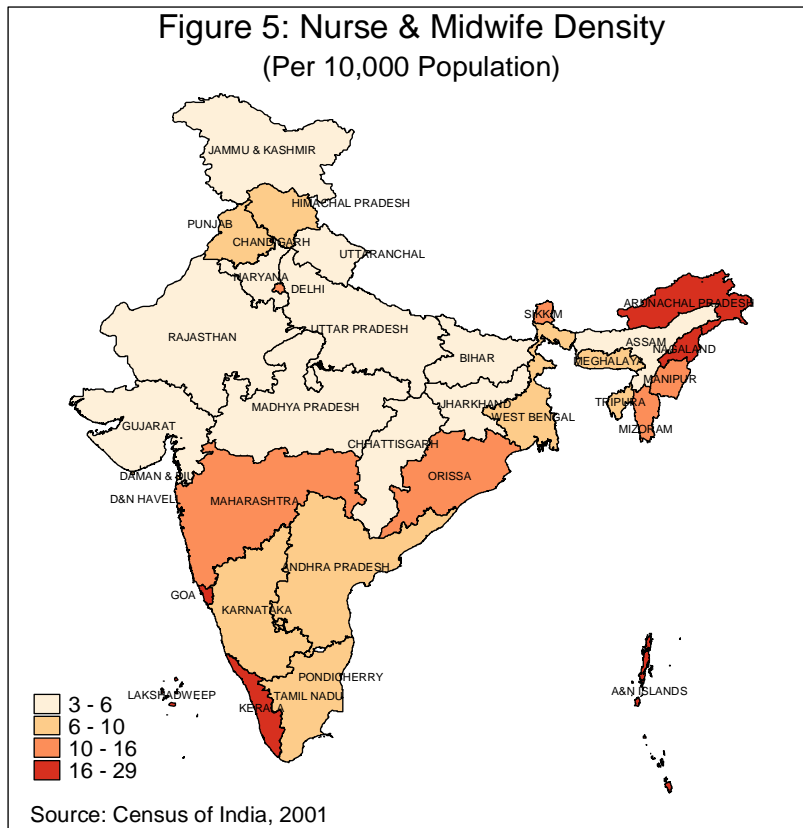
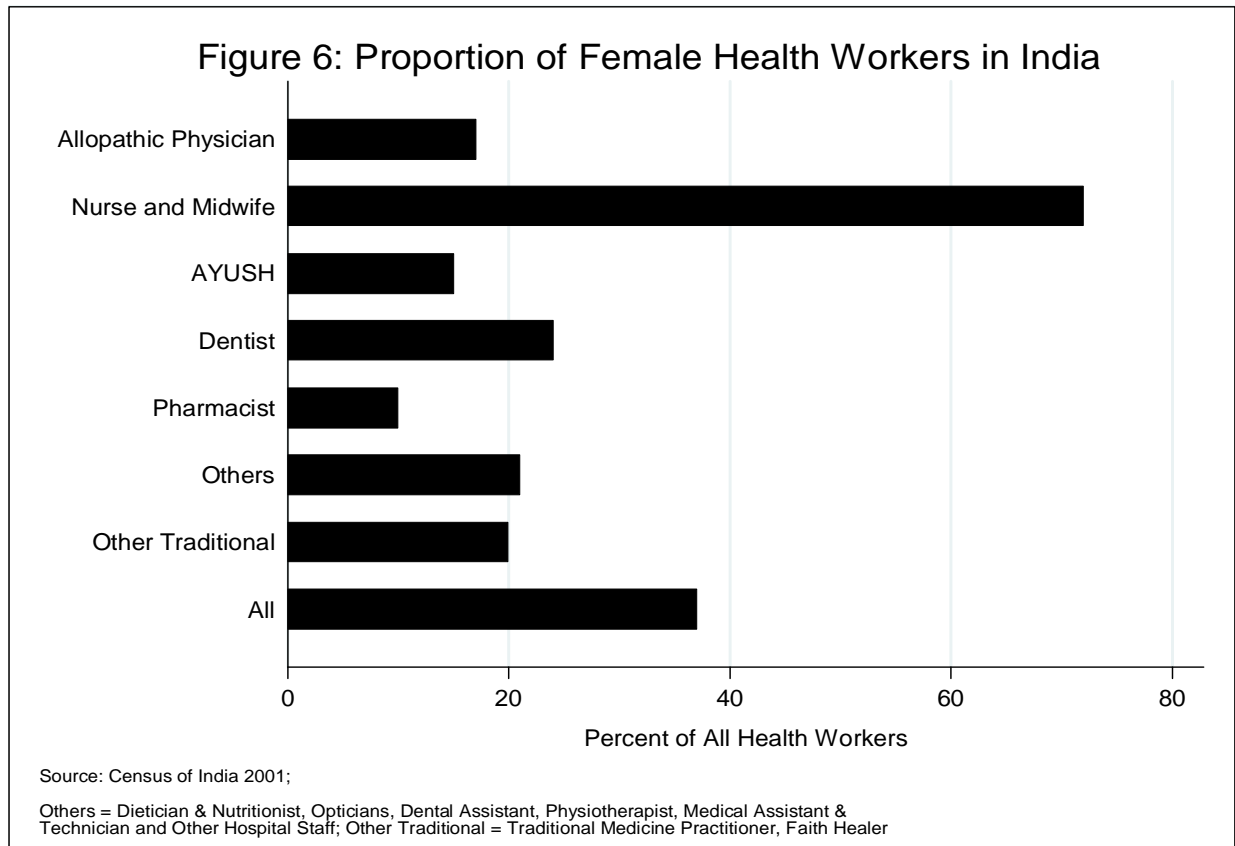


Figure 5 shows the distribution of nurses & midwives across different states. Most of northern and central states fall in the bottom two density quartiles (less than 10 workers per 10,000 population). These include the states of Gujarat, Rajasthan, Haryana, Punjab, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, West Bengal and Assam. Many of these

states, with the exception of Gujarat, Haryana and Punjab are also amongst the poorest in the country. Other low nurse & midwife density states include Karnataka, Andhra Pradesh and Tamil Nadu. States with higher nurse and midwife densities i.e. those in the top two quartiles, are present in the southern and eastern part of India. This includes the states of Maharashtra, Goa, Kerala, Orissa, Manipur, Mizoram, Arunachal Pradesh, Nagaland and Tripura. Differences between states in the bottom and top quartiles is considerable; some of the high nurse & midwife density states like Goa (20) and Kerala (19) have densities up to six times as much as the low density states like Bihar (3) and Uttar Pradesh (3).

## 5.4 Female Health Workers

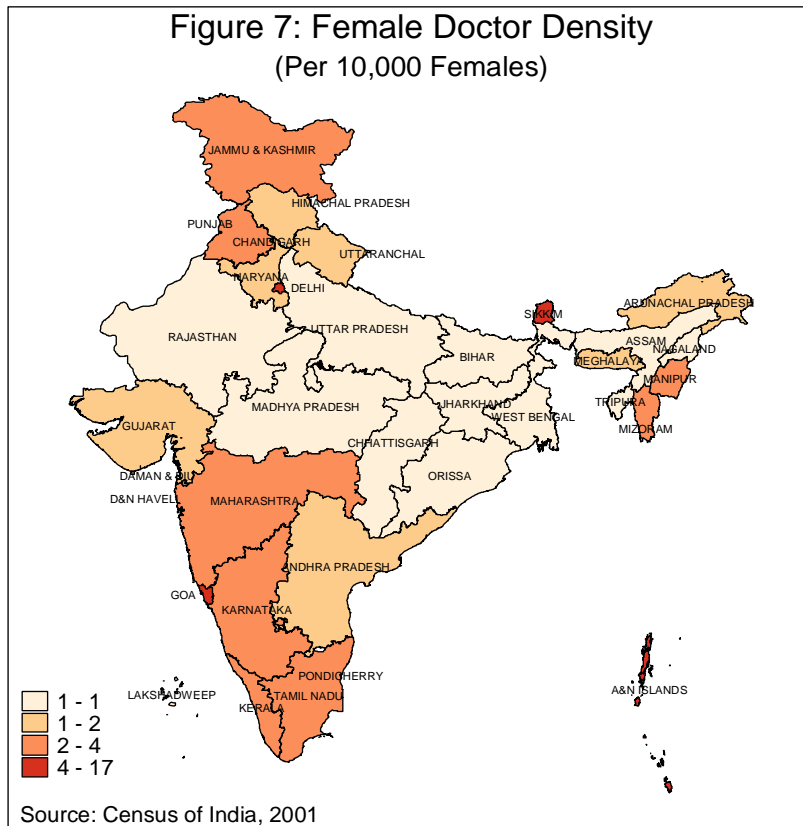
Female doctors and health workers are a critical part of the health workforce. The presence of female doctors and health workers in health facilities and in communities is important for women’s access to health services. While female doctors and health workers provide health care to the general population, for many women in India, they are the main providers of health care, especially for reproductive and gynaecological health.



In India, there are approximately 7 (15) female health workers per 10,000 population (females). This is remarkably low, when compared to the total health workforce density of 20 per 10,000 population, indicating that women comprise only around a third of all health workers in the country (Figure 6). The share of female doctors is also surprisingly low. There are around 1(2) female doctors per 10,000 population (females). Compared to the density of 6 doctors per 10,000 population, female doctors comprise only 17% of the doctors in the country. Female nurse and

midwife density is around 5 (10) per 10,000 population (females). Not surprisingly, female nurses and midwives constitute the majority of the 7 per 10,000 nurses and midwives in India.

