Journal of Population and Social Studies, Volume 26 Number 2 April 2018: 101 - 118
DOI: 10.25133/JPSSv26n2.008

Nursing Shortages in the Rural Public Health Sector of India

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Abstract

The objective of this article is to examine the situation of the nursing workforce and the shortage of nurses in the public health sector in rural India. Using secondary data from various publications of government agencies of India, an assessment of the size, distribution, adequacy, and shortfall of the nursing workforce in the rural public health sector in India is presented for the period of 2005–2017. The paper also examines the impact of nursing shortages and discusses the causes of nursing shortages in India, and shows that although the numbers of nurses in the rural public health sector have been rising incrementally in both absolute terms and in relation to the population being served in the period from 2005 to 2017, the sector is still suffering from acute nurse shortages. The densities of nurses as well as the ratio of nurses to doctors is abysmally low compared to global norms, and these figures vary considerably across states and union territories. This study has found significant adverse effects of these nursing shortages on critical health outcomes such as the infant mortality rate (IMR) and the under-five mortality rate (U-5MR). It is suggested that sufficient staffing of nurses in rural health centers should be enacted to eradicate this nursing shortage and to enhance public health care services in rural areas.

Keywords

Nurse staffing; nurse workforce; nurse shortages; skill mix; staffing levels

Introduction

Nurses represent an important segment of health care providers and constitute almost half of the total health workforce in most countries (Buchan & Calman, 2004; Malik, 2008). They generally practice in a wide range of health care settings and can be considered "front-line" staff in most situations as they are the initial point of patient contact in any health system (Buchan & Calman, 2004; Naylor & Kurtzman, 2010). Spending more time caring for the patient than any other health care provider, they play a crucial role in the safety and recovery of the patient (Garretson, 2004). Thus, a sufficient supply of nurses is deemed to be crucial in order to maintain a satisfactory standard of health care.

The significance of sufficient nursing staff and the adverse effects of nursing shortages are well documented in the literature (Buchan & Calman, 2004; Blegen, Goode, & Reed, 1998; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Subirana, Long, Greenhalgh, & Firth, 2014). Nursing shortages impact various factors, such as health care delivery processes, the capacity of health facilities, the quantity and quality of health care services, the nurses themselves (as the role becomes more stressful and taxing during such shortages), and, ultimately, the health outcomes of the patients (Buerhaus et al., 2007). According to Buerhaus et al. (2007) prolonged shortages of nurses reduce the quantity of patient care, increase operational and labor costs, and decrease

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the efficiency and effectiveness of the care that is provided. Arthur & James (1994) remark that the shortage of nurses might cause high stress levels and mental exhaustion among them leading to an increase in mistakes, in accidents, and, ultimately, in situations that might be construed as involving malpractice. The adverse effects on health include such deleterious outcomes as increased mortality rates, increased accident rates and patient injuries, increased infection rates, and postoperative complications (Buchan & Calman, 2004).

Despite the crucial role of nurses in health care, most countries have, for some time, been facing acute shortages in their nursing workforce (Buchan & Calman, 2004). The World Health Statistics report of 2016 shows that globally there was a deficit of over 9 million nurses and midwives in 2013 (WHO, 2016). The shortage was found to be more acute in developing countries, especially in Africa, Southeast Asia, and Eastern Mediterranean regions, where the respective densities of nurses are much lower compared to the European Union and the American regions (WHO, 2016).

Estimates suggest that in India there was a shortage of 2.4 million nurses in 2012 (WHO, 2010). Other sources reporting nursing shortages in the country include: Nandan, Nair, & Datta (2007); Malik (2008); Rao, Bhatnagar, & Berman (2009); and Hazarika (2013). According to the World Health Statistics report of 2016, India had about 17 nurses and midwives for every 10,000 people, a figure much lower than that of developed countries (WHO, 2016). In India, during this year, there were also adverse nurse to population and nurse to doctor ratios of 1:584 and 2.3:1 respectively (WHO, 2014). Furthermore, only 40% of registered nurses are actively employed because of low recruitment, migration, attrition, and resignations due to poor working conditions (Government of India [GOI], 2005), leading to nurse shortages at every level of the health care system in the country. The problem of nurse shortages is compounded by the fact that even the nurses who are active in their roles are unevenly distributed across the country with the urban areas and developed regions having a higher nursing workforce compared to rural and less developed areas. Also, as most nurses tend to take jobs in the private rather than the public sector (Rao et al., 2009), the public health system, especially in rural areas, has to bear the brunt of nurse shortages. Although, it was over a decade ago that the Government of India launched its flagship programme for rural health care, the National Rural Health Mission (NRHM), for the purpose of strengthening primary health care infrastructure and human resources for health in rural areas, the problem of shortages of skilled health care workforce, including nurses, in the rural public health sector has not yet been resolved. Because over two-thirds of India's population live in rural areas and about one-fourth of them are below the poverty line, and thus unable to afford private health care facilities, they are dependent solely on public medical facilities. Thus, the shortage of vital health workers, and nurses in particular, severely affects the health care of the rural poor.

In light of these chronic shortages, the goal of this study is to determine whether or not any progress has been made to rectify or cope with the existing problems while detailing some specific repercussions of the nursing shortage on the rural population. Whereas earlier studies maintained a broader focus on the nursing crisis, emphasizing nursing shortages in both rural and urban areas, this study concentrates exclusively on nursing shortages in public hospitals in rural India. Also, as the evidence of previous studies is now relatively out of date, the present study adds to the existing literature by not only offering a more specific concentration on the rural sector but also presenting more current information.

Data and Methods

1) Data

The study is based on secondary data from government publications in India as well as publications offered by the WHO and the World Bank. There are various sources of data on the nursing workforce in India with the most common being *Population Census*, *National Sample Survey* (NSS) quinquennial surveys on employment and unemployment, and the live registration records of nurses and midwives that are maintained by the Indian Nursing Council (INC). Data on the nursing workforce in the public health sector is published by the Central Bureau for Health Intelligence, Ministry of Health and Family Welfare, Government of India in the form of annual reports, such as the *National Health Profile*, the *Bulletin on Rural Health Statistics*, and the *Annual Report to the People on Health*, which contain data based on information provided by the INC.

Data on the size and density of the workforce of nurses and midwives were derived from the *Global Health Workforce Statistics* published by the WHO (WHO, 2014), the *World Bank Open Data* (World Bank, 2018), and the *National Health Profile 2017* (GOI, 2017a). Data on the required number of posts, number of sanctioned posts, actual staff positions, number of vacant posts, and shortfall of nurses and midwives in the rural public health centers in India and in the states/Union Territories (UTs) were drawn from the *Bulletin on Rural Health Statistics 2006 and 2016-17* (GOI, 2006a; 2017b). Information on the number of nursing institutions and admission capacity are taken from the Nursing Council of India. State level population data was collected from the *Population Projections for India and States 2001–2026* published by the Registrar General and Census Commissioner, Government of India (GOI, 2006b).

2) Methods

The analysis in this paper is descriptive in nature and has been carried out on both national and state levels. Since the objective of the paper is to examine progress in the availability of nurses in the workforce, we have focused on what we consider to be the most relevant time period: from 2005, which was the year of implementation of the NRHM, to 2017, which is the latest year for which data is available.

There are various approaches for benchmarking whether the health care workforce is adequate. The most commonly used approach is the ratio of workforce to population, which can be interpreted either through the population being served by a health care worker or by determining health care worker density. In order to analyze the numerical adequacy of nurses and midwives in the public health sector in rural India, this study estimated the densities of nurses and midwives (the number of nurses and midwives per 10,000 people), the ratio of nurses and midwives to population (the number of people served by one nurse or midwife), and the ratio of nurses to doctors (the number of nurses and midwives for every doctor). The study also performed a correlation analysis to examine the relationship between the density of nurses and health outcomes such as infant mortality rate (IMR) and under-five mortality rate (U5-MR).

