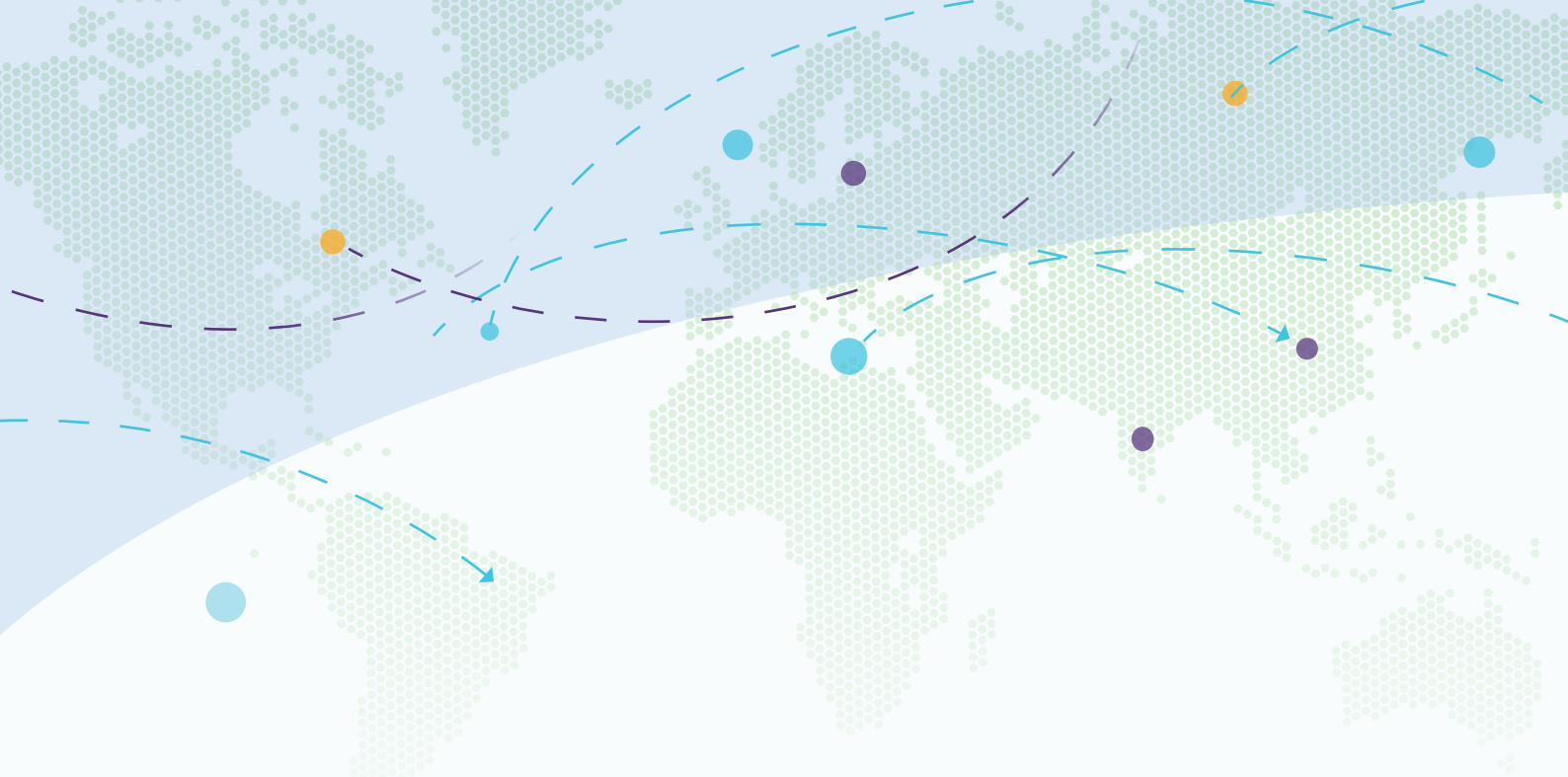


SURGICAL WORKFORCE IN INDIA

What the state of Kerala tells us
about the production, stock and
migration of the health workforce