As expected, there are substantial differences in the presence of female health workers between urban and rural areas in the country. The density of female health workers in rural and urban India is around 3 and 16 per 10,000 population, respectively, making the density of the urban female health workforce more than five times that of rural areas. This difference is even more remarkable in terms of the female population. The density of female health workers per 10,000 females in urban (35) is around five times that of rural (7) areas.



The density of female doctors is around 3 (6) in urban and 0.2 (0.4) in rural areas per 10,000 population (females), making the density of female doctors in urban areas 15 times that of rural areas. Compared to the rural density of 3 doctors per 10,000 population, female doctors comprise only 6% of the rural doctors in the country. Urban-rural differences in the availability of female nurse & midwives is also quite large.

The density of female nurses & midwives in urban (11) is around four times that of rural (3) areas.

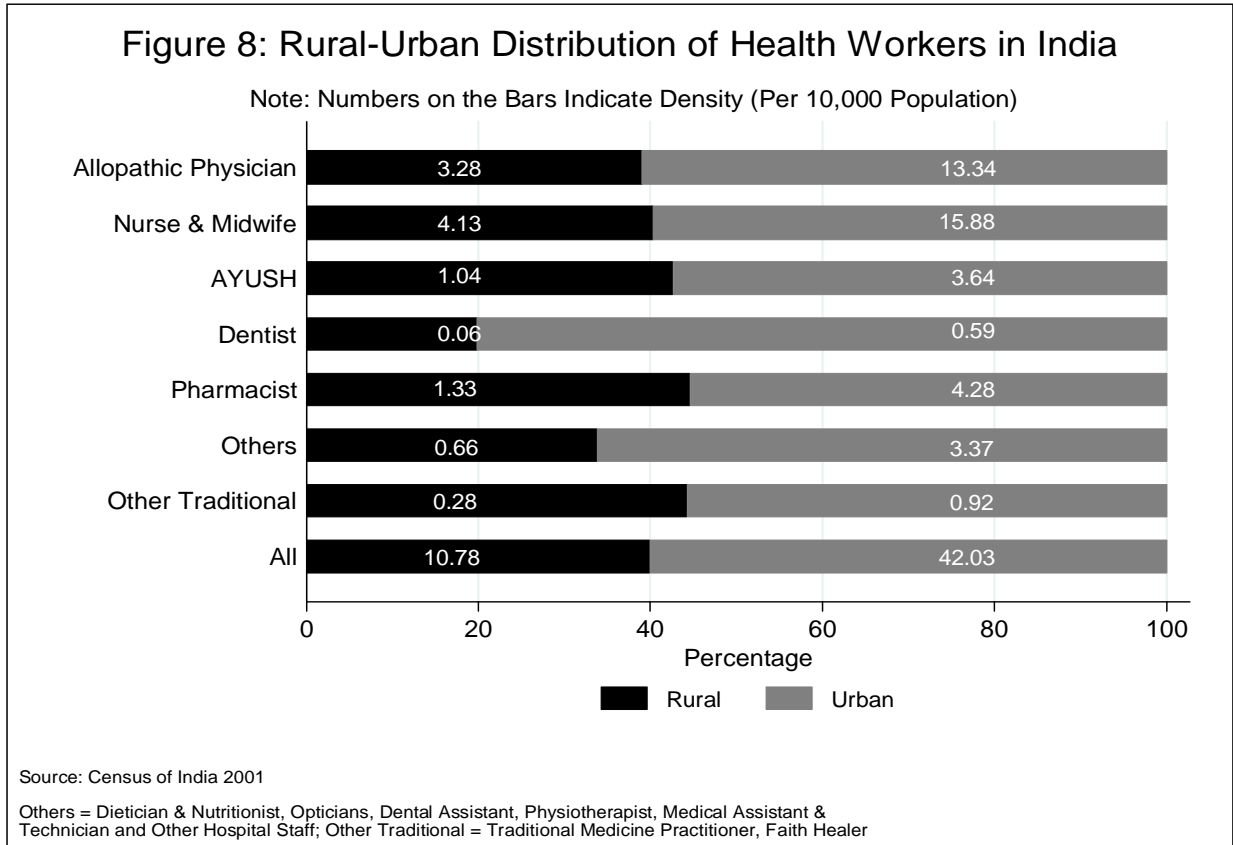
The geographic distribution of female health workers, particularly doctors, indicates substantial variability (Figure 7). States with low female doctor density, which are present in the bottom two density quartiles (less than 2 female doctors per 10,000 females), tend to cluster in the belt

running across north-central India. This spans the states of Gujarat, Rajasthan, Haryana, Himachal Pradesh, Uttaranchal, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, West Bengal, Orissa, Assam, Arunachal Pradesh and Nagaland. The bulk of these states, with the exception of Gujarat and Haryana, are also amongst the poorest in the country. States with higher female doctor densities i.e. those in the top two quartiles, tend to cluster in the north and southern and north-eastern fringes of India. This includes the states of Jammu& Kashmir, Punjab, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Manipur and Mizoram. Some of the high female doctor density states like Kerala (4) have densities up to eight times as much as the low density states like Bihar (0.5) and Uttar Pradesh (1).

### **5.5 Rural-Urban Distribution of the Health Workforce**

The rural-urban distribution of health workers is an important issue for India and it is well known that the distribution of health workers is heavily skewed towards urban areas. Figure 8 describes the urban-rural distribution of India's health workforce according to the Census. These estimates indicate that overall and across most health worker categories, typically 60 percent of the health workers are present in urban areas. In contrast, only 28% of the country's population is urban (Census of India 2001).

Health worker density in urban and rural areas is dramatically different, with the density of health workers in former being 4 times that of latter. This is particularly alarming because the rural population is a little more than two and a half times the urban population, indicating that a relatively small fraction of the country's health workforce is available in areas where the majority of the population resides. Government estimates of the number of health workers in rural and urban areas are only available for those in the public sector.

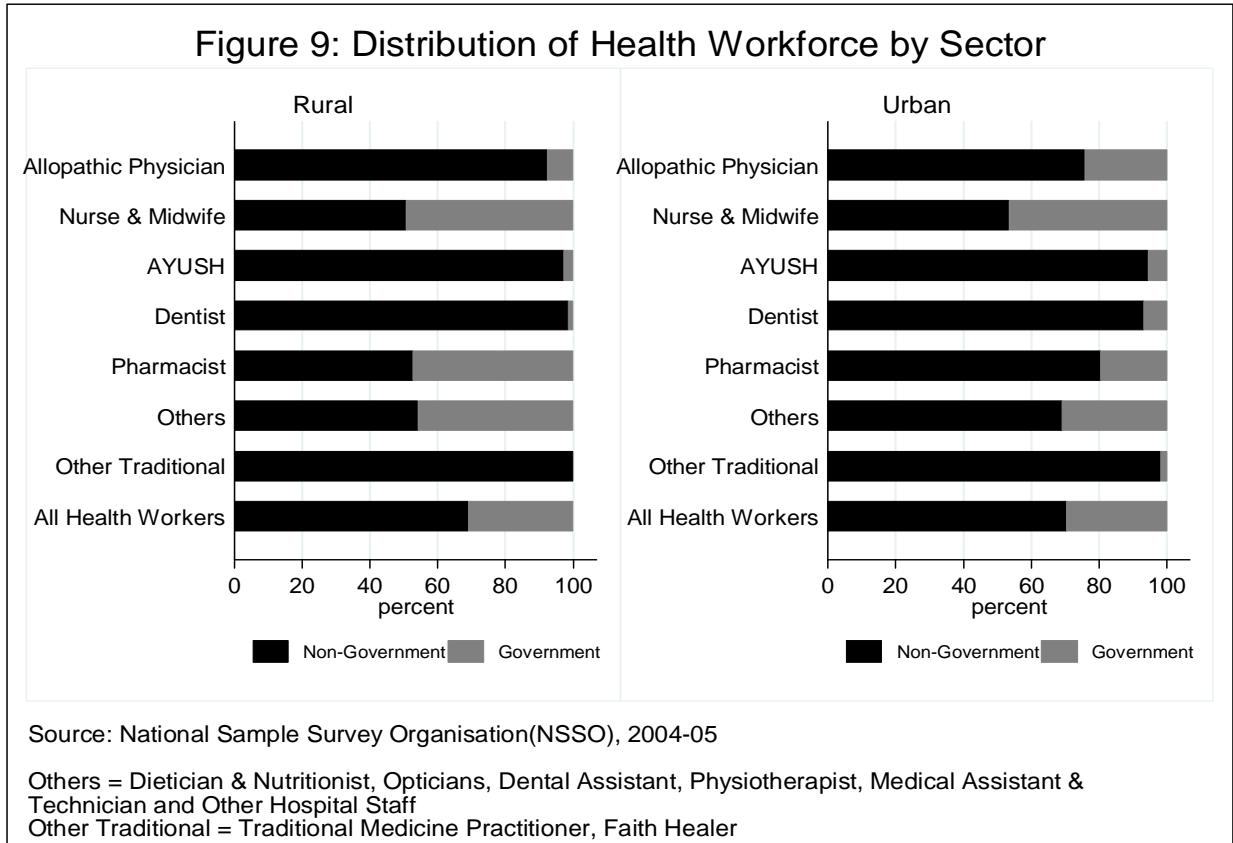


Allopathic physicians are highly concentrated in urban (13.34) compared to rural (3.28) areas. In general, there are a little more than four times as many allopathic physicians in urban compared to rural areas. Nurses and Midwives density is similarly skewed between urban (15.88) and rural (4.13). In general, there are slightly more than three times as many nurses and midwives in urban compared to rural areas. The distribution of other health worker groups like dentists, AYUSH practitioners, Pharmacists, Others and Other Traditional health workers follows the similar patterns with urban densities being two to ten times higher in urban compared to rural areas (see Annex 4).