Variables like the percentage of health centers functioning without nurses and midwives, the percentage shortfalls of nurses and midwives, the percentage of required posts that remain non-sanctioned, and the percentage of sanctioned posts that remain vacant have been used as a means of gauging the extent to which there is a shortage of nurses and midwives. The shortfall of nurses and midwives is computed as the difference between the required number

of nurses and midwives, which is calculated using prescribed population norms and actual staff positions. Vacancy is calculated as the difference between the number of sanctioned posts and actual staff positions.

Results and Discussion

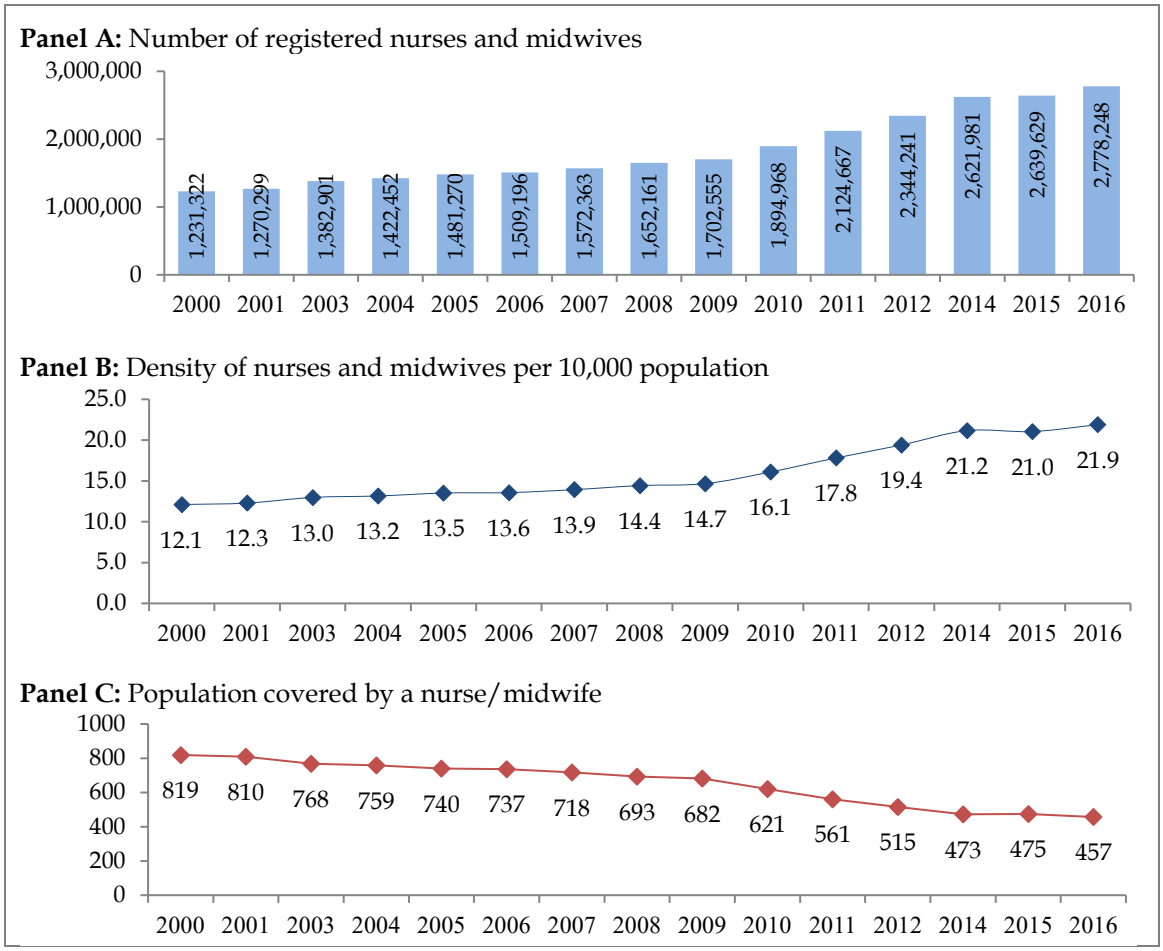
The results and discussion have been divided into five parts: assessment of the nursing workforce in India, the availability of nurses in the rural public health sector in India, the extent of the shortfall of nurses in the rural public health sector, the causes of the shortage of nurses in the rural public health sector, and, lastly, the impact of nursing shortages. Overall, the analysis indicates that the public health sector in rural India suffers from an acute shortage of nurses and that the nursing shortage has an adverse effect on health indicators such as IMR and U-5MR.

Nursing Workforce in India: Overall View

The lack of qualified nurses in public hospitals in rural areas notwithstanding, there has been a considerable rise in the nursing and midwifery workforce in India in the last two decades. The total number of nurses and midwives registered with the State Nursing Councils in India increased from 1.23 million in 2000 to 1.48 million in 2005 and then again to 2.78 million in 2016 (Figure 1). This indicates a density of nurses and midwives per 10,000 people of 12.1 in 2000, 13.5 in 2005, and 21.9 in 2016. Each nurse and midwife had to serve about 819 people in 2000, a figure which considerably declined to 740 in 2005 and to 457 in 2016.

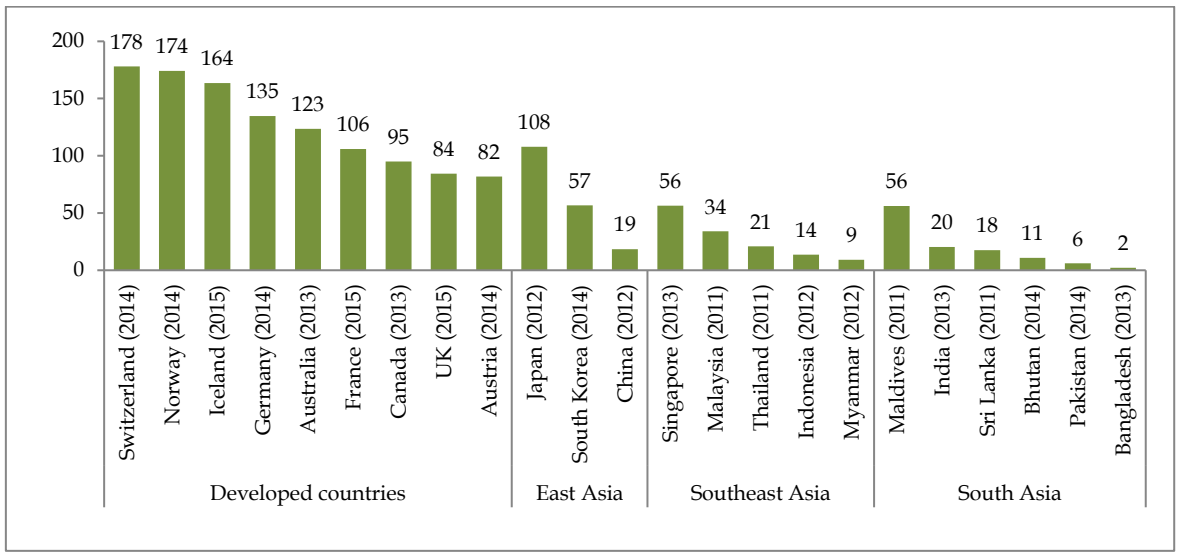
Comparing the density of nurses and midwives to that of other countries, India can be seen to have a substantially lower figure than most developed nations including Canada, Iceland, Switzerland, Norway, Australia, the United Kingdom, Germany, France, and Austria, where the proportion is 80–180 nurses for every 10,000 people in each community (Figure 2). East Asian and Southeast Asian countries including Japan, South Korea, Singapore, Malaysia, and Thailand also have a higher density of nurses and midwives than India. However, when compared to other South Asian countries, the figure for India is higher than all with the exception of the Maldives.