World Health
Organization



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Abbreviations

ASI.....	Association of Surgeons of India
AYUSH.....	ayurveda, yoga and naturopathy, unani, siddha and homeopathy
ECR.....	emigration check required
GDP	gross domestic product
MBBS.....	Bachelor of Medicine, Bachelor of Surgery (Latin: Medicinae Baccalaureus, Baccalaureus Chirurgiae)
NORKA	Non-Resident Keralites' Affairs Department
ODEPC.....	Overseas Development and Employment Promotion Consultants
OECD.....	Organisation for Economic Co-operation and Development
WHO	World Health Organization

Abstract

Background. India continues to experience shortages of health workers despite impressive increases in production capacity in recent years. Even as the country suffers from a chronic shortage of health workers, it has become a major source of migrant medical doctors and nurses across the world.

Objectives. This report uses available data to present estimates of the production, stock and migration of surgical specialists in India and from the state of Kerala, and identifies gaps in and limitations of available data sources.

Methods. The research protocol described in the first phase of the Brain Drain to Brain Gain project, which focuses on the WHO Global Code of Practice on the International Recruitment of Health Personnel, was used to define mapping, data collection and analysis for this report. Multiple data sources were used to gather information on the production, stock and migration of surgical specialists. In addition, two medical schools in Kerala were surveyed to ascertain current job location of surgical specialist students who graduated in 2013–2014.

Results. The production capacity of surgical specialists in both India as a whole and in Kerala state has experienced an upward trend in recent years, and in 2015 it was estimated to be 9048 and 412, respectively. Estimates of the stock of surgeons in India range between 1.5 and 6.8 per 100 000 population, while estimates of the density of surgical specialists in Kerala range between 2.3 and 10.2 per 100 000 population. India and Kerala have substantial deficits in surgical specialists, according to the recent Lancet Commission on Global Surgery. Data on Indian-trained surgical specialists working overseas are scarce, and the lack of a comprehensive and updated source of information on the surgical workforce makes it difficult to obtain reliable figures on the migration of the surgical workforce from Kerala. Available information indicates that most migration of the surgical workforce is to English-speaking, developed countries. A rough estimate of the cumulative migration rate for doctors (including surgical specialists) in Kerala is around 40%.

Conclusions. In India and Kerala, while migration of health workers appears to be substantial, this seems to be less of an issue in the case of the surgical workforce. However, the consequences of migration should not be ignored and need careful reflection, particularly as India and Kerala have substantial deficits in surgical specialists, especially in rural areas. There is clearly an urgent need to attract surgical specialists and doctors to rural areas by offering monetary and non-monetary incentives, as well as improving working conditions there. Strategies for increasing the supply of surgical specialists include creating attractive opportunities to serve locally (thereby reducing the draw of serving abroad), and increasing the production of specialist doctors by creating more positions for training. As an interim measure, multi-skill training of general doctors to reduce the deficit of surgical specialists, particularly at community health centres, should be expanded. Fragmented information systems on the health workforce prevent accurate and comprehensive assessments of stock and migration of surgical specialists. Information systems for human resources for health are in need of urgent strengthening.

Key words: India, migration, surgical, doctors, WHO Code of Practice, Kerala

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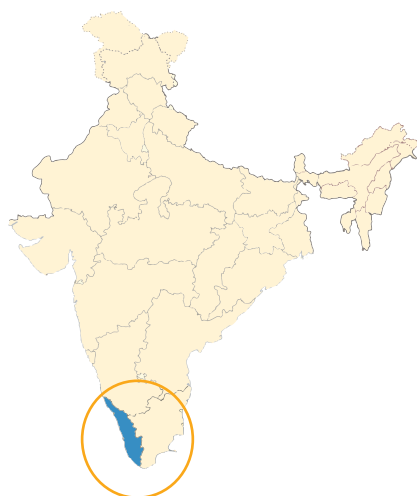
1. Background

India has a mixed health system in which both the public and private sectors provide health care. The health system's heterogeneity extends itself to different systems of medicine practised in the country and pluralistic health services. India's health system is faced with numerous challenges, including that of adequate financing and human resources. Across India, approximately 80% of outpatient services and 60% of inpatient services are provided by the private sector (1). Out-of-pocket expenditure on health is over 85% (2). Despite robust economic growth in the last several decades, public contribution to overall health spending in India has hovered around 1.3% of

its gross domestic product (GDP) (3). India continues to experience shortages of health workers, despite impressive increases in production capacity. Even as the country suffers from a chronic shortage of health workers, India is a major source of migrant medical doctors and nurses across the world.