## **6. HEALTH WORKERS IN THE GOVERNMENT AND NON-GOVERNMENT SECTOR**

Data on health workers in the public and private sector were available only from the NSSO. Figure 9 shows the distribution of health worker categories by sector (public or private). Overall, the majority (70%) of health workers work in the private sector in both urban and rural areas. This pattern generally holds across health worker categories though there are some important exceptions.

The majority of allopathic physicians in rural (90%) and in urban (80%) are employed by the private sector, indicating that the public sector plays a small role in providing physician services in both rural and urban areas of India. This finding confirms findings from other studies which show that the majority of curative care services are provided by the private sector in India (GOI 2005). In contrast, around 50% of the nurses & midwives in both urban and rural areas are employed by the public sector. While this indicates that the public sector contains a large capacity to providing nursing and midwifery services in both rural and urban areas, this finding is at variance with findings from national surveys which indicate that the majority of attended births take place in the private sector (IIPS 2005). AYUSH physicians and dentists are also mostly present in the private sector in both urban and rural areas. Pharmacists and health workers in the Others category tend to be equally distributed between the public and private sector in rural areas, but are mostly present in the private sector in urban areas. Other Traditional health workers are mostly in the private sector.



Government estimates also suggest that the distribution of health workers is heavily skewed towards urban areas. The total number of allopathic doctors in the government service is approximately 77,000 (CBHI 2006). According to the Medical Council of India, there are a total of 660,856 doctors in the country. It follows from this that there are approximately 583,900 doctors in the private sector which indicates that 12% of the doctors are in public and 88% in private sector. This is very similar to the NSSO estimates. The National Commission on Macroeconomics and Health (2005) also found the health workforce to be highly concentrated in the non-government sector. The Commission conducted a survey in 8 districts to find 75 percent of specialists and 85 percent of technology services in the private sector. The survey also reported that the private sector provided 75 percent of services for dental health, mental health, vascular and cancer diseases and, more significantly, 40 percent for communicable diseases and deliveries.

## **7. DISCUSSION AND POLICY IMPLICATIONS**

This study shows that a variety of data sources can be used to provide useful information on the health workforce in India. The results from this study suggest that the Census appears to be the preferred source for health workforce estimates. An important reason behind this is its large sample size which covered every district in the country and, within each district, both urban and rural areas. This allows for robust estimates of the health workforce across health worker categories, states and geographical areas. Further, the Census estimates have been shown to have good correspondence with the NSSO estimates at the aggregate level, indicating good reliability.

The health workforce estimates reported by the Government and allied agencies need strengthening in terms of comprehensiveness, reliability and ability to report current information on the health workforce. In regard to this, an important recommendation to the state professional councils would be to maintain a live register of health workers.

The quality of health workforce data in the Census and NSSO can be strengthened in several ways. These include greater clarity in the NCO codes, redefining some health worker categories and grouping them under more appropriate headings. Certain categories of health workers like community health workers deserve separate classification codes. Community health workers have been an important part of rural health workforce in India. Yet, the current classification either merges them with nurse & midwives or leaves them out of the count. This is of crucial significance as the Government employs five hundred thousand Accredited Social Health Activists (ASHAs) under its National Rural Health Mission and nearly 1 million community workers for the Integrated Child Development Scheme, adding a significant number to the health workforce especially in rural areas.

Both the Census and NSSO identify health workers on self-reported occupations. This allows the inclusion of health workers who have little or no formal medical training to be counted among professionally trained health workers. Accurate health workforce estimates would need such health workers to be separately identified.

The findings from the study provide many suggestions for policy makers and planners as well as the Census and other health information systems for collection and classification of health workforce information. The upcoming Census in 2011 could consider modifying its questionnaire in a manner which would separate out the professionally trained medical practitioners from those who are not. Similarly, the use of new classification codes can segregate a nurse from a midwife.

Estimates from both Census and NSSO indicate that the density of health workers is less than the WHO norm of 2.5 workers/ 1000 population (WHO 2006, JLI 2004). These findings suggest the need for policy measures to increase density of health workers, especially doctors, nurses and female health workers. However, when community workers like ASHAs are added to the aggregate health workforce, India appears to meet the WHO norm.

The large geographic differences in the health workforce, both in terms of rural-urban and between states, are important challenges in reforming India's health workforce policies. The disparity between urban and rural areas is particularly significant as the urban population accounts for less than a third of India's total population. Similarly, the distribution of health workers between public and private sector is also a cause of concern, mainly due to higher cost of treatment involved in the private sector.

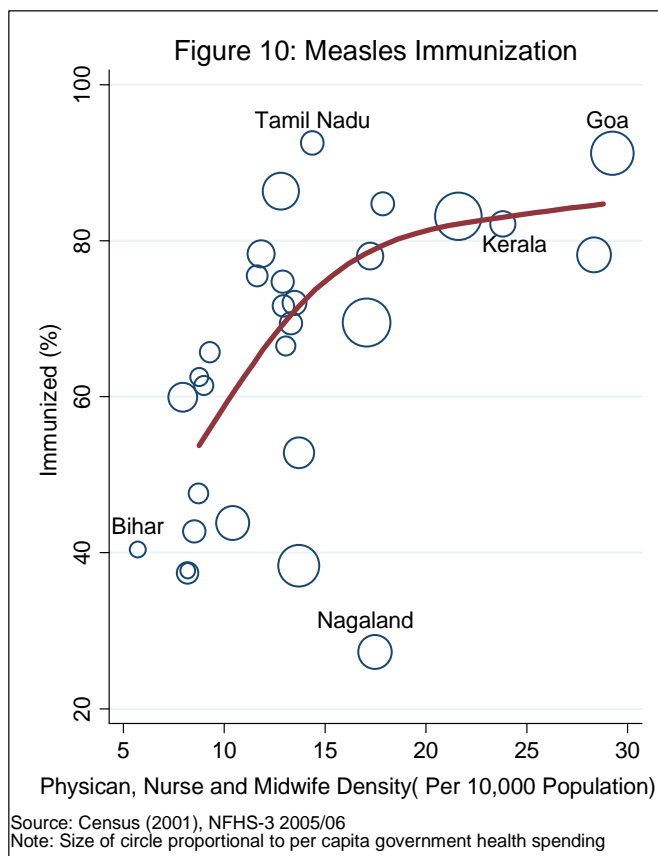
Another important issue, especially from a health systems point of view, is the adverse nurse-doctor ratio of 0.8. A higher nurse-doctor ratio is preferred because nurses can deliver many of the basic clinical care and public health services, particularly at the community level, at a lower cost than trained physicians.

Providing health services to rural areas has been a priority for the Government. However, the large percentage of physicians present in urban areas, in contrast to the more equitable distribution of nurses, suggests that nurses might be more suitable for providing basic health services in rural settings. Moreover, the presence of female doctors and health workers in health facilities and in communities is important for women's access to health services. Thus, there is an urgent need to increase the availability of female health workers, especially in rural areas.

**8. HEALTH AND SERVICE UTILIZATION OUTCOMES AND THE HEALTH WORKFORCE**

A series of recent studies showed that the availability of health workers is an important determinant of service utilization and key health outcomes including immunization coverage, outreach of primary care and infant, child and maternal survival (WHO 2006, JLI 2004, Anand and Barnighausen 2007). Since health services are delivered by health workers, having an adequate health workforce in terms of size, composition, quality and geographical distribution is important for ensuring uptake of health services and population health.

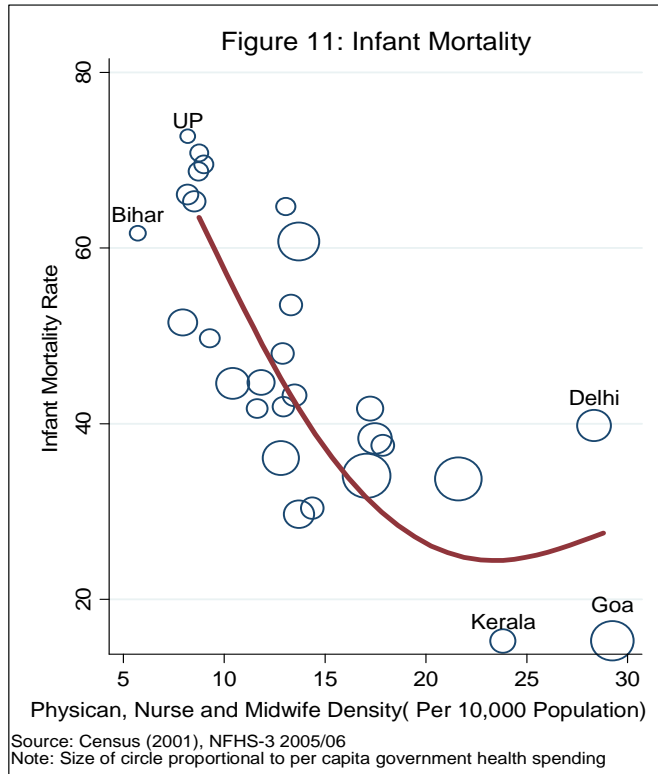
This section of the report examines the association between health workforce availability (i.e. density) and key health and service utilization outcomes at the state level in India. Health worker density here includes the combined density of allopathic physicians, nurses and midwives. These health workers were chosen because they are involved in providing a range of health services to the population.