The density of nurses and midwives is associated with the level of economic development in a given country. Figure 3 shows the positive relationship between this density and the per capita gross domestic product (GDP) across 158 countries of the world for which data on nurse and midwife density are available.



Source: Data for 2000–2004 from WHO (2014) and for 2005–2016 from National Health Profile (2017).

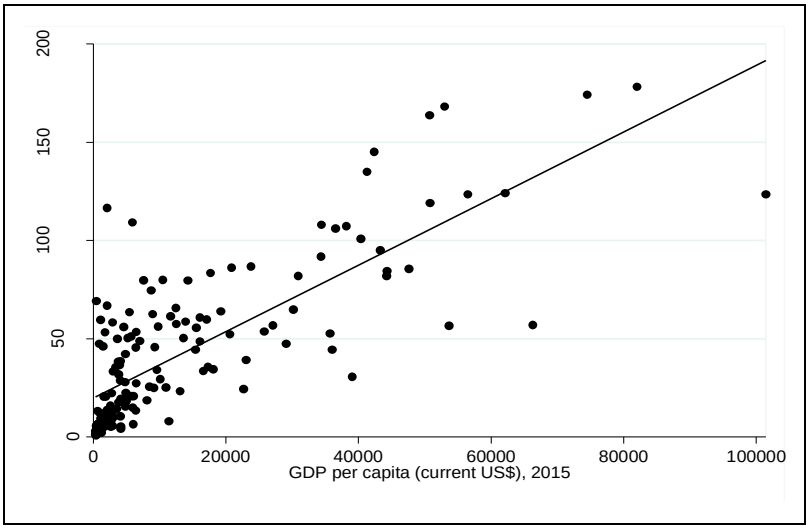
Figure 1: Registered nurses and midwives in India, 2000–2016



Note: Figures in parentheses alongside the country name indicate the reference year.

Source: Compiled from World Bank (2018)

Figure 2: Density of nurses and midwives (per 10,000 population) in select countries



Notes: GDP per capita data is for the year 2015 and density of nurses and midwives data is for the latest available year from 2011 to 2015.

Source: Author's estimation based on data from World Bank (2018)

Figure 3: Relationship between density of nurses and midwives and GDP per capita across countries

The ratio of nurses to the population is considerably lower in India (1:819 in 2000 and 1:457 in 2016) than in developed countries (1:100–200). India also has a lower ratio of nurses to doctors (2.2:1 in 2001 and 2.8:1 in 2016) compared to developed countries (3:1 or higher). Specifically, the ratio has been calculated as 5:1 in Japan, 4.5:1 in Canada and Iceland, 4.4:1 in Switzerland, 3.6:1 in Norway, 3.3:1 in Australia, and 3.2:1 in the United Kingdom in 2011 (WHO, 2014). Although there is no national norm for an effective nurse to doctor ratio, the World Development Report of 1993 recommends that the ratio of nurses to doctors should exceed 2:1 as a minimum, and a ratio of 4:1 or higher is desirable for cost-effective health care (World Bank, 1993).

One striking feature of the nursing workforce in India is that there are significant disparities in the distribution of nurses and midwives, not only from state to state but also between urban and rural areas (Rao et al., 2009; Hazarika, 2013). A recent study (Rao et al., 2009), based on Population Census 2001, found that the density of nurses and midwives, which as a national average was 7.4 for every 10,000 people, was strikingly different across geographical areas. For example, the density was found to be 6 for every 10,000 people in the states of Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jammu and Kashmir, Jharkhand, Madhya Pradesh, Rajasthan, Uttarakhand, and Uttar Pradesh. In Andhra Pradesh, Himachal Pradesh, Karnataka, Meghalaya, Punjab, Tamil Nadu, Tripura, and West Bengal, by contrast, it varied from 6–10 for every 10,000 people, whereas in Maharashtra, Manipur, Mizoram, Orissa, and Sikkim it varied further with 10–16 nurses for every 10,000 people; and in Arunachal Pradesh, Goa, Kerala, and Nagaland the figure exceeded 16 for every 10,000 people. The study further shows that about 60% of nurses and midwives in India lived in urban areas. Overall, the data shows that the density of nurses and midwives in rural areas (4.1 per 10,000 people) was just around one fourth the amount in urban areas (15.9 per 10,000 people). Also, more than 50% of nurses and midwives, both in rural and urban areas, were employed in the private sector. Nurses have tended to work in urban rather than rural areas and in the private rather than the public sector, and as a result, fewer nurses are available in rural areas, especially in the public sector. The following sections examine the day-to-day realities experienced by the nursing workforce in the rural public health sector of India.

Nursing Workforce in Rural Public Health Sector

The rural public health system in India consists of three tiers: sub-centers, primary health centers (PHCs), and community health centers (CHCs), with several nursing and midwifery cadres deployed at each level. The sub-center, which is the first contact point between the primary health care system and the community, is manned by one auxiliary nurse midwife (sometimes known by the acronym ANM, or simply called a female health worker), one additional ANM on a contract basis, and one male health worker. They tend to serve a population of around 5,000 people in the plains and 3,000 people in hilly areas and areas populated by tribes. At the next referral level (PHCs), one staff nurse, two additional staff nurses on a contract basis, one ANM, one lady health visitor (LHV, or female health assistant), and one male health assistant to assist the medical officer, are deployed. In the third tier (CHCs), seven staff nurses are deployed to assist the doctors and specialists. These nurses and midwives are either graduates or diploma holders, and there are no specialist nurses in clinical areas in the rural public health system. A brief description of the various nursing and midwifery cadres and the degree that is typically required by them is provided in Box-1.

Box 1: Nursing and midwifery workforce in India's rural public health sector

Nurse: Professionals with a diploma in General Nursing and Midwifery (3 and 1/2 year course), or a bachelor's degree in nursing (4 year course), or a postgraduate degree in nursing (2-3 year course), and registered as RNM with the State Nursing Council.

