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# USING MULTIPLE SOURCES OF INFORMATION TO ESTIMATE INDIA'S HEALTH WORKFORCE*

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*This note describes how health workforce estimates were calculated using data from the Census, National Sample Survey Organization (NSSO) and Government sources and were triangulated to produce a set of "best available estimates". Results indicate that there are substantial differences between officially reported statistics and estimates from the Census and National Sample Survey Organization (NSSO) but, importantly, there is better agreement between the latter two. The Census appears to be the best available estimate. The note enumerates the advantages and disadvantages of each data source and also recommends actions to strengthen both data sources and data methods.*



Routine information on India's health workforce suffers from significant limitations reducing its comprehensiveness and reliability. State professional council reports on the numbers in the health workforce are inaccurate as a result of non-adjustment for health workers leaving the workforce due to death, migration and/or retirement or double counting of workers due to their being registered in more than one state. Further, all states do not follow the same registering procedure which reduces comparability.[1] Certain categories of health workers, such as physiotherapists, medical technicians and faith healers, are not recorded in government statistics, making it difficult to estimate the overall size and composition of the health workforce.

Our study examined different data sources such as the Census of India and nationally representative household surveys to assess how to develop comprehensive and reliable estimates of the health workforce in India. This note describes how health workforce estimates from these sources and the Government were triangulated to produce a set of "preferred estimates". The merits and de-merits of this approach are also discussed.

## DATA SOURCES USED

1. **Census of India 2001**: The 2001 Census collected information on the self-reported occupation of all individuals in the country. Health workforce estimates are based on a sample of enumerated individuals. From each district of the country, 20% of the rural and 50% of the urban enumeration blocks (EB) were selected using systematic sampling. In the 11 smaller states and union territories (< 2 million population) all EBs were selected, making the total sample size roughly 297 million individuals. The sample estimates were then inflated by a factor of 5 for rural and 2 for urban to get population totals.
2. **National Sample Survey Organisation (NSSO), 2004-05**: The 61st round on 'Employment and Unemployment', a nationally representative household survey, recorded the self-reported economic activity of employed individuals covering 124,680 households and 602,833 individuals.
3. **Government of India (GoI)**: Official estimates of registered doctors and nurses were obtained from the Medical and Nursing Councils of India. The Ministry of Health and Family Welfare (MOHFW), Government of India, also publishes information on human resources in the health sector through various periodicals, such as Health Information of India and the Bulletin of Rural Health Statistics.

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* Health workers in sufficient numbers, in the right places, and adequately trained, motivated and supported are the backbone of an effective, equitable, and efficient health care system. Success in creating and sustaining an effective health workforce in India to achieve national health goals will require sound policy and creative and committed implementation. More and better information on human resources for health in India is one element needed to achieve this. This note summarizes recent and ongoing work in support of India's health work force goals. For the full report, see *Rao, K. et al "India's Health Workforce: Size, Composition and Distribution" HRH Technical Report #1 at www.hrhindia.org*

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## METHODOLOGY FOR DEVELOPING A "BEST AVAILABLE" ESTIMATE

Several adjustments were performed to make the NSSO and Census estimates comparable. While the Census estimates were recorded in March 2001, the NSSO survey was conducted between July'04 and June'05. On the assumption that growth in the health workforce follows that of the general population, the Census estimates were inflated by 8% to reflect the percent increase in population between 2000-2005.

Health workers were identified in the Census and NSSO samples using the National Classification of Occupations (NCO). The Census used the NCO-2004 codes whereas the NSSO used the NCO-1968; NCO-68 codes were converted to NCO-04 with little loss of information. To further improve comparability between the two, certain health worker categories were either split or merged together. For example, because the function of nurses and midwifes is often similar they were merged into a single category. Some of the employed individuals in the NSSO data had missing NCO codes. These individuals were recognised as health workers based on their National Industrial Classifications (NIC) codes and their educational qualifications.

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. In the NSSO data, 25% of the individuals (42% in rural and 15% in urban) classified as doctors reported no medical training. While it is not possible to verify how many doctors (or other health workers) identified in the Census were fully qualified, it is possible that similar levels of less than fully qualified medical professionals are also included. This would result in a large overestimate of the numbers of qualified physicians. There is no representative way of assessing this problem at this time.

The final set of health worker categories for which estimates were produced included - allopathic physicians and surgeons, dentists, AYUSH practitioners (Ayurvedic, Yoga, Unani, Sidha, Homeopathy), nurses and midwives, pharmacists, others (dieticians, opticians, dental assistants, physiotherapists, medical assistants and technicians and other hospital staff) and other traditional medicine practitioners.