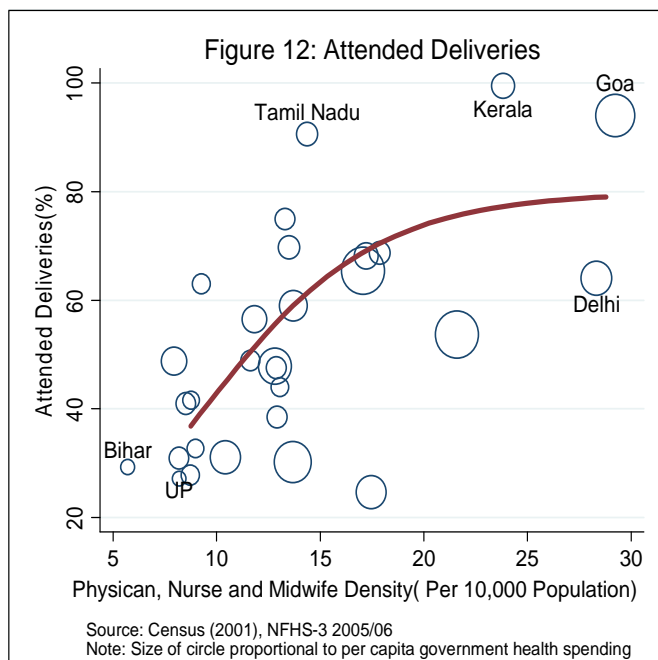
Figures 10, 11 and 12 show the association between health worker density and coverage of measles immunization (Figure 10), infant mortality (Figure 11) and assisted deliveries (Figure 12). Each circle in the graph represents a state and the size of the circle indicates the relative size of per capita government health spending in the state. The trend lines in each graph are from fitting median splines to the data.

All three figures show a strong association between health workforce density and health outcomes and service use. Higher worker density is associated with higher measles immunization, lower infant

mortality and greater attended deliveries. Typically, the health and service use indicators improve rapidly as health workforce density increases and then plateau after a certain density level.



In all three Figures the effect of health workforce density on the outcomes of interest appears to peak and plateau between 20 to 30 health workers (doctors, nurses and midwives) per 10,000 population. This simple association suggests the importance of health worker adequacy for improving service use and better health. Further, in general, states with higher per capita health spending tend to have higher workforce density and better health outcomes. State health spending and workforce density is closely linked since the majority of state health spending is on workforce salaries.



Among states, Bihar and UP tend to have low health worker density and poor health outcomes, while Goa and Kerala are at the opposite extreme. While Figures 10 to 12 indicate that there is a strong association between health workforce density and health and service utilization outcomes, interestingly there is considerable variation in these outcomes for given density levels, particularly at lower workforce densities. For example, Tamil

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Nadu has better or comparable performance relative to Goa and Kerala in terms of measles immunization and attended deliveries, though it has a considerably lower health workforce density. Such large variation in health and service utilization outcomes for given health workforce density indicates that there are several factors other than the workforce density which are influencing health and service utilization. This includes, among other things, the efficiency of health workers, their quality, their distribution and composition. These are important areas of further research.

**BIBLIOGRAPHY**

1. Anand S and Bärnighausen T. 2004. “Human resources and health outcomes: cross-country econometric study”. *Lancet*, 364: 1603–09.
2. Anand S and Bärnighausen T. 2007. “Health Workers and Vaccination Coverage in Developing Countries: An Econometric Analysis”. *Lancet*, 369: 1277-1285.
3. Banerjee A, Deaton A and Duflo E. 2004. Wealth, Health and Health Services in Rural Rajasthan. Paper No. 8, Poverty Action Lab, Massachusetts Institute of Technology.
4. Census of India. 2001. <http://www.censusindia.gov.in>
5. Government of India. 1961. Report of Health Survey and Planning Committee (Chairman: Mudaliar), Ministry of Health and Family Welfare, Government of India.
6. Government of India. 2005. Human Resources for Health. In Financing and Delivery of Health Services in India. National Commission on Macroeconomics and Health Background Papers, Ministry of Health and Family Welfare, Government of India.
7. Government of India. 2005. Central Bureau of Health Intelligence. <http://www.cbhidghs.nic.in>
8. Government of India. 2006. Bulletin on Rural Health Statistics in India. Infrastructure Division, Department of Family Welfare, Ministry of Health and Family Welfare, Government of India.
9. International Institute of Population Sciences. 2005. National Family Health Survey (NFHS-3), 2005-06, India. International Institute of Population Sciences and ORC Macro: Mumbai.
10. Joint Learning Initiative. 2004. Human Resources for Health – Overcoming the Crisis. Joint Learning Initiative, Harvard University and World Health Organization.
11. Medical Council of India. 2005. <http://www.mciindia.org>
12. National Sample Survey Organisation. 2004-05. 61<sup>st</sup> Survey Round on Employment and Unemployment in India. National Sample Survey Organisation, New Delhi.
13. World Development Report. 1993. World Bank, Washington DC.
14. World Health Organisation. 2006. Working Together for Health – World Health Report 2006. World Health Organization, Geneva.

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15. World Health Organisation. 2007. Not Enough Here... Too Many There – Health Workforce in India. World Health Organization, Country Office for India.

**ANNEXURE**

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**ANNEX 1: CONCORDANCE TABLE FOR NCO-1968 AND NCO-2004**

CATEGORIES	NCO 1968 USED FOR CLASSIFICATION BY NSSO	NCO 2004 USED FOR CLASSIFICATION BY CENSUS
<b>ALLOPATHIC PHYSICIANS/SURGEONS/SPECIALISTS</b>	<b>Allopathic physicians/surgeons/specialists = 070</b> 070.10 Physician, General 2221.10 070.15 Surgeon, General 2221.15 070.20 Anatomist, Medical 2221.20 070.25 Anaesthetist 2221.25 070.30 Psychiatrist 2221.30 070.35 Neurologist 2221.35 070.40 Dermatologist 2221.40  070.45 Ear, Nose and Throat Specialist 2221.45 070.50 Cardiologist 2221.50 070.55 Radiologist 2221.55 070.60 Tuberculosis Specialist 2221.60 070.65 Ophthalmologist 2221.65  070.70 Venereologist 2221.70 070.75 Obstetrician 2221.75 070.78 Gynaecologist 2221.78 070.80 Paediatrician 2221.80 070.85 Orthopaedist 2221.85 070.90 Surgeons and Medical Specialists, Allopathic, Other 2221.90	<b>Allopathic physicians/surgeons = 2221</b> 2221.10 Physician, General 070.10 2221.15 Surgeon, General 070.15 2221.20 Anatomist, Medical 070.20 2221.25 Anaesthetist 070.25 2221.30 Psychiatrist 070.30 2221.35 Neurologist 070.35 2221.40 Dermatologist 070.40 2221.42 Allergy Specialist 2221.45 Ear, Nose and Throat Specialist 070.45 2221.50 Cardiologist 070.50 2221.55 Radiologist 070.55 2221.60 Tuberculosis Specialist 070.60 2221.65 Ophthalmologist 070.65 2221.68 Urologist 2221.70 Venereologist 070.70 2221.75 Obstetrician 070.75 2221.78 Gynaecologist 070.78 2221.80 Paediatrician 070.80 2221.85 Orthopaedist 070.85 2221.90 Surgeons and Medical Specialists, Allopathic, Other 070.90
	<b>Public Health Physicians = 078</b> 078.10 Health Officer 2229.10	<b>Health Professional (except nursing) = 2229 (20%)</b> 2229.10 Health Officer 078.10 2229.15 Administrator, Hospital 2229.30 Physician, Osteopathic
<b>DENTISTS</b>	<b>Dentists = 074</b> 074.10 Dentist 2225.10	<b>Dental Specialists = 2225</b> 2225.10 Dentist 074.10 2225.20 Oral and Maxillofacial Surgeon 2225.30 Orthodontist 2225.40 Periodontist 2225.50 Prosthodontist

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		2225.60 Paediatric Dentist 2225.90 Dental Specialists, Other	
<b>AYUSH</b>	<b>Ayurvedic physicians/surgeons = 071</b> 071.10 Physician, Ayurvedic 071.20 Physician, Sidha	2222.10 2229.40	<b>Ayurvedic physicians/surgeons = 2222</b> 2222.10 Physician, Ayurvedic 2222.90 Physicians and Surgeons, Ayurvedic, Other 071.10
	<b>Homeopathy physicians/surgeons = 072</b> 072.10 Physician, Homoeopathic 072.20 Physician, Bio-Chemic	2223.10 2223.20	<b>Homeopathy physicians/surgeons = 2223</b> 2223.10 Physician, Homeopathic 2223.20 Physician, Bio-Chemic 2223.90 Physicians and Surgeons, Homeopathic, Other 072.10 072.20
	<b>Unani physicians/surgeons = 073</b> 073.10 Physician, Unani	2224.10	<b>Unani physicians/surgeons = 2224</b> 2224.10 Physician, Unani 2224.90 Physicians and Surgeons, Unani, Other 073.10
<b>NURSES, MIDWIVES AND RELATED PROFESSIONALS</b>	<b>Nurses = 084</b> 084.10 Nurse, General 084.20 Nurse, Specialist 084.30 Nurse, Industrial 084.90 Professional Nurses, Other	3231.10 2230.20 3231.20 2230.90	<b>Nursing Professionals = 2230</b> 2230.10 Nurse, Specialist 2230.90 Professional Nurses, Other 084.20 084.90
	<b>Nursing, Sanitary and other Medical Health Technicians (not classified elsewhere)= 089</b> 089.10 Nursing Attendant 089.20 Midwifery Attendant 089.30 Sanitary Inspector 089.40 Sanitary Daroga 089.50 Masseur 089.90 Nurses and Other Medical & Health Technicians, Other	3231.30 3232.20 3222.10 3222.20 3226.40 3231.90	<b>Nursing Associate Professional = 3231</b> 3231.10 Nurse, General 3231.20 Nurse, Industrial 3231.30 Nursing Attendant 3231.90 Nurses, Other 084.10 084.30 089.10 089.90  <b>Sanitarians = 3222</b> 3222.10 Sanitary Inspector 3222.20 Sanitary Darogha 3222.90 Sanitarians, Other 089.30 089.40
	<b>Midwives &amp; Health Visitors = 085</b> 085.10 Midwife 085.20 Lady Health Visitor	3232.10 3232.30	<b>Midwives = 3232</b> 3232.10 Midwife 3232.20 Midwifery Attendant 3232.30 Lady Health Visitor 085.10 089.20 085.20