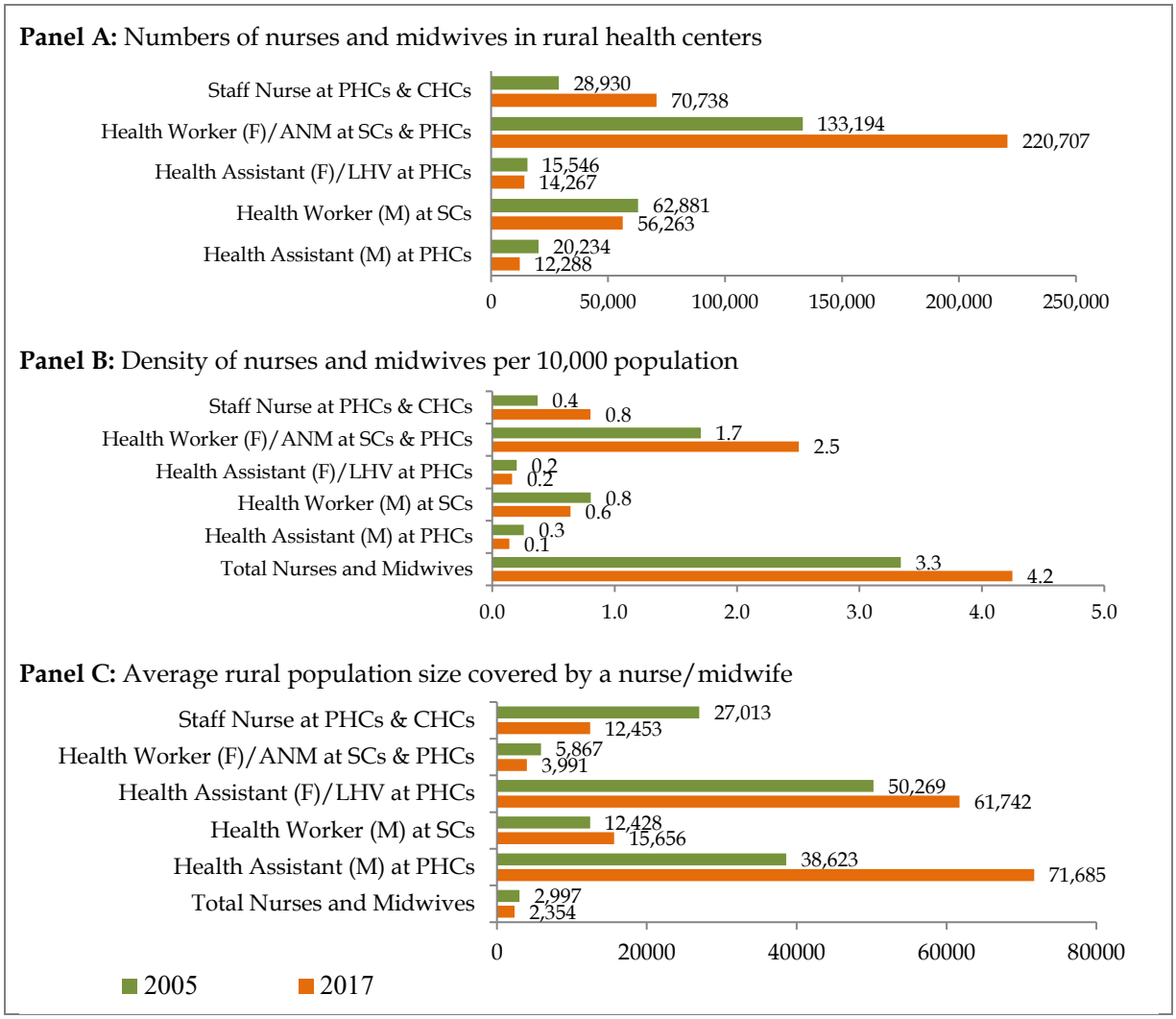
Auxiliary Nurse Midwife (ANM): Professionals with a diploma in ANM (2-year course), and registered as RANM with the State Nursing Council.

Lady Health Visitor (LHV): Professionals with a diploma in ANM and registered as ANM/multipurpose worker female (MPWF) with the State Nursing Council; and have completed the promotional training course as prescribed by the INC.

Male Health Worker: Persons with a diploma in Multipurpose Health Worker (MPW).

Male Health Assistant: Persons with Biology or Science at 10+2 level and also have undergone 6 months' training in public health.

The total number of nurses and midwives in the public sector in rural India was estimated at 374,263 in 2017 compared to 260,785 in 2005. This constituted around 83% of the public health care workforce in rural areas. The ANMs had the highest share, followed by staff nurses and male health workers (Figure 4). Between 2005 and 2017, the numbers of staff nurses and ANMs increased, whereas the numbers of LHVs, male health workers, and male health assistants decreased. As a result, the ratio of nurses to the population that they serve declined even though the figures for LHV, male health workers, and male health assistant increased during this period. As of March 2017, nurse to population ratios were as follows: 1:2,354 (total nurses and midwives), 1:12,453 (staff nurses), 1:3,991 (ANMs), 1:61,742 (LHVs), 1:15,656 (male health workers), and 1:71,685 (male health assistants). In other words, there were 4.2 nurses and midwives for every 10,000 people in 2017 compared to 3.3 in 2005. Between 2005 and 2017, the densities of staff nurses and ANMs increased, whereas the densities of LHVs, male health workers, and male health assistants declined (Figure 4).



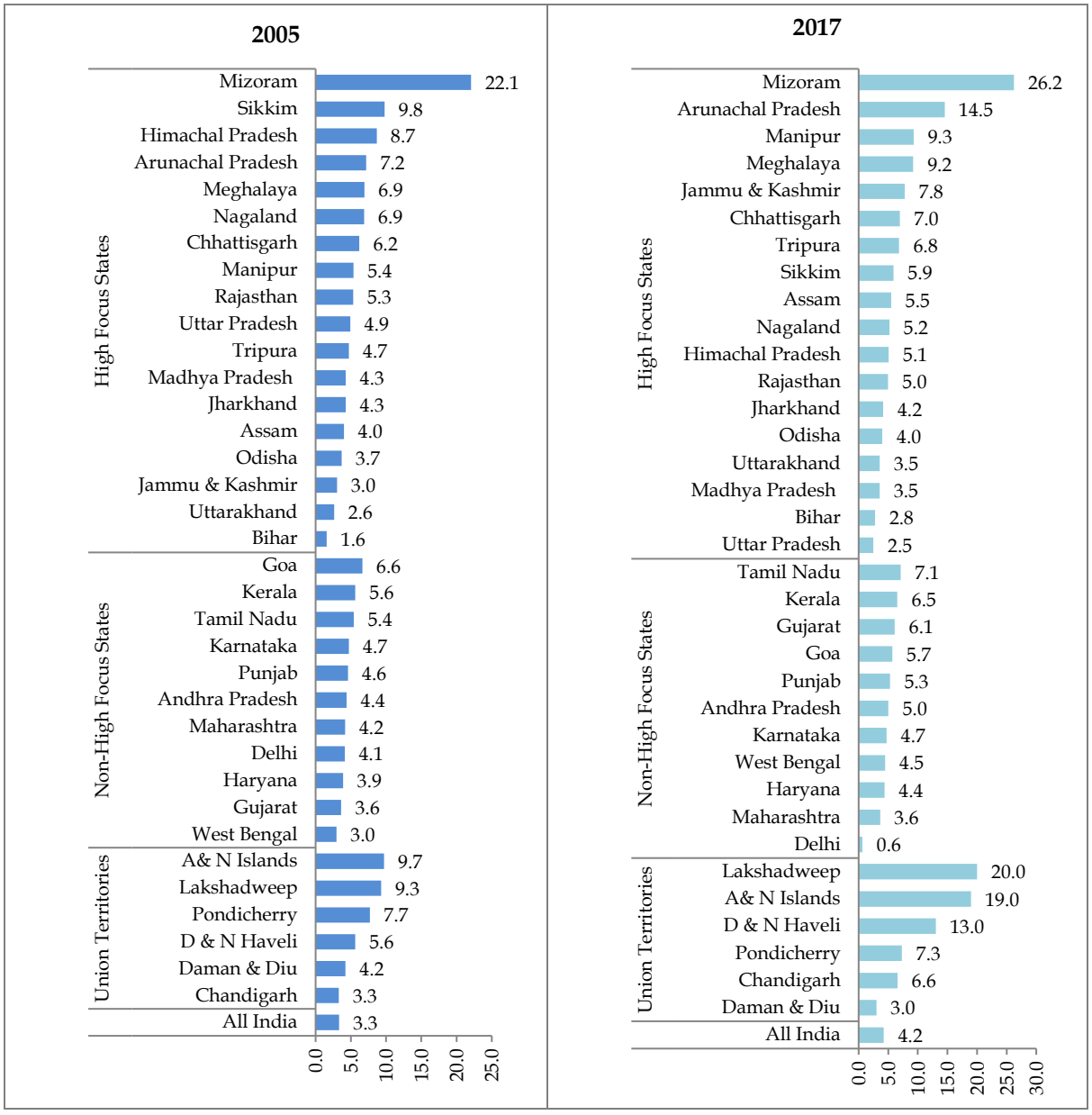
Source: Estimated from Bulletin on Rural Health Statistics in India (2006, and 2016-17)

Figure 4: Availability of nurses and midwives in rural health centers, 2005 – 2017

The ratio of nurses to doctors was 2.3:1 in 2017 compared to 1.2:1 in 2005 (including midwives the ratio was 11:1 in 2005 and 12:1 in 2017). This indicates that rural public health centers in India have a skewed mix of nurses to doctors. When considering the World Bank's recommendation of the optimal ratio of nurses to doctors (World Bank, 1993), it can be said that although the public health sector in rural India fulfils the minimum norm of two nurses per doctor, it is still far from the desirable norm of four or more nurses per doctor.