## COMPARISON OF DIFFERENT DATA SOURCES

The Census, NSSO and GoI estimates for the number of health workers overall and in different categories are shown in Figure 1. A comparable Government estimate of the total number of health workers does not exist. The number of health workers estimated by the Census and the NSSO were remarkably close to each other. They suggest that overall there were 2.1 million health workers in India in 2005 which translated into a density of approximately 20 health workers per 10,000 population (Figure 1). This estimate included both qualified and unqualified health workers. If the figures are adjusted to exclude a proportion of those self-reported health workers who did not report their qualifications (an estimate of "unqualified" workers), based on the NSSO data on self-reported qualifications, then the adjusted ratio of health workers to population would be a little above 8 per 10,000 population.[2]

While the totals are close, counts for specific categories of health workers differed substantially for the different sources of data. The Census and NSSO estimates were similar to each other, except for allopathic physicians and 'others'. The Census numbers were higher for allopathic physicians, nurses and pharmacists. NSSO estimates were greater for all others. GoI estimates were generally higher than the other two, particularly for nurse and midwifes and for AYUSH practitioners and especially higher if one considers a correction for unqualified health workers. An exception to this was the slightly higher number of doctors reported by the Census. This could be a result of the inclusion of inadequately trained medical practitioners in this category.

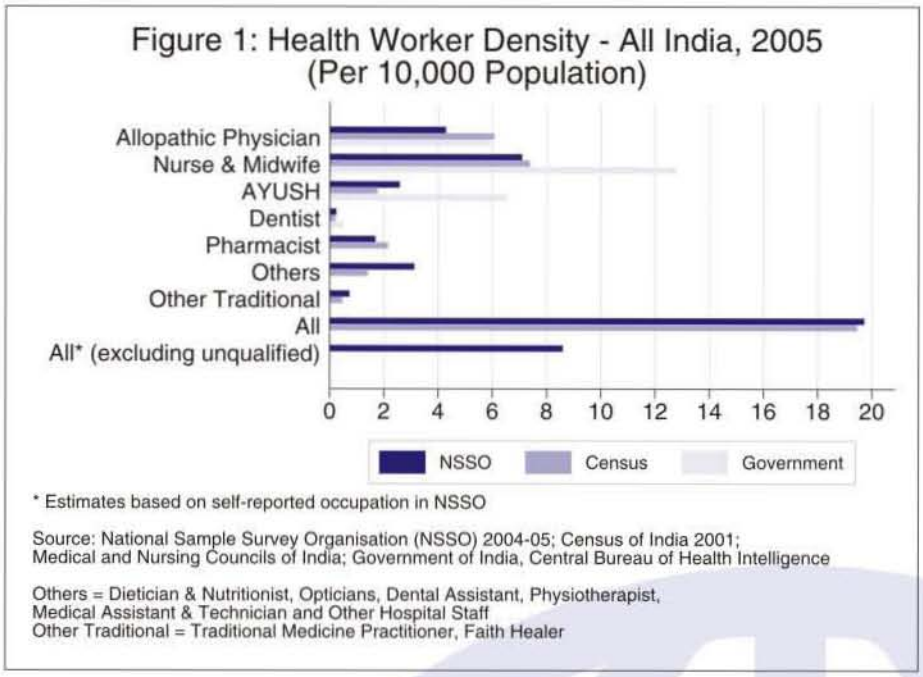
Both the Census and the NSSO estimates paint a similar picture of the composition of the health workforce, especially concerning the adverse nurse-physician ratio. They also suggest a very low proportion of female health workers, especially female physicians and particularly so in rural areas.

Figure 2 compares the state level estimates of the number of health workers produced by the Census and NSSO. The majority of states tend to cluster close to the diagonal line, indicating good correspondence between the Census and NSSO estimates. However, there are significant differences between the two sources of data even when total health worker numbers are summed by state. And there are some large outliers (e.g. Gujarat, Sikkim, Delhi and Mizoram), which fall at a substantial distance away from the diagonal line showing poor agreement between the NSSO and Census. Disaggregated results for allopathic doctors and nurses and midwifes also show a similar pattern. Since the overall Census and NSSO estimates are close, these inter-state discrepancies cancel out each other at the aggregate level. State level estimates using these two sources are much less consistent than national aggregates.