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		3232.90 Midwifery Associate Professionals, Other
<b>PHARMACISTS AND RELATED</b>	<b>Pharmacists = 076</b> 076.10 Chemist, Pharmaceutical 2113.70 076.20 Pharmacist 3228.10	<b>Pharmaceutical Assistants= 3228</b> 3228.10 Pharmacist 076.20 3228.20 Laboratory Assistant, Pharmaceutical 083.10 3228.90 Pharmaceutical Assistants, Other
	<b>Pharmaceutical Assistants = 083</b> 083.10 Laboratory Assistant, Pharmaceutical 3228.20	
<b>MEDICAL ASSISTANTS AND TECHNICIANS</b>	<b>Vaccinators, Inoculators and Medical Assistants = 080</b> 080.10 Vaccinator 3221.20 080.20 Inoculator 3221.30 080.30 Dresser 3221.40	<b>Medical Assistants = 3221</b> 3221.10 Laboratory Assistant, Clinical 060.10 3221.20 Vaccinator 080.10 3221.30 Inoculator 080.20 3221.40 Dresser 080.30 3221.90 Medical Assistants, Other
	<b>X-Ray Technicians = 086</b> 086.10 X-Ray Technician 3133.10	<b>Medical Equipment Operators = 3133</b> 3133.10 X-Ray Technician 086.10 3133.20 Bio-Medical Equipment Technician 3133.90 Medical Equipment Operators, Other
	<b>Life Science Technicians = 060</b> 060.10 Laboratory Assistant, Clinical 3221.10	
<b>DIETICIANS AND NUTRITIONISTS</b>	<b>Dieticians &amp; Nutritionists = 077</b> 077.10 Nutritionist 3223.10 077.20 Dietician 3223.20 077.30 Animal Nutritionist 3223.30	<b>Dieticians &amp; Nutritionists = 3223</b> 3223.10 Nutritionist, General 077.10 3223.20 Dietician, General 077.20 3223.30 Animal Nutritionist 077.30 3223.90 Dieticians and Nutritionists, Other 077.90
<b>OPTOMETRISTS AND OPTICIANS</b>	<b>Optometrists and Opticians = 087</b> 087.10 Optician, General 3224.10 087.20 Optician, Contact-lens 3224.20	<b>Optometrists = 3224</b> 3224.10 Optician, General 087.10 3224.20 Optician, Contact-Lens 087.20 3224.90 Optometrists and Opticians, Other
<b>DENTAL ASSISTANTS</b>	<b>Dental Assistants = 081</b> 081.10 Dental Assistant 3225.10	<b>Dental Assistants = 3225</b> 3225.10 Dental Assistant 081.10

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		3225.90 Dental Assistants, Other	
<b>PHYSIOTHERAPISTS</b>	<b>Physiotherapists and Occupational Therapists = 088</b> 088.10 Physiotherapist 3226.10 088.20 Occupational Therapist 3226.20 088.30 Speech Therapist and Audiologist 3229.10	<b>Physiotherapist &amp; Related = 3226</b> 3226.10 Physiotherapist 088.10 3226.20 Occupational Therapist 088.20 3226.30 Chiropodist 079.20 3226.40 Masseur 089.50 3226.90 Physiotherapists and Related Associate Professionals	
		<b>Modern Health Associate Professional (except nursing) = 3229</b> 3229.10 Speech Therapist and Audiologist 088.30 3229.20 Speech Pathologist 3229.30 Voice Pathologist 3229.40 Orthotist and Prosthetist 3229.50 Orientation & Mobility Instructor 3229.90 Medical and Health Technicians, Other 089.90	
<b>OTHER TRADITIONAL HEALTH WORKERS</b>	<b>Other Physicians = 079</b> 079.10 Naturopath 2229.20 079.20 Chiropodist 3226.30 079.90 Physicians and Surgeons, Other 2229.90	<b>Health Professional except Nursing = 2229 (80%)</b> 2229.20 Naturopath 079.10 2229.40 Physician, Sidha 071.20 2229.90 Physicians and Surgeons, Other 079.90	
		<b>Traditional Medicine Practitioners = 3241</b> 3241.90 Traditional Medicine Practitioners, Other 079.90	
		<b>Faith Healers = 3242</b>	

**ANNEX 2: ADJUSTMENTS AND IMPUTATIONS MADE TO NSSO AND CENSUS DATA**

Using the NSSO and Census data the number, composition and distribution of health workers were estimated using NCO codes. The NSSO used the NCO-68 codes to classify occupations and 19 categories in the NCO-68 codes were pertinent to the health workforce. These were grouped according to the comparable categories listed in Appendix 1. The 2001 Census used the NCO (2004) codes to categorise workers, with 20 codes characterising the health workforce. These were grouped according to the categories listed in Appendix 1.

**A. Missing Values and Imputation**

Some of the individuals classified as employed in the NSSO data had missing NCO codes. On cross-tabulating the missing NCO codes with the NIC codes, the missing values pertaining to health workers were identified. These individuals (health workers) were assigned to health worker groups (see Appendix 1) based on the information collected on their educational degrees and their NIC codes. There was a group of non-physician health workers who, based on their NIC codes, were identified as working in the hospital but could not be further classified and were placed in the category called “Other Hospital Staff”.

**B. Combining and Splitting Health Worker Categories**

To make NSSO and Census estimates comparable, one NCO-2004 code in the Census, “Health Professionals except Nursing”(NCO code 2229) had to be split into two. This was required as the category consisted of two very different kinds of health workers: health officer, hospital administrator and osteopathic physician - who are allopathic doctors, and sidha physicians, naturopath and other physicians and surgeons - who are classified as other traditional health workers (see table below).

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<b>NSSO-NCO (1968)</b>		<b>Census-NCO (2004)</b>	
<b>078 Public Health Physicians</b>		<b>2229 Health Professionals (except Nursing)</b>	
078.10 Health Officer	2229.10	2229.10 Health Officer	078.10
		2229.15 Administrator, Hospital	
		2229.30 Physician, Osteopathic	
<b>079 Other Physicians</b>		2229.20 Naturopath	079.10
079.10 Naturopath	2229.20	2229.40 Physician, Sidha	071.20
079.20 Chiropodist	3226.30	2229.90 Physician & Surgeons, Other	
079.90 Physician & Surgeons, Other	2229.90		079.90

Thus, code 2229 in the Census is a combination of 078 and 079 in the NSSO. Thus, to split 2229 into public health physicians and other physicians, a formula of  $078 / (078+079)$  was applied to derive the proportion of 1:4. This proportion was used to split all relevant Census estimates

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**ANNEX 3: SIZE AND DENSITY (PER 10,000 POPULATION) OF THE HEALTH WORKFORCE IN INDIA**

Estimate	NSSO			Census			Government Estimates		
	Category	NCO Classification	Number	Density	NCO Classification	Number	Density	Number	Density
<b>Allopathic Physicians &amp; Surgeons</b>	Allopathic Doctor		454,233	4.08	Allopathic Physician/Surgeon	676,756	6.07	660,856	5.93
	Public Health Physician		22,461	0.20					
	Total		476,694	4.28	Total	676,756	6.07	660,856	5.93
<b>Dentists</b>	Dentist		26,336	0.24	Dentist	22,962	0.21	55,344	0.50
<b>AYUSH</b>	Ayur		134,015	1.20	Ayur	115,934	1.04		
	Unani		28,361	0.25	Unani	10,822	0.10		
	Homeopathy		125,391	1.13	Homeopathy	69,732	0.63		
	Total		287,767	2.58	Total	196,488	1.76	726,370	6.52
<b>Nurses, Midwives &amp; Related Professionals</b>	Nurse		298,230	2.68	Nursing Professional	15,490	0.14		
	Nursing, Sanitary Asst.		379,602	3.41	Nursing Associate Professional	530,443	4.76		
	Midwives		111,841	1.00	Midwives	99,504	0.89		
				0.00	Sanitarian	178,151	1.60		
	Total		789,673	7.09	Total	823,589	7.39	1,422,452	12.77
<b>Pharmacists &amp; Related</b>	Pharmacist		114,926	1.03					
	Pharmaceutical Asst.		72,349	0.65	Pharmaceutical Asst.	239,276	2.15		
	Total		187,275	1.68	Total	239,276	2.15		
<b>Dieticians &amp; Nutritionists</b>	Dietician & Nutritionist		260	0.00	Dietician & Nutritionist	3,587	0.03		
<b>Opticians &amp; Optometrists</b>	Optician & Optometrist		3,539	0.03	Optometrist	13,678	0.12		
<b>Medical Asst. &amp; Tech.</b>	Medical Asst. & Tech.		168,159	1.51	Medical Equipment Operator	16,240	0.15		
					Medical Assistant	99,010	0.89		
	Total		168,159	1.51	Total	115,250	1.03		
<b>Dental Assistants</b>	Dental Assistant		10,002	0.09	Dental Assistant	2,658	0.02		
<b>Physiotherapist</b>	Physiotherapist				Physiotherapist	7,265	0.07		
					Modern Health Associate Prof.	15,396	0.14		
	Total		0	0.00	Total	22,662	0.20		
<b>Other Traditional Health Workers</b>	Trad. Health Worker		81,363	0.73	Trad. Medicine Practitioner	11,756	0.11		
					Faith Healer	651	0.01		
					Health Prof. except Nursing	38,911	0.35		
	Total		81,363	0.73	Total	51,318	0.46		
<b>Other Hospital Staff</b>	Other Hospital Staff		165,753	1.49	Other Hospital Staff	NA	NA		
<b>All</b>	All Health Workers		<b>2,196,821</b>	<b>19.72</b>	All Health Workers	<b>2,168,223</b>	<b>19.46</b>		