Marked variability in the densities of nurses and midwives is seen across states/UTs (Figure 5). The density of nurses and midwives for every 10,000 people varied from 1.6 in Bihar to over 22 in Mizoram in 2005 and from 0.6 in Delhi to 26.2 in Mizoram in 2017. Thus, the density of nurses and midwives in the highest density state (Mizoram) was about 14 times that of the lowest density state (Bihar) in 2005 and 41 times that of the lowest density state (Delhi) in 2017. The Gini coefficient (which is a measurement of distributional inequality) of the density of nurses and midwives across states/UTs turned out to be 0.262 in 2005 and 0.327 in 2017, indicating that inter-state disparity in the distribution of nurses and midwives has increased over the years.

Among the NRHM's more salient states, Bihar, Uttarakhand, and Jammu and Kashmir had a lower density of nurses and midwives than the national average in 2005, whereas Uttar Pradesh, Bihar, Madhya Pradesh, Uttarakhand, and Odisha fell into this category in 2017. The remaining states/UTs were found to have a higher density of nurses and midwives than the national average with the exception of West Bengal in 2005, Delhi, Maharashtra, and Daman and Diu in 2017, but no states/UTs except Mizoram, Lakshadweep, Andaman and Nicobar Island, Arunachal Pradesh, and Dadra and Nagar Haveli exhibited a density of more than 10 nurses and midwives per 10,000 people. In 2017, the density of nurses and midwives was between 7–10 per 10,000 people in six states and between 5–7 per 10,000 people in another twelve states. Between 2005 and 2017, the density declined in seven of the high-focus states, namely, Sikkim, Himachal Pradesh, Uttar Pradesh, Nagaland, Madhya Pradesh, Rajasthan and Jharkhand, and in the non-high focus states and UTs of Delhi, Goa, Maharashtra, Daman and Diu, and Pondicherry.



Source: Estimated from Bulletin on Rural Health Statistics in India (2006, and 2016-17)

Figure 5: State-wise density (per 10,000 population) of nurses and midwives, 2005 – 2017

Shortage of Nurses in Rural Public Health Sector

The discussion in the previous section reveals that the rural public health sector across the country does not have sufficient nurses and midwives. As of March 2017, out of the 156,231 Sub-Centers functioning in rural India, 4% were without an ANM, 50.3% were without a male health worker, and 2.7% were without both an ANM and a male health worker (Table 1). Surprisingly, the percentage of Sub-Centers functioning without ANMs and male health workers has increased in the post-NRHM period.

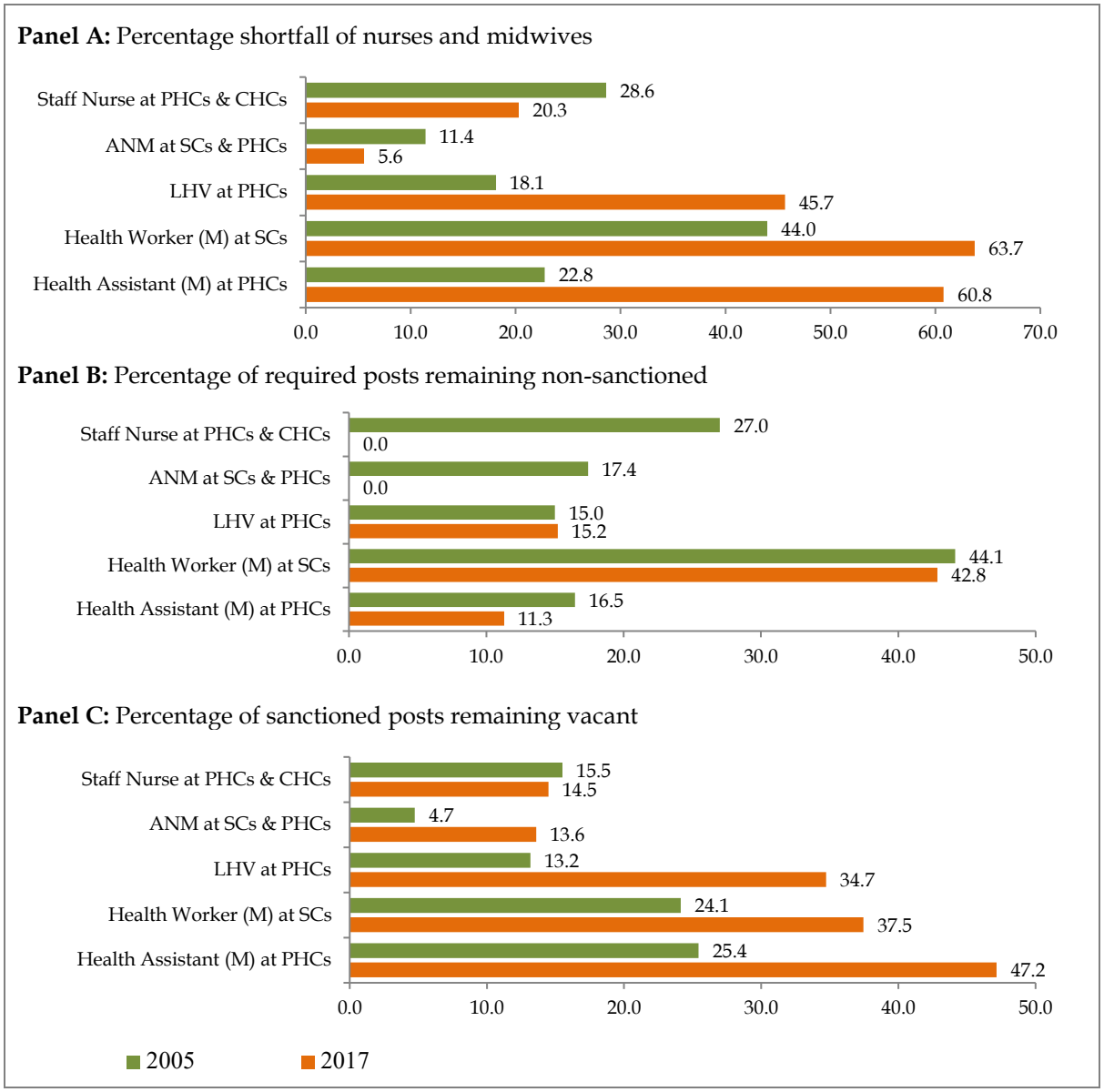
The shortage varied greatly across states/UTs. As of March 2017, the percentage of Sub-Centers without an ANM was highest at 89% in Arunachal Pradesh, followed by 32.5% in Tripura, 19% in Himachal Pradesh, 12.3% in Rajasthan and 11.4% in Tamil Nadu. The percentage of Sub-Centers without a male health worker was as high as 100% in Nagaland and Puducherry; above 70% in Chandigarh, Uttar Pradesh, Delhi, Rajasthan, West Bengal, and Uttarakhand; between 50%–70% in Jammu and Kashmir, Madhya Pradesh, Himachal Pradesh, Andaman and Nicobar Islands, Jharkhand, Meghalaya, and Arunachal Pradesh; and between 30%–50% in Haryana, Andhra Pradesh, Odisha, Punjab, Assam, Bihar, and Daman and Diu. The states with a higher than national average percentage (2.7%) of Sub-Centers without both ANMs and male health workers were Arunachal Pradesh, Himachal Pradesh, Rajasthan, Karnataka, Uttarakhand, Tamil Nadu, Jammu and Kashmir, Punjab, Tripura, and Bihar, with Arunachal Pradesh having the highest percentage (19.6%).