The southern state of Kerala (Figure 1), where this study was conducted, is unique in the Indian context for its human development achievements, which are far superior to other states in India and on a par with those of developed countries. Though Kerala is a small state – it comprises 1.18% of the total area and 3.34% of the total population of India – its human development achievements have made the “Kerala model” a source of considerable interest among development thinkers, as it demonstrates that considerable progress in human development can be achieved in resource-poor environments. The infant mortality rate for Kerala in 2014 was 12 per 1000 live births, compared to 40 for India as a whole; and the state has a below-replacement fertility rate of 1.8 (2.3 for India) (Table 1). Further, according to the 2011 census, Kerala has a literacy rate of 94% (96% male and 93% female), which far exceeds India's average of 73% (81% male, 65% female). Per capita expenditure (2008–2009) on health in Kerala is approximately 507 rupees (US\$ 7), compared to 166 rupees (US\$ 2) in Bihar, or even 421 rupees (US\$ 6) in neighbouring Tamil Nadu (5). A key contributing factor to Kerala's remarkable achievements in human development is its long-standing commitment to the social sectors by the state's rulers, even before India's independence. This

FIGURE 1. LOCATION OF KERALA STATE, INDIA



government commitment has resulted in effective public sector programmes in health and education, land reforms, public distribution of food, and housing development. In addition, public awareness and public action have contributed to well-functioning social services in health and education.

Kerala also stands out as a major supplier of nurses to other states in India. This reflects the state's high capacity for producing nurses and doctors. Moreover, a substantial number of health workers from Kerala, particularly nurses, work across the world. This is part of a broader pattern of citizens of the state migrating for employment internally and externally, particularly to the Middle East.

1.1 Health system context and human resources for health policy

In India's mixed health system, the majority of outpatient visits and hospitalization episodes involve private sector providers. Health workers can be regular or contractual government employees, or work exclusively in the private sector, as the majority do. However, it is not uncommon for public sector health workers to also officially or unofficially work as private practitioners. Constitutionally in India, health is the responsibility of the state, which is therefore responsible for managing and financing the public sector health workforce.

With regard to production of doctors, medical education in India, maintaining standards, accreditation of institutions, awarding degrees and registration of medical doctors are largely the responsibility of the Medical Council of India, established in 1934 under the Medical Council Act of 1933. There are 419 medical colleges in India (199 government and 220 private) providing MBBS¹ training (6, 7). Almost half (46%) of these institutes are located in the southern part of the country, followed by 21% in the west and 16% in northern states.

India has experienced an exponential growth of medical schools in recent decades, largely driven by the growth in the number of private sector institutions. Medical education is highly subsidized in government training institutes, while the cost of a private education is several

TABLE 1. KERALA STATE: KEY STATISTICS

	Kerala	India
Literacy rate ^a	94%	73%
Total fertility rate (2013) ^b	1.8	2.3
Infant mortality rate (2014) ^b	12	40
Sex ratio (females per 1000 males) ^a	1084	943

Source: ^aCensus of India 2011; ^bRegistrar General of India (4).

magnitudes higher. The number of medical schools increased remarkably from 136 in 1990 to 270 in 2008 to 419 presently, with around 54% of these in the private sector. These institutions offer undergraduate (MBBS) and postgraduate specialist training degree and diploma courses. Annually, around 56 738 doctors with an undergraduate (MBBS) degree and 25 850 with postgraduate degrees are produced in India (6, 7). The state of Kerala has 25 medical schools and reflects the concentration of medical training institutes in the southern states of India. According to the Medical Council of India, Kerala has an annual production capacity of 3400 MBBS doctors.

Regarding the availability of doctors, India continues to experience shortages of doctors despite an impressive increase in production capacity. The country had only 6.4 doctors, nurses and midwives per 10 000 population in 2012, which is one quarter of the WHO benchmark of 22.8 workers in these categories per 10 000 population associated with achieving 80% deliveries attended by skilled personnel in cross-country comparisons (8). This shortage is further exacerbated in rural areas due to a scarcity of doctors in those locations.