Source: National Sample Survey Organisation 2004-05; Census of India 2001; Medical and Nursing Councils of India; Government of India, Central Bureau of Health Intelligence

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**ANNEX 4: HEALTH WORKER DENSITY BY AREA (PER 10,000 POPULATION)**

Estimate	NSSO			Census		
Category	NCO Classification	Rural	Urban	NCO Classification	Rural	Urban
<b>Allopathic Physician/Surgeons</b>	Allopathic Doctor	2.23	8.87	Allopathic Physician/Surgeon	3.28	13.34
	Public Health Physician	0.18	0.25		0.00	0.00
	Total	2.42	9.12	Total	3.28	13.34
<b>Dentists</b>	Dentist	0.15	0.47	Dentist	0.06	0.59
<b>AYUSH</b>	Ayur	0.81	2.22	Ayur	0.60	2.17
	Unani	0.13	0.57	Unani	0.04	0.24
	Homeopathy	0.56	2.60	Homeopathy	0.39	1.23
	Total	1.51	5.38	Total	1.04	3.64
<b>Nurses, Midwives &amp; Related Professionals</b>	Nurse	1.04	6.92	Nursing Professional	0.08	0.28
	Nursing, Sanitary Assistant	2.29	6.32	Nursing Associate Professional	2.33	11.07
	Midwives	0.94	1.18	Midwives	0.68	1.44
		0.00	0.00	Sanitarian	1.03	3.08
Total	4.27	14.42	Total	4.13	15.88	
<b>Pharmacists &amp; Related</b>	Pharmacist	0.72	1.83			
	Pharmaceutical Asst.	0.28	1.61	Pharmaceutical Asst.	1.33	4.28
	Total	1.00	3.44	Total	1.33	4.28
<b>Dieticians &amp; Nutritionists</b>	Dietician & Nutritionist	0.00	0.01	Dietician & Nutritionist	0.02	0.06
<b>Opticians &amp; Optometrists</b>	Optician & Optometrist	0.03	0.03	Optometrist	0.04	0.34
<b>Medical Assistants &amp; Technicians</b>	Medical Asst. & Technician	1.14	2.46	Medical Equipment Operator	0.05	0.40
		0.00	0.00	Medical Assistant	0.43	2.08
	Total	1.14	2.46	Total	0.48	2.48
<b>Dental Assistants</b>	Dental Asst.	0.04	0.21	Dental Asst.	0.01	0.06
<b>Physiotherapists</b>	Physiotherapist	0.00	0.00	Physiotherapist	0.02	0.18
		0.00	0.00	Modern Health Associate Prof.	0.10	0.24
	Total	0.00	0.00	Total	0.12	0.43
<b>Other Traditional Health Workers</b>	Other Traditional Health Workers	0.62	1.02	Traditional Medicine Practitioner	0.09	0.13
		0.00	0.00	Faith Healer	0.00	0.01
		0.00	0.00	Health Professional except Nursing	0.18	0.78
	Total	0.62	1.02	Total	0.28	0.92
<b>Other Hospital Staff</b>	Other Hospital Staff	0.56	3.90	Other Hospital Staff		
<b>All Health Workers</b>	All Health Workers	<b>11.74</b>	<b>40.46</b>	All Health Workers	<b>10.78</b>	<b>42.03</b>

Source: National Sample Survey Organisation 2004-05; Census of India 2001

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**ANNEX 5: DENSITY OF FEMALE HEALTH WORKERS BY AREA**

Category	NCO Classification	Density (Per 10,000 Population)			Density (Per 10,000 Females)		
		Rural	Urban	Total	Rural	Urban	Total
<b>Allopathic Physicians &amp; Surgeons</b>	Allopathic Physician/Surgeon	0.22	3.12	1.03	0.47	6.45	2.14
<b>Dentists</b>	Dentist	0.01	0.16	0.05	0.02	0.32	0.10
<b>AYUSH</b>	Ayur	0.05	0.42	0.15	0.11	0.86	0.32
	Unani	0.00	0.03	0.01	0.00	0.05	0.02
	Homeopathy	0.03	0.27	0.10	0.07	0.56	0.21
	Total	0.08	0.71	0.26	0.18	1.47	0.54
<b>Nurses, Midwives &amp; Related Professionals</b>	Nursing Professional	0.06	0.22	0.11	0.13	0.46	0.22
	Nursing Associate Prof.=3231	1.92	9.01	3.89	4.01	18.63	8.11
	Midwives	0.62	1.30	0.81	1.29	2.69	1.68
	Sanitarian	0.32	0.98	0.50	0.66	2.02	1.04
	Total	2.92	11.51	5.31	6.10	23.80	11.06
<b>Pharmacists &amp; Related</b>	Pharmaceutical Asst.	0.10	0.49	0.21	0.20	1.02	0.43
<b>Dieticians &amp; Nutritionists</b>	Dietician & Nutritionist	0.01	0.03	0.01	0.01	0.07	0.03
<b>Opticians &amp; Optometrists</b>	Optometrist	0.00	0.02	0.01	0.01	0.05	0.02
<b>Medical Asst. &amp; Tech.</b>	Medical Equipment Operator	0.01	0.04	0.02	0.02	0.09	0.04
	Medical Assistant	0.10	0.47	0.20	0.20	0.97	0.42
	Total	0.11	0.51	0.22	0.22	1.06	0.46
<b>Dental Assistants</b>	Dental Asst.	0.00	0.01	0.01	0.00	0.03	0.01
<b>Physiotherapists</b>	Physiotherapist	0.00	0.06	0.02	0.01	0.13	0.04
	Modern Health Associate Prof.	0.02	0.07	0.04	0.05	0.14	0.07
	Total	0.03	0.13	0.06	0.06	0.27	0.11
<b>Other Traditional Health Workers</b>	Traditional Medicine Practioners	0.01	0.02	0.01	0.01	0.03	0.02
	Faith Healer	0.00	0.00	0.00	0.00	0.00	0.00
	Health Professional except Nursing	0.04	0.19	0.08	0.08	0.40	0.17
	Total	0.04	0.21	0.09	0.09	0.44	0.19
<b>All</b>	<b>All Health Workers</b>	<b>3.51</b>	<b>16.91</b>	<b>7.24</b>	<b>7.34</b>	<b>34.96</b>	<b>15.08</b>