Table 1: Percentage of sub-centers functioning without a nurse and midwife, 2005 – 2017

States/UTs	Without ANM		Without HW(M)		Without Both	
	2005	2017	2005	2017	2005	2017
High focus States						
Arunachal Pradesh	26.4	89.1	72.6	53.2	26.4	19.6
Assam	1.6	0.0	97.8	35.1	1.6	0.0
Bihar	n/a	3.6	n/a	33.4	n/a	3.2
Chhattisgarh	14.5	3.8	25.3	25.6	n/a	1.7
Himachal Pradesh	20.3	19.1	10.6	60.2	3.7	11.4
Jammu & Kashmir	1.5	5.4	0.9	66.2	n/a	5.4
Jharkhand	n/a	1.6	n/a	59.9	n/a	2.2
Madhya Pradesh	6.8	0.0	17.3	60.9	0.0	0.0
Manipur	4.0	6.4	31.0	21.1	4.0	1.9
Meghalaya	0.0	0.5	30.7	56.2	0.0	0.2
Mizoram	5.5	0.0	13.7	15.7	1.4	0.0
Nagaland	15.0	1.8	15.0	100.0	15.0	0.0
Odisha	6.0	3.8	n/a	46.9	n/a	1.9
Rajasthan	3.3	12.3	25.7	83.6	1.7	9.4
Sikkim	0.0	4.8	0.0	17.0	0.0	1.4
Tripura	25.4	32.5	44.0	20.6	18.9	3.3
Uttar Pradesh	2.1	0.0	62.6	92.3	2.1	0.0
Uttarakhand	7.8	9.5	32.4	70.6	40.2	6.6
Non-high focus States						
Andhra Pradesh	2.7	0.0	51.0	47.7	1.5	0.0
Delhi	0.0	0.0	0.0	90.0	0.0	0.0
Goa	7.6	0.0	14.5	27.1	n/a	0.0
Gujarat	5.8	0.0	25.6	13.1	n/a	0.0
Haryana	0.9	1.6	n/a	48.1	n/a	1.0
Karnataka	0.0	7.8	60.8	27.0	0.0	7.8
Kerala	9.2	0.0	25.6	0.0	0.4	0.0
Maharashtra	7.1	4.0	9.3	26.4	4.5	2.4
Punjab	9.2	5.2	31.1	40.3	5.7	3.4
Tamil Nadu	2.5	11.4	n/a	17.5	n/a	5.6
West Bengal	n/a	0.2	33.5	77.1	n/a	0.4
Union Territories						
A & N Islands	0.0	0.0	100.0	60.2	0.0	0.0
Chandigarh	0.0	0.0	38.5	94.1	0.0	0.0
D & N Haveli	0.0	0.0	76.3	23.9	0.0	0.0
Daman & Diu	0.0	0.0	19.0	30.8	0.0	0.0
Lakshadweep	0.0	0.0	92.9	0.0	7.1	0.0
Pondicherry	0.0	0.0	100.0	100.0	0.0	0.0
All India	4.0	4.1	30.7	50.3	1.7	2.7

Notes: n/a– data not available, ANM– auxiliary nurse midwife, HW (M)– male health worker.
(Source: Estimated from Bulletin on Rural Health Statistics in India, 2006 and 2016-17)

As of March 2017, there was a shortage of 20.3% of staff nurses at PHCs and CHCs, 5.6% of ANMs at Sub-Centers and PHCs, 45.6% of LHVs at PHCs, 63.7% of male health workers at Sub-Centers, and 60.8% of male health assistants at PHCs (Figure 6). Interestingly, the percentage shortage of LHVs, male health workers, and male health assistants considerably increased between 2005 and 2017. The percentage shortage of staff nurses and ANMs declined, however.



Source: Estimated from Bulletin on Rural Health Statistics in India (2006 and 2016-17)

Figure 6: Shortfall and vacancy of nurses and midwives in rural health centers, 2005 – 2017

The shortages of LHVs, male health workers, and male health assistants were found to be widespread across states/UTs, whereas not many states have faced a shortage of staff nurses and ANMs (Table 2). The states with a shortage of nurses and midwives higher than the national average were mostly the NRHM's high-focus states. As of March 2017, the shortage of LHVs at PHCs was as high as 100% in Himachal Pradesh, Dadra and Nagar Haveli, and Daman and Diu, between 75%-99% in eight states/UTs, between 50%-74% in eight

states/UTs; and between 30%-49% in five states. The shortage of male health workers at Sub-Centers was above 75% in 11 states/UTs; between 50%-75% in 12 states/UTs; and between 30%-50% in five states/UTs. The shortage of male health assistants at PHCs was above 75% in 17 states/UTs; between 50%-75% in seven states/UTs; and between 30%–50% in four states.

Table 2: State-wise shortfall and vacancy of nurses and midwives (in percentages), 2017

States/UTs	Staff Nurse at PHCs & CHCs		ANM at SCs & PHCs		LHV at PHCs		HW(M) at SCs		HA(M) at PHCs	
	S	V	S	V	S	V	S	V	S	V
High focus States										
Arunachal Pradesh	15	+	+	0	96	0	71	0	43	0
Assam	+	0	+	+	70	19	40	7	90	0
Bihar	61	31	+	0	95	89	87	42	89	67
Chhattisgarh	3	29	+	+	18	20	26	26	46	28
Himachal Pradesh	53	35	32	20	100	100	60	59	91	57
Jammu & Kashmir	+	13	+	3	84	36	77	18	96	48
Jharkhand	30	+	+	+	95	95	57	23	89	90
Madhya Pradesh	4	31	+	16	18	18	60	13	54	54
Manipur	+	18	+	13	31	21	11	20	24	12
Meghalaya	+	+	+	4	34	+	56	+	24	+
Mizoram	+	63	+	+	67	78	1	4	61	74
Nagaland	+	+	+	+	81	+	100	0	58	+
Odisha	53	+	+	+	56	52	46	20	100	0
Rajasthan	+	25	2	25	47	47	92	48	98	71
Sikkim	13	+	+	11	50	50	41	41	96	+
Tripura	+	+	33	+	65	+	26	+	75	+
Uttar Pradesh	53	2	+	+	47	49	81	58	74	83
Uttarakhand	48	+	1	5	40	19	96	80	95	80
Non-high focus States										
Andhra Pradesh	+	15	+	17	0	12	61	38	100	0
Delhi	+	+	+	18	+	36	100	0	100	0
Goa	+	2	18	25	63	44	60	0	100	0
Gujarat	10	12	15	16	13	31	13	13	33	37
Haryana	+	13	+	13	25	19	53	43	58	26
Karnataka	12	+	39	28	54	25	65	45	+	45
Kerala	+	+	+	+	98	0	37	0	+	0
Maharashtra	42	22	2	35	1	25	57	42	11	6
Punjab	+	8	+	6	+	+	52	52	38	34
Tamil Nadu	+	8	21	21	27	27	76	36	24	30
West Bengal	+	11	+	10	83	22	79	77	92	74
Union Territories										
A & N Islands	+	3	+	4	9	0	63	0	50	0
Chandigarh	+	+	+	+	0	+	88	0	100	+
D & N Haveli	+	+	+	+	100	0	11	+	100	0
Daman & Diu	11	+	+	+	100	0	35	29	50	0
Lakshadweep	+	0	+	+	75	0	0	0	100	0
Pondicherry	+	+	+	+	70	8	100	0	15	0

Notes: S– Shortfall (as percentage of required posts), V– Vacancy (as percentage of sanctioned posts). + indicates surplus, SC– sub-center, PHC– primary health center, CHC– community health center, ANM– auxiliary nurse midwife, LHV– lady health visitor, HW– health worker, HA– health assistant, M– male, F– female.