1.2 Migration of health workers

India is an important and growing supplier of doctors to the world. One study estimated that in 2004, there were 71 290 Indian-trained doctors working in 18 destination countries (9). The top four destinations were the United States of America, United Kingdom of Great Britain and Northern Ireland, Canada and Australia. In some countries, Indian-trained doctors represent a sizeable proportion of the workforce. For instance, Indian-trained doctors currently constitute 9% of all registered doctors in the United Kingdom and form the largest group of foreign-trained doctors there (10). One study of a leading

1 Professional degree in medicine and surgery: Bachelor of Medicine, Bachelor of Surgery (Latin: *Medicinae Baccalaureus, Baccalaureus Chirurgiae*).

medical college in India found that 54% of graduates during 1989–2000 now reside outside India, with the United States being the most popular destination (11).

However, few Indian sources or studies exist on the extent of doctor or specialist doctor migration. For one, information on migrating doctors is not collected by any government agency. No official statistics are collected on the numbers of doctors or specialist doctors leaving the country.

The Indian Government does not have a formal policy on the migration of doctors or specialists. Unofficially, it appears that doctor migration is not seen as a significant issue in government circles. At the same time there are inconsistent efforts in the form of bonds and stipulations – monetary and non-monetary – to try and ensure students going abroad for higher education in medicine return on completion of their education.

Much more effort has been put into understanding and regulating the migration of nurses, especially to the Middle East. Recent initiatives to regulate the international mobility of nurses have been in the form of making it mandatory for nurses to take an emigration clearance before undertaking employment in one of the “emigration check required” (ECR) countries,² and also reinforcing the role of government agencies in the recruitment and migration of nurses. In Kerala, the Non-Resident Keralites’ Affairs Department (NORKA) and its field agency NORKA-Roots, and the Overseas Development and Employment Promotion Consultants (ODEPC), are government agencies, established in 1996 and 1977 respectively, that are designated to facilitate recruitment and movement of Kerala-trained nurses overseas for employment. This does not apply to medical doctors.

International migration of health workers – usually from low- and middle-income countries to more developed countries – is an area of study that has received attention globally. In 2010, the Sixty-third World Health Assembly adopted the WHO Global Code of Practice on the International Recruitment of Health Personnel. The

debate on health worker migration juxtaposes benefits in terms of the transfer of skills and knowledge, professional development and remuneration of migrants from destination countries with arguments on the impact of the emigration of skilled health workers on the source countries, which often are resource poor and have a chronic shortage of health workers. The Global Code aims to promote ethical and fair international recruitment of health workers, taking into account the needs of the source and destination countries, as well as those of the health workers themselves. Member States are required to designate a national authority and to report on the implementation of the Global Code, and to provide data on the international migration of health workers.

2. Objectives

India is a major source country for migrant health workers; yet, the country faces a serious shortage of health workers within. Data and information on the number of qualified health workers are constrained by inadequate mechanisms to collect, process and use such information, and very little is known on the numbers of health workers migrating overseas. Within the broader context of the Global Code and its implementation, there is a need to understand the “stocks” and “flows” of health workers; to map and contribute to the development of better information systems on the health workforce; and to generate evidence on migration flows of health workers. Within India, the state of Kerala has been recognized for its commitment to and investments in health and education; it is also known for its production of medical professionals, many of whom, especially nurses, migrate overseas and within the country. Given its large migrant workforce, both public and private systems to facilitate the movement of health workers, especially nurses, are operational in the state, and studies of Kerala’s migrant workforce have been undertaken, including of migrant nurses. Less emphasis has been laid, however, on studying the migration patterns of other highly skilled workers, including doctors. With this background, and taking account of such factors as the size of the state, the number of institutes of medical education and the assistance available from the state’s Department of Health and Family Welfare, Kerala was chosen as the location of the present study, which aims to provide a situation analysis of the surgical workforce

2 Afghanistan, Bahrain, Indonesia, Iraq, Kuwait, Lebanon, Libya, Jordan, Malaysia, Oman, Qatar, Saudi Arabia, Sudan, Syria, Thailand, United Arab Emirates, Yemen.

and external migration in the state of Kerala. Its specific objectives are:

- estimate Kerala's capacity for producing specialist doctors trained in surgery (or "entry" into the workforce);
- determine the current availability of doctors and specialist (surgical) doctors in Kerala (the workforce "stock");
- estimate the numbers involved and trends in the external migration of surgical doctors from Kerala.