Source: Census of India 2001

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**ANNEX 6: HEALTH WORKER DENSITY (PER 10,000 POPULATION) BY STATE**

State	All Health Workers		Allopathic Physician		Nurse & Midwife		Ayush		Dentist		Pharmacist		Others		Other Traditional	
	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census
INDIA	19.72	19.46	4.28	6.07	7.09	7.39	2.58	1.76	0.24	0.21	1.68	2.15	3.12	1.42	0.73	0.46
Andhra Pradesh	23.54	21.31	4.52	7.84	11.48	7.54	1.60	0.90	0.18	0.12	1.43	2.37	1.97	1.66	2.35	0.88
Arunachal Pradesh	15.08	26.83	1.97	3.17	6.10	17.92	0.00	0.29	0.00	0.19	4.70	2.50	2.30	1.98	0.00	0.78
Assam	7.93	14.37	0.16	2.83	3.93	6.18	0.66	1.15	1.23	0.06	0.50	2.24	0.55	1.28	0.89	0.63
Bihar	9.55	10.19	2.06	3.96	2.73	2.80	1.21	1.02	0.06	0.04	0.27	1.88	2.89	0.43	0.33	0.06
Chhattisgarh	14.89	15.81	2.59	4.09	9.01	5.74	0.43	1.20	0.00	0.07	0.55	1.19	1.19	2.77	1.13	0.75
Delhi	10.20	44.56	1.53	15.03	8.34	15.80	0.00	3.22	0.00	1.02	0.12	4.44	0.21	4.43	0.00	0.63
Goa	59.27	41.55	6.35	10.99	34.64	19.72	0.00	1.32	2.66	1.26	15.62	3.71	0.00	3.95	0.00	0.60
Gujarat	19.69	17.27	3.89	4.40	2.83	5.95	0.79	1.94	0.08	0.21	4.51	2.97	4.84	1.24	2.75	0.57
Haryana	24.36	19.68	4.02	8.21	9.58	4.52	2.49	2.27	0.39	0.45	2.52	2.80	4.78	1.24	0.58	0.18
Himachal Pradesh	19.53	26.37	5.97	5.96	8.21	9.76	0.27	2.89	0.00	0.49	4.84	5.33	0.00	1.63	0.24	0.31
Jammu & Kashmir	8.10	20.66	1.81	6.77	2.22	6.29	0.23	0.61	0.18	0.28	0.21	4.66	3.45	1.90	0.00	0.15
Jharkhand	9.66	14.09	4.23	3.94	0.44	6.23	1.89	0.84	0.00	0.08	0.00	1.77	3.10	1.06	0.00	0.17
Karnataka	25.43	20.59	7.58	7.32	1.98	8.29	3.58	1.17	0.00	0.32	0.00	1.25	12.30	1.56	0.00	0.67
Kerala	31.27	38.37	4.45	6.28	18.08	19.16	4.50	3.69	0.00	0.62	2.70	3.50	1.30	4.13	0.24	1.00
Madhya Pradesh	13.87	15.54	2.68	4.89	7.64	5.79	1.33	1.39	0.00	0.09	0.55	2.14	1.16	1.00	0.51	0.24
Maharashtra	28.98	28.69	7.09	7.88	9.73	11.06	6.47	3.59	1.22	0.32	3.19	2.43	0.98	2.71	0.31	0.69
Manipur	7.34	22.49	1.91	4.54	3.87	12.32	0.39	0.43	0.00	0.16	0.94	2.84	0.23	1.71	0.00	0.48
Meghalaya	22.09	15.32	1.12	2.51	11.68	9.19	2.06	0.38	0.00	0.15	0.64	1.41	6.39	1.18	0.19	0.50
Mizoram	19.26	46.24	0.47	5.32	10.20	11.84	2.30	0.10	0.00	0.54	1.49	1.18	4.80	23.61	0.00	3.65
Nagaland	17.59	27.09	2.05	3.37	12.45	17.30	0.00	0.22	0.00	0.12	3.08	4.64	0.00	1.15	0.00	0.27
Orissa	11.55	19.65	0.48	2.69	6.72	12.84	1.58	1.74	0.00	0.07	2.06	1.19	0.47	0.83	0.23	0.29
Punjab	25.99	26.75	6.57	11.14	9.93	7.79	2.52	2.31	1.75	0.44	3.61	3.27	1.15	1.62	0.47	0.19
Rajasthan	25.42	13.75	5.03	3.97	17.61	4.95	0.74	1.35	0.00	0.16	0.73	2.45	1.22	0.66	0.09	0.20
Sikkim	21.90	41.51	1.66	7.49	12.21	14.11	0.00	0.17	0.00	0.17	0.00	0.86	8.03	7.02	0.00	11.69
Tamil Nadu	28.83	22.55	9.07	6.09	3.27	10.43	1.97	1.37	0.00	0.29	0.00	1.69	14.52	1.94	0.00	0.74
Tripura	11.26	17.83	1.05	3.21	9.85	9.15	0.00	2.18	0.00	0.16	0.36	2.34	0.00	0.41	0.00	0.39
Uttar Pradesh	15.38	12.58	3.76	6.04	4.02	2.76	1.99	1.26	0.00	0.12	2.90	1.73	1.81	0.44	0.91	0.24
Uttaranchal	31.07	20.86	4.19	7.40	12.10	6.27	9.13	2.21	0.00	0.27	2.30	3.49	3.35	0.86	0.00	0.37
West Bengal	21.13	23.70	3.16	7.07	7.79	10.44	6.66	2.91	0.18	0.15	1.04	1.43	1.06	1.20	1.24	0.49

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Union Territory	All HW		Allopathic Physician		Nurse & Midwife		Ayush		Dentist		Pharmacist		Others		Other Traditional	
	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census	NSSO	Census
A & N Islands	42.13	46.85	0.00	7.59	28.81	17.43	7.36	0.66	0.00	0.22	1.93	3.89	4.04	9.81	0.00	7.24
Chandigarh	52.40	65.26	14.03	23.17	19.43	24.46	0.00	3.53	0.00	1.73	0.00	3.84	15.38	7.18	3.56	1.36
Dadra & Nagar Haveli	0.00	12.32	0.00	2.70	0.00	5.62	0.00	1.22	0.00	0.09	0.00	1.65	0.00	0.91	0.00	0.13
Daman & Diu	2.40	22.32	0.00	4.95	0.00	9.77	2.40	1.03	0.00	0.66	0.00	2.59	0.00	2.59	0.00	0.72
Lakshadweep	22.73	36.98	13.64	5.24	9.09	19.64	0.00	0.82	0.00	0.49	0.00	3.11	0.00	6.38	0.00	1.31
Pondicherry	27.58	53.53	7.85	10.60	2.64	29.39	0.00	1.47	0.00	0.81	0.00	3.96	17.09	6.53	0.00	0.77

Source: National Sample Survey Organisation 2004-05, Census of India 2001

Note:

1. Others = Dieticians & Nutritionists, Opticians & Optometrists, Medical Assistants & Technicians, Dental Assistants, Physiotherapists and Other Hospital Staff
2. Other Traditional Health Workers = Traditional Medicine Practitioner, Faith Healer

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**ANNEX 7: DOCTOR DENSITY (PER 10,000 POPULATION) BY STATE AND AREA**

State/UT	Total			Rural		Urban	
	NSSO	Census	MCI	NSSO	Census	NSSO	Census
INDIA	4.28	6.07	5.78	2.42	3.28	9.12	13.34
Andhra Pradesh	4.52	7.84	4.32	3.87	5.41	6.30	14.36
Arunachal	1.97	3.17	-	0.62	1.53	7.33	9.65
Assam*	0.16	2.83	-	0.17	1.37	0.11	12.89
Bihar	2.06	3.96	3.91	2.02	2.86	2.38	13.31
Chhattisgarh	2.59	4.09	0.21	1.56	2.69	6.67	9.67
Delhi	1.53	15.03	17.02	0.00	8.32	1.64	15.53
Goa	6.35	10.99	16.07	0.00	4.43	12.71	17.55
Gujarat	3.89	4.40	7.05	1.59	1.35	7.74	9.52
Haryana	4.02	8.21	0.60	3.68	5.31	4.86	15.32
Himachal Pradesh	5.97	5.96	0.19	4.54	3.91	19.33	24.96
Jammu & Kashmir	1.81	6.77	7.37	1.70	2.07	2.14	21.03
Jharkhand	4.23	3.94	0.19	0.91	2.45	15.85	9.12
Karnataka	7.58	7.32	12.28	3.65	3.02	15.19	15.68
Kerala	4.45	6.28	10.30	2.05	3.29	11.29	14.80
Madhya Pradesh	2.68	4.89	4.44	2.85	2.47	2.20	11.54
Maharashtra	7.09	7.88	9.28	2.61	3.42	13.19	13.95
Manipur	1.91	4.54	-	0.92	2.03	5.09	12.55
Meghalaya	1.12	2.51	-	0.38	0.58	4.21	10.49
Mizoram	0.47	5.32	-	0.00	1.92	0.95	8.78
Nagaland	2.05	3.37	-	1.16	2.10	6.27	9.33
Orissa	0.48	2.69	3.90	0.56	1.29	0.00	10.68
Punjab	6.57	11.14	13.46	5.57	6.55	8.51	20.08
Rajasthan	5.03	3.97	3.76	2.22	1.81	14.26	11.03
Sikkim	1.66	7.49	-	1.49	5.07	2.95	26.65
Tamil Nadu	9.07	6.09	11.22	3.16	1.73	16.63	11.66
Tripura	1.05	3.21	-	0.47	1.35	3.81	12.16
UP	3.76	6.04	2.60	2.63	3.94	8.06	14.05
Uttaranchal	4.19	7.40	-	1.29	4.86	12.64	14.78
West Bengal	3.16	7.07	6.24	1.90	5.01	6.38	12.37
A&N Islands	0.00	7.59	-	0.00	5.14	0.00	12.50
Chandigarh	14.03	23.17	-	9.97	4.80	14.48	25.21
Dadra & Nagar Haveli	0.00	2.70	-	0.00	1.01	0.00	8.43
Daman & Diu	0.00	4.95	-	0.00	2.32	0.00	9.33
Lakshadweep	13.64	5.24	-	27.27	4.58	0.00	5.89
Pondicherry	7.85	10.60	-	23.79	2.48	0.00	14.62

Source: National Sample Survey Organisation 2004-05; Census of India 2001; Medical Council of India (MCI) 2005; Government of India, Central Bureau of Health Intelligence 2005

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**ANNEX 8: NURSE DENSITY (PER 10,000 POPULATION) BY STATE AND AREA**

State/UT	Total			Rural		Urban	
	NSSO	Census	INC	NSSO	Census	NSSO	Census
INDIA	7.09	7.39	12.77	4.27	4.13	14.42	15.88
Andhra Pradesh	11.48	7.54	22.53	8.42	4.41	19.71	15.98
Arunachal	6.10	17.92	-	5.79	12.72	7.33	38.46
Assam	3.93	6.18	7.90	0.80	4.20	25.51	19.84
Bihar	2.73	2.80	1.86	2.46	1.71	5.05	12.15
Chhattisgarh	9.01	5.74	0.12	7.57	3.33	14.72	15.35
Delhi	8.34	15.80	1.84	0.00	8.40	8.96	16.36
Goa	34.64	19.72	-	61.29	16.73	7.99	22.71
Gujarat	2.83	5.95	22.44	1.08	2.78	5.78	11.26
Haryana	9.58	4.52	12.86	10.72	2.34	6.78	9.88
Himachal Pradesh	8.21	9.76	27.11	7.16	6.83	18.01	36.97
Jammu & Kashmir	2.22	6.29	-	2.42	4.71	1.62	11.06
Jharkhand	0.44	6.23	0.01	0.41	2.87	0.51	17.96
Karnataka	1.98	8.29	19.42	2.69	3.46	0.60	17.67
Kerala	18.08	19.16	31.87	15.65	18.10	25.02	22.19
Madhya Pradesh	7.64	5.79	17.77	2.31	2.88	22.29	13.82
Maharashtra	9.73	11.06	10.40	4.74	4.58	16.52	19.87
Manipur	3.87	12.32	-	2.46	8.86	8.40	23.38
Meghalaya	11.68	9.19	-	2.27	4.53	50.57	28.47
Mizoram	10.20	11.84	28.71	5.16	5.19	15.33	18.64
Nagaland	12.45	17.30	-	3.96	13.93	52.27	33.09
Orissa	6.72	12.84	19.57	4.41	11.81	19.85	18.72
Punjab	9.93	7.79	24.42	11.13	4.96	7.59	13.32
Rajasthan	17.61	4.95	9.38	4.74	2.68	59.76	12.37
Sikkim	12.21	14.11	-	13.40	11.37	2.79	36.03
Tamil Nadu	3.27	10.43	34.24	0.77	5.38	6.47	16.91
Tripura	9.85	9.15	4.94	10.44	5.91	7.02	24.68
UP	4.02	2.76	2.57	2.66	1.47	9.20	7.70
Uttaranchal	12.10	6.27	-	5.67	4.31	30.77	11.96
West Bengal	7.79	10.44	13.03	4.46	5.10	16.34	24.15
A&N Islands	28.81	17.43	-	28.63	15.99	29.24	20.31
Chandigarh	19.43	24.46	-	0.00	8.10	21.59	26.27
Dadra & Nagar Haveli	0.00	5.62	-	0.00	4.06	0.00	10.92
Daman & Diu	0.00	9.77	-	0.00	4.73	0.00	18.18
Lakshadweep	9.09	19.64	-	0.00	20.62	18.18	18.65
Pondicherry	2.64	29.39	-	0.00	13.71	3.94	37.11