Source: Estimated from Bulletin on Rural Health Statistics in India, 2016-17

It is also worthwhile to note here that the effective availability of nurses depends not only on the numbers of in-position nurses but also on the absence rate and attrition rate. As the above discussion shows, as well as suffering from grossly inadequate numbers of nurses and midwives in public health centers, the public health sector in rural areas has also suffered from a high degree of absenteeism and a low level of participation in the provision of health care services utilizing existing nurses and midwives. A recent study by Muralidharan et al. (2011), based on a nationally representative all-India survey conducted in 19 states between December 2002 and March 2003, found the absenteeism rate among nurses at PHCs and CHCs in rural India to be about 40%. The absence rate was above 50% in Karnataka, Uttar Pradesh, Bihar and Uttaranchal; between 40%–50% in Gujarat, Assam, Kerala, Punjab, Jharkhand and Haryana; and between 25%–40% in Himachal Pradesh, West Bengal, Rajasthan, Orissa, Maharashtra, Tamil Nadu, Andhra Pradesh, Chhattisgarh and Madhya Pradesh. In addition, the study reports that in many instances public health facilities, most often Sub-Centers, do not open on time, and on some occasions not at all, leading to inconvenience for patients.

Causes of Nursing Shortages

Despite the NRHM mission since its implementation in April 2005 seeking to strengthen rural health care infrastructure, there has been an acute shortage of nurses and midwives in public health centers in rural areas across the country. In fact, the shortage of nurses and midwives worsened in the post-NRHM period even as the stock of nurses and midwives in the country increased substantially. This increase has been influenced by the rapid expansion of the number of nursing institutions and the amount of nurse-training capacity in the country. Table 3 shows the number of institutions offering various nursing and midwifery courses in the country and the admissions capacity from 2005 to 2017. It can be seen that, during that period, the number of General Nursing and Midwifery (GNM) training institutions and their admissions capacity increased by a factor of 2.5, while the number of Auxiliary Nursing and Midwifery (ANM) training institutions and their admissions capacity increased by factors of 7.3 and 8.2 respectively. As of March 2017, there were 3,123 GNM training institutions with an admissions capacity of 125,762, 1,986 ANM training institutions with an admissions capacity of 57,019, 1,831 institutions offering a Bachelor of Science (BSc) degree in Nursing with an admissions capacity of 91,806, 780 institutions offering a Post Basic Bachelor of Science (P.B.B.Sc) degree in Nursing with an admissions capacity of 24,865, and 637 institutions offering a Master of Science (MSc) degree in Nursing with an admissions capacity of 12,390. However, an alarming aspect of nursing education in India has been the growing involvement of the private sector and the quality of education offered by private institutions. As of March 2017, about 85%-95% of nursing and midwifery institutions and overall admissions capacity were controlled by the private sector. Although the increasing involvement of the private sector has helped to overcome the shortcomings resulting from inadequate expansion of the training capacity in the public sector, it has raised questions on the quality of nursing education in the country (Hazarika, 2013). The Report of the National Commission on Macroeconomics and Health of the Government of India has pointed out that private institutes have been operating for profit only and a substantial proportion of these institutes are, due to serious shortages in faculty, infrastructure, and quality of education, unsuitable for teaching (GOI, 2005).

Table 3: Number of nursing institutions and admissions capacity in India

Course	Number of Institutions			Admission Capacity		
	2005	2012	2017	2005	2012	2017
General Nursing and Midwifery (GNM)	1,312	2,670	3,123	50,628	109,224	125,762
Auxiliary Nursing and Midwifery (ANM)	271	1,642	1,986	6,942	46,719	57,019
Bachelor of Science (BSc) in Nursing	349	1,578	1,831	n/a	80,245	91,806
Post Basic Bachelor of Science (P.B.B.Sc) in Nursing	50	696	780	n/a	22,655	24,865
Master of Science (MSc) in Nursing	54	535	637	n/a	10,026	12,390

Notes: n/a – data not available.
Source: Nursing Council of India

The increases in training capacity and the stock of registered nurses and midwives in the country along with increases in the number of nurses and midwives in absolute numbers (as well as in relation to the population being served) point to the fact that the shortage of nurses and midwives in India is not driven by supply-side factors, but by an increase in demand. With the growing population size, particularly increases in the numbers of the aged and of children, and the increasing burden of both communicable and non-communicable diseases, this demand for nurses has been growing.

The shortage of nurses is partly caused by the shortage in the required numbers of health centers in rural areas. As of March 2017, there was shortfall of 34,946 (19.5%) Sub-Centers, 6,409 (21.8%) PHCs, and 2,168 (29.6%) CHCs (GOI, 2017b). As a result, the nurses and midwives who were to be deployed in these health centers added to the total shortage. Furthermore, a significant percentage of the required posts of nurses and midwives remained non-sanctioned. In 2005, 27% of the required posts of staff nurses at PHCs and CHCs, 17.4% of the required posts of ANMs at Sub-Centers and PHCs, 15% of the required posts of LHVs at PHCs, 44% of the required posts of male health workers at Sub-Centers, and 16% of the required posts of male health assistants at PHCs remained non-sanctioned (see Figure 6). By 2017, all the required posts of staff nurses and ANMs had been sanctioned, whereas the percentage of required posts remaining non-sanctioned declined in the case of LHVs, male health workers, and male health assistants. Even out of the sanctioned posts, a considerable percentage of posts lay vacant at all levels. As of March 2017, about 14.5% of sanctioned posts of staff nurses at PHCs and CHCs, 13.6% of sanctioned posts of ANMs at Sub-Centers and PHCs, 34.7% of sanctioned posts of LHVs at PHCs, 37.5% of sanctioned posts of male health workers at Sub-Centers, and 47.2% of sanctioned posts of male health assistants at PHCs were vacant (see Figure 6). Contrary to expectations, between 2005 and 2017 the percentage of vacant posts significantly increased in the case of all nursing cadres except staff nurse. Once again, the states with a higher percentage of vacant posts of nurses and midwives than the national average were mostly the NRHM's high-focus states (see Table 2).

The shortage of health centers and the vacancies in sanctioned posts have a variety of causes, such as, in the latter case, undue delays in the recruitment process, poor retention policies, and unwillingness of nurses and midwives to work in rural areas, etc. It is also clear that politicians' promises concerning the construction of new facilities and new appointments may be based more on their political interests rather than any genuine will to act.