The Census and NSSO estimates for distribution of health workers across rural and urban areas were also similar. Both sources indicate that overall, and amongst most health worker categories, typically 60% of the health workers resided in urban areas. Government estimates of the number of health workers in rural and urban areas were only

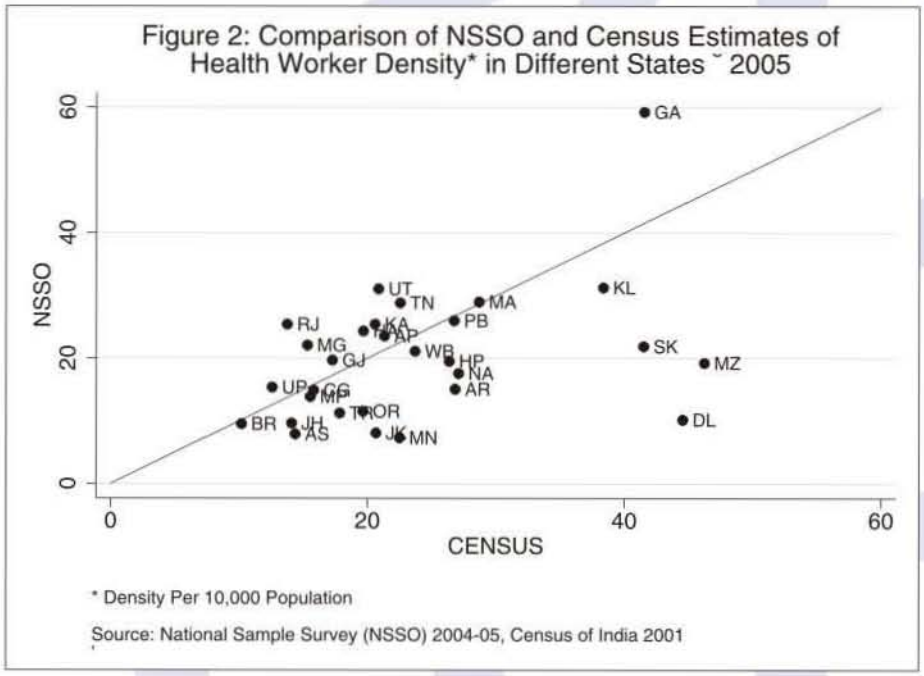
available for those working in the public sector.

Estimates of heath workforce based on the Census and NSSO data have several advantages. They are based on population counts in each state which avoids the problem of double counting. They are available for all states in India, provide geographic estimates, and have fewer comparability issues because they are based on standard occupational codes. However these sources of data have limitations. The small sample size of the NSSO prevents robust disaggregated estimates at the state level and by health worker type. Further, these data sources cannot track short-term changes in the health workforce since the NSSO survey is conducted only every 5 years and the Census every ten years.




## CONCLUSIONS

Several data sources provide usable information on the health workforce in India. We conclude that, at this time, the Census is the preferred source for overall health workforce estimates. The census has the advantage of being an officially accepted data source for government. Its large sample size provides estimates for every district in the country and, within each district, both urban and rural areas. It also supports 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 some reliability. However, both the Census and the NSSO estimates are based on self-reported occupations which is susceptible to incorrect self-reports, particularly by unqualified health workers.




For breakdowns by public and private sector, only the NSSO data is available for national and state level estimation at this time. We have applied its public and private sector percentages to the census numbers for this purpose.

While we propose use of the available data at this time, this does not mean the data are satisfactory. The obvious inconsistencies, such as those regarding physician training and qualifications, are unacceptable. India should be able to count its medical doctors as well as other major categories of health workers in a timely, accurate, and reliable way. Despite similarities in total numbers between the census and the NSSO estimates, there are large inconsistencies across categories of health workers and state level estimates. Since states are the largest employers of health workers and the main regulators of the health workforce, effective state-level policy making will be seriously hindered by uncertainty about numbers, types of workers, location, and sector of work.

Urgent action is needed to improve data for policy and planning. We propose action to strengthen both data sources and methods.

## ACTIONS TO IMPROVE DATA SOURCES AND METHODS

1. Create a task force comprising of the MOHFW, agencies collecting human resource information (e.g. Census,

NSSO) and experts to recommend ways to make human resources information more reliable, valid and timely.

2. Task force should review registration procedures for doctors, nurses, midwives, and pharmacists. Professional councils should be encouraged to maintain live registers and updated on a continuous basis. Other health workers, especially RMPs, should also be similarly registered.
3. For data sources like the Census and NSSO which rely on self-reported occupations, improve validation of reported occupations through better assessment of education and other criteria. The upcoming Census in 2011 strengthened by 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 to segregate nurses from midwifes.
4. For data sources like the Census and NSSO, create new classification codes for categories of health workers like community health workers and RMPs.

[1] 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.

[2] There is no fully satisfactory way to adjust census figures for qualifications at this time, but this adjustment is presented to emphasize this problem in the available data. Data on health workforce presented in this policy note do not distinguish between qualified and unqualified health workers, unless specifically mentioned.

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