In addition, this study provides a summary of available sources of data on production and migration of health workers in India, identifies gaps in and limitations of available data sources, and provides recommendations for improvements in information systems for human resources for health.

3. Methods

The methods undertaken for this study are based on the protocol outlined under the broader, WHO multicountry study, Brain Drain to Brain Gain: Supporting the WHO Code of Practice on International Recruitment of Health Personnel for Better Management of Health Worker Migration. The protocol is designed to guide the work on generating evidence on migration of select cadres of health workers in five countries: India, Ireland, Nigeria, South Africa and Uganda. The first year of the study focuses on the migration of the surgical workforce; in the cases of India and Nigeria, the protocol is to be implemented at the state level. Templates outlined in the protocol towards the different stages of data collection have been used to identify stakeholders and develop data collection tools.

A variety of secondary data sources were used to arrive at estimates. In addition, primary data were collected from two medical schools in Kerala. A combination of templates A and B (record of stakeholder engagement and data identification; and current record of relevant data sources and data providers identified) was used to identify stakeholders and potential sources of data. Elements from template E (data, information, and analysis hierarchy for country reports) were used to identify variables to extract from secondary and primary data sources. A summary of data collected and used in this report is presented in Annex 4.

For the purpose of this study, the surgical workforce includes physicians trained in general surgery as well as in other fields of medicine having a surgical component, including obstetrics and gynaecology, ophthalmology, orthopaedics, otorhinolaryngology, transfusion medicine and anaesthesia. A list of degree and non-degree courses selected under this study as surgical specialist courses is presented in Table 2 (see section 4.1). In addition, general doctors also perform minor surgeries. In particular, multi-skill programmes offered as in-service training aim to reduce the deficit of surgical specialists by training general doctors in limited surgical specialist skills. However, the number or distribution of such multi-skilled general doctors is not known.

3.1 Production

There are two principal data sources to derive estimates of production of doctors and specialist doctors. The first is the number of seats that are available for undergraduate (MBBS) and surgical specialist courses as reported by the Medical Council of India. A second data source is registration of MBBS graduates and those completing specialist surgical training with the Medical Council of India and the state councils (Travancore-Cochin Council of Modern Medicine).

All medical professionals who have completed their undergraduate degree (MBBS) from medical colleges in Kerala are required to register with the Travancore-Cochin Council of Modern Medicine. Registration information for over 13 000 medical doctors registered during the period 2000–2014 with the Travancore-Cochin Council of Modern Medicine has been sourced. Details on postgraduate, surgical and any other degrees obtained after the MBBS degree are also recorded in the same database; registered MBBS doctors are required to update their registration information upon receiving additional qualifications. Enforcement of this is variable.

The Travancore-Cochin Council of Modern Medicine has a digitized version of its database according to date of MBBS graduation. Hence, information received had to be reorganized by year of completion of post-graduation in order to extract the number of surgeons and anaesthetists trained over the past decade. For the purposes of the study, the number of surgeons trained in a specific specialty was computed by adding all those who had registered after completing either a degree (Master of Surgery, Doctor of Medicine, Diplomate of National Board) or a diploma in a

given year. In cases where a doctor had both a degree and a diploma in the same specialty, only one (first degree or diploma obtained) was considered as the year of training.

3.2 Stock

Two data sources have been used to provide information on the stock of doctors and specialist doctors in India and Kerala. The first is a nationally representative household survey that collected information on occupations; the second is member registration information from various surgical councils.