Source: National Sample Survey Organisation 2004-05; Census of India 2001; Indian Nursing Council (INC) 2005

Note: For Data from INC

1. Assam = Assam + Arunachal Pradesh + Manipur + Meghalaya + Nagaland
2. Maharashtra = Maharashtra + Goa
3. Punjab = Punjab + J & K
4. Tamil Nadu = Tamil Nadu + Andaman & Nicobar Islands + Pondicherry
5. West Bengal = West Bengal+ Sikkim

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**ANNEX 9: FEMALE HEALTH WORKER DENSITY BY STATE**

State	Density (Per 10,000 Population)			Density (Per 10,000 Females)		
	Allopathic Physician	Nurse & Midwives	All Health Workers	Allopathic Physician	Nurse & Midwives	All Health Workers
INDIA	1.03	5.31	7.24	2.14	11.06	15.08
Andhra Pradesh	1.14	5.00	6.82	2.28	9.99	13.65
Arunachal	0.84	9.18	10.66	1.79	19.54	22.68
Assam	0.45	4.86	5.65	0.93	10.13	11.77
Bihar	0.26	1.77	2.12	0.54	3.69	4.41
Chhattisgarh	0.48	3.99	5.15	0.97	7.98	10.30
Delhi	4.43	11.35	18.12	9.84	25.23	40.28
Goa	3.59	16.68	24.53	7.33	34.04	50.07
Gujarat	0.84	4.44	6.32	1.75	9.25	13.16
Haryana	1.09	3.34	5.21	2.36	7.27	11.33
Himachal Pradesh	1.02	7.69	9.84	2.09	15.69	20.08
Jammu & Kashmir	1.60	3.46	5.86	3.33	7.21	12.20
Jharkhand	0.44	4.46	5.09	0.89	9.09	10.40
Karnataka	1.69	6.09	8.78	3.46	12.43	17.91
Kerala	2.13	16.72	24.33	4.18	32.79	47.71
Madhya Pradesh	0.67	3.74	4.75	1.39	7.79	9.89
Maharashtra	2.03	8.17	12.52	4.23	17.01	26.07
Manipur	1.29	9.10	11.66	2.62	18.58	23.79
Meghalaya	1.06	7.83	9.76	2.17	15.97	19.93
Mizoram	1.83	10.97	23.38	3.82	22.85	48.70
Nagaland	0.63	13.42	15.30	1.31	27.96	31.87
Orissa	0.43	10.10	10.81	0.87	20.62	22.06
Punjab	1.72	5.91	8.87	3.65	12.57	18.86
Rajasthan	0.56	3.23	4.00	1.16	6.74	8.33
Sikkim	2.74	12.68	21.04	5.82	26.98	44.77
Tamil Nadu	1.97	7.52	10.84	3.94	15.05	21.69
Tripura	0.28	5.78	6.39	0.57	11.80	13.04
UP	0.47	1.73	2.42	0.98	3.61	5.04
Uttaranchal	0.85	4.07	5.39	1.74	8.31	10.99
West Bengal	0.63	6.98	8.19	1.32	14.55	17.07
A&N Islands	2.47	14.86	22.97	5.36	32.30	49.94
Chandigarh	7.49	19.11	31.95	17.03	43.42	72.62
Dadra & Nagar Haveli	0.61	4.92	6.23	1.42	11.44	14.48
Daman & Diu	0.72	7.00	8.69	1.84	17.77	22.06
Lakshadweep	0.65	13.09	16.04	1.36	27.27	33.41
Pondicherry	2.96	21.96	27.81	5.91	43.93	55.63

Source: Census of India 2001

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**ANNEX 10: FEMALE HEALTH WORKER DENSITY BY STATE AND AREA**

State	Density (Per 10,000 Females)					
	Allopathic Physician		Nurse & Midwives		All Health Workers	
	Rural	Urban	Rural	Urban	Rural	Urban
INDIA	0.47	6.45	6.10	23.80	7.34	34.96
Andhra Pradesh	0.69	6.58	5.82	21.26	7.12	31.30
Arunachal	0.86	5.50	12.15	49.10	13.50	59.41
Assam	0.26	5.41	6.95	31.38	7.59	39.76
Bihar	0.20	3.68	2.06	18.31	2.32	23.16
Chhattisgarh	0.23	3.91	4.18	23.18	5.27	30.42
NCT of Delhi	3.22	10.34	9.92	26.38	15.58	42.14
Goa	2.15	12.48	28.30	39.78	35.67	64.46
Gujarat	0.19	4.40	4.32	17.64	4.96	27.14
Haryana	0.57	6.75	3.21	17.20	4.18	28.83
Himachal Pradesh	0.95	12.35	10.54	62.09	12.96	84.18
Jammu & Kashmir	0.57	11.60	4.76	14.57	6.32	29.83
Jharkhand	0.19	3.38	3.83	27.77	4.18	32.42
Karnataka	0.73	8.76	5.03	26.80	6.39	40.28
Kerala	2.01	10.37	31.15	37.47	41.87	64.35
Madhya Pradesh	0.20	4.62	3.34	19.84	3.75	26.50
Maharashtra	0.81	8.95	6.91	30.96	9.22	49.34
Manipur	0.77	8.50	13.31	35.29	15.40	50.35
Meghalaya	0.34	9.94	8.25	48.88	9.13	65.95
Mizoram	1.39	6.35	9.56	36.69	21.90	76.59
Nagaland	0.84	3.40	21.94	55.35	24.54	65.26
Orissa	0.19	4.73	19.79	25.31	20.27	32.20
Punjab	0.75	9.28	7.80	21.82	9.61	36.83
Rajasthan	0.17	4.45	3.29	18.27	3.61	24.16
Sikkim	3.65	23.41	21.32	72.75	34.10	131.10
Tamil Nadu	0.89	7.82	7.72	24.38	9.65	37.01
Tripura	0.06	3.07	6.91	35.70	7.37	40.70
UP	0.27	3.64	1.86	10.20	2.29	15.37
Uttaranchal	0.57	5.09	5.17	17.24	6.04	25.08
West Bengal	0.29	3.98	6.36	35.59	7.12	42.63
A&N Islands	3.56	9.03	28.19	40.63	39.13	71.87
Chandigarh	0.73	18.85	8.72	47.28	10.42	79.53
Dadra & Nagar Haveli	0.13	5.72	8.29	22.02	9.60	30.82
Daman & Diu	1.23	2.85	6.38	36.64	8.35	44.78
Lakshadweep	1.36	1.36	25.91	28.64	30.68	36.14
Pondicherry	0.94	8.36	15.91	57.73	18.36	73.99

Source: Census of India 2001

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**ANNEX 11: HEALTH WORKER DENSITY ( PER 10,000 POPULATION) BY SECTOR**

Estimate	NSSO						Official Estimates		
Category	Non-Government			Government			Non-Government	Government	Total
	Rural	Urban	Total	Rural	Urban	Total			
<b>Allopathic Physician</b>	2.23	6.91	3.53	0.18	2.20	0.74	7.26	2.48	5.93
<b>Dentist</b>	0.14	0.44	0.23	0.00	0.03	0.01	-	-	-
<b>AYUSH</b>	1.46	5.09	2.47	0.04	0.29	0.11	-	-	-
<b>Nurse &amp; Midwife</b>	2.16	7.70	3.70	2.11	6.72	3.39	-	-	-
<b>Pharmacist</b>	0.53	2.77	1.15	0.48	0.67	0.53	-	-	-
<b>Dieticians &amp; Nutritionists</b>	0.00	0.01	0.00	0.00	0.00	0.00	-	-	-
<b>Opticians &amp; Optometrists</b>	0.02	0.03	0.02	0.01	0.00	0.01	-	-	-
<b>Medical Asst. &amp; Technicians</b>	0.59	1.64	0.88	0.56	0.82	0.63	-	-	-
<b>Dental Asst.</b>	0.04	0.10	0.06	0.00	0.11	0.03	-	-	-
<b>Other Traditional Health Workers</b>	0.62	1.01	0.73	0.00	0.02	0.00	-	-	-
<b>Other Hospital Staff</b>	0.31	2.80	1.00	0.24	1.10	0.48	-	-	-
<b>All Health Workers</b>	8.11	28.49	13.77	3.63	11.97	5.94	-	-	-

Source: National Sample Survey Organisation 2004-05; Medical Council of India (MCI) 2005