The working conditions in rural health centers can be considered to be poor as essential infrastructure, such as staff quarters, drinking water facilities, electricity, all-weather motorable road connections, etc. are either not available or not in a functioning condition. As of March 2017, 44.6% of Sub-Centers did not have quarters for ANMs, 20.5% of Sub-Centers and 6.6% of PHCs were without regular water supply, 24% of Sub-Centers and 3.6% of PHCs were without electric supply, and 9.9%of Sub-Centers and 5.3% of PHCs were without all-

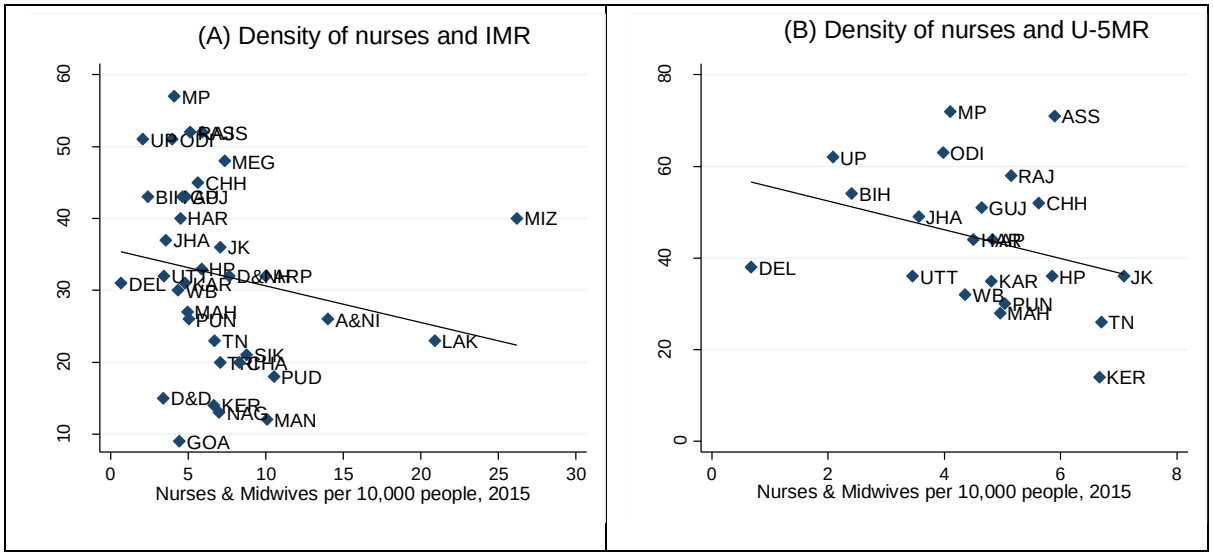
weather motorable road connections (GOI, 2017b). Because of the poor infrastructure facilities, few applicants wish to pursue jobs in rural areas, and even those who are employed rarely visit their centers.

Another contributing factor is the migration of nurses to urban areas and abroad, especially to developed countries, for better career opportunities, working conditions, salaries, and other benefits. In the last two decades, there has been a significant increase in the migration of nurses from India and it has emerged as one of the major countries of origin of foreign nurses in developed countries such as the United States, the United Kingdom, Canada, Australia, Ireland, and the Gulf countries. Some estimates suggest that about 20% of graduates of Indian nursing schools go abroad every year (Sinha, 2007). A recent study (Percot, 2006) estimates that about 40,000-60,000 Indian nurses are working in the Gulf countries. This large-scale emigration aggravates nurse shortages in the country.

Impact of Nursing Shortages

The shortage of nurses and midwives has huge repercussions on health care delivery processes, the capacity of the health centers, and ultimately the quality of health care services being provided. The shortage implies that there are too few nurses and midwives at the health centers to deal with the number of patients demanding health care. This creates overburdening for existing nurses and physicians, reduces nurses' time for patients, delays nurses' response to patients, and increases patient waiting time for tests. All these factors lead to subsequent delays in the treatment and discharge of patients. Furthermore, the increased workload affects the efficiency and effectiveness of nurses in maintaining patient safety and in providing quality of patient care and increases the levels of stress and mental exhaustion among nurses, which can result in increases in mistakes, accidents, and medical errors, and, ultimately, in unethical practices. All of these take their toll on the quality of health care services being provided. Finally, because of the poor quality of health care, people are reluctant to use public health facilities and instead visit private practitioners resulting in increases in the out-of-pocket expenditure of the poor.

The nursing shortage also adversely affects health outcomes. It is well known that critical health indicators such as IMR and U-5MR have a negative correlation with the availability of health care providers. Figure 7 clearly shows that IMR and U-5MR have a negative correlation with the density of nurses and midwives across states/UTs. This is further confirmed by our estimates of Spearman's rank correlation coefficient comparing the densities of nurses and midwives with IMR and U-5MR, which turned out to be relatively high and negative at –0.334 for the density of nurses and IMR, and –0.373 for the density of nurses and U-5MR. The coefficients are statistically significant at the conventional level of significance, implying that states/UTs with higher densities of nurses and midwives tend to have lower IMR and U-5MR. This confirms the existing evidence that a higher density of nurses is associated with better health outcomes.



Source: Author's estimation

Figure 7: Relationship between the density of nurses and health outcomes across states/UTs

The shortage of nurses and midwives in rural health centers, especially in Sub-Centers, may also hinder the effective implementation of some important government health care programmes, such as, Janani Suraksha Yojana (JSY), Universal Immunization Programme (UIP), Mission Indradhanush, Rashtriya Bal Swasthya Karyakram (RBSK), etc. Since the implementation of these schemes requires engagement of especially the nurses and midwives with people at the village level, the shortage of nurses and midwives has huge repercussions on the effective implementation of these schemes.

Conclusion

The availability of nurses and midwives in rural areas has remained a major concern in India even more than a decade after the launch of the NRHM mission in 2005, which was aimed at strengthening rural health care infrastructure. Although the numbers of nurses and midwives in public health centers in rural areas have steadily increased from 2005 to 2017 in absolute terms as well as in relation to the population being served, they are not sufficient to meet the health care needs of people in rural areas. Both the nurse to population ratio and the nurse to doctor ratio are abysmally low in rural India compared to global norms. Furthermore, there is widespread disparity in the distribution of nurses and midwives across states/UTs and the inter-state disparity has increased from 2005 to 2017. The past decade has seen widespread shortages in cadres such as LHV, male health worker, and male health assistant, whereas the shortages of staff nurses and ANMs have declined. The states with shortages of nurses and midwives higher than the national average are mostly the NRHM's high-focus states. There is also the serious problem of vacancies in sanctioned posts at all levels coupled with a sizable proportion of the required posts remaining non-sanctioned across states/UTs.

Our analysis shows that the nursing shortage has had a significant adverse effect on critical health indicators such as IMR and U-5MR. The shortage has resulted from a combination of factors, such as rising demand, lack of proper health manpower planning, reluctance of the government to create new facilities and sanction new posts, faulty recruitment and retention policies, deplorable working environments, insufficient infrastructure facilities in rural health centers, and migration of nurses.

The limitations of our analysis are worth mentioning. Firstly, this paper provides only a descriptive analysis of the availability and shortfall of nurses in the public health sector in rural India. Secondly, we have only examined the correlation between the availability of nurses and health indicators and have not analyzed the efficiency of the existing nursing workforce in the public health sector. Further research needs to be carried out in these areas.

The findings call for immediate attention from the state regarding the sufficient staffing of nurses and midwives in the rural health sector through the creation of the required number of posts and the filling of vacant posts by simplifying the recruitment procedures with the aim of eradicating nurse shortages and enhancing health care services. Efforts also should be made to make the rural service attractive for nurses and midwives by providing competitive job packages that include both monetary and non-monetary incentives and by improving infrastructure facilities in rural health centers. Apart from this, strategies also need to be developed to counteract the attrition of nurses and midwives caused by illness, death, retirement, and migration.

Acknowledgement

The author would like to thank two anonymous reviewers of the journal for helpful comments and suggestions. The usual disclaimer applies.

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