Regarding the data from household surveys, the current stock of doctors was estimated using data from the 68th round (July 2011 to June 2012) of the National Sample Survey on Employment and Unemployment. The National Sample Survey employed multistage stratified cluster sampling to cover 101 724 households and 456 999 persons in 7469 villages and 5268 urban blocks throughout the country. Data were collected based on self-reported occupations that were categorized using the National Classification of Occupations and the National Industrial Classification. This study used a combination of both National Classification of Occupations (2004) and National Industrial Classification (2008) codes to enumerate those who had self-reported as health professionals and group them into the following categories: allopathic (modern medicine) doctors, dentists, AYUSH (ayurveda, yoga and naturopathy, unani, siddha and homeopathy) practitioners, nurses and midwives, health associates, and traditional practitioners. Allopathic doctors included those in medical practice, hospitals, diagnostic or pathological laboratories, and other agencies relating to health as well as teaching professionals in medicine. The data did not allow separate identification of specialist doctors or those in surgical practice. Finally, as the occupations were based on self-reports, in order to differentiate qualified from unqualified providers, information on technical education (degree, certificate or diploma) and general education of respondents was used. Overall, 56.4% of the health workforce did not have the requisite qualification, including 42.3% of allopathic doctors, and 58.4% of nurses and midwives. Figure 3 presents the density of qualified health workers (see section 4.2).

With regard to data from professional associations, there is no single source of information on the numbers of doctors practising by their specialization or area of work.

To estimate the number of surgical specialists currently practising in Kerala, details of specialist doctors who are members of the Association of Surgeons of India (ASI) have been used.

Established in 1938, the ASI is the largest association of surgeons in the country. The association offers voluntary lifetime membership (different categories) to doctors trained in surgical specialties and surgeons in training. In 2010, the ASI updated its database of members and upgraded it to an electronic format. The database contains details of over 18 000 existing members from across the country. However, the ASI informed the study team that over time, with the greater emergence of specialty-specific associations, registering with the ASI was no longer the norm among doctors trained in surgical specialties. Therefore, the use of the ASI database to estimate stock is constrained by its inability to capture those doctors with a surgical specialty who might be registered with subspecialty-specific associations, other than the ASI. A number of associations of doctors with subspecialties operate at the national, state and district levels (see Annex 7 for a list of surgical associations).

3.3 Migration

Multiple sources of data were explored to estimate the mobility of health workers trained in surgical specialties in Kerala.

Existing studies. In 2013, the Department of Economics and Statistics, government of Kerala, conducted the Pravasi Malayali Census (Non-Resident Keralite Census) along with the sixth Economic Census. The report, which is published only in Malayalam, is accessible under the “ad hoc survey report” section of the Department of Economics and Statistics. Aggregate data and information on doctors and nurses have been presented in the report; however, the results do not cover the migration of doctors by their training and specialties.

Primary data sources. Two sources of information have been used to estimate the number of medical doctors from Kerala working overseas. These are:

- **Overseas professional councils and licensing bodies.** Associations of medical doctors, professional councils and licensing bodies were contacted for information on (a) doctors trained in India practising

in the country of the council or association; and (b) details on doctors trained in India who are from and trained in Kerala.

- **Medical colleges.** Information was gathered on the location of students who were members of cohorts graduating in 2010 and 2014 from specialist courses in one public and one private medical college. Contact information for postgraduate students enrolled in 2010 at the Government Medical College, Thiruvananthapuram, was obtained and follow-ups regarding current place of work were conducted over the phone. A list of students to have graduated in the year 2014 and their current place of work was sourced from the Amrita School of Medicine, Kochi.

Visa documentations. The Ministry of Health and Family Welfare issues documentation mandatory for Indian students undertaking training in medicine in the United States.³ However, figures on these are only available at the national level.

4. Results:

This section presents findings on the production, stock and migration of the surgical workforce from India and Kerala using the most relevant data sources identified in section 3 above. Following is a description of entry and exit flows, that is, estimates of the production and migration of the surgical workforce, and the existing workforce stock in India and the state of Kerala.

4.1 Production

India

At present, India has 419 medical schools that produce 56 738 doctors with undergraduate (MBBS) degrees and 25 850 with postgraduate degrees (6, 7). While there has been a substantial increase in the number of MBBS graduates over the past five years, increasing from 37 192 in 2010–2011 to 56 738 in 2015–2016, production of specialist doctors has remained relatively stagnant, increasing from 18 972 to 25 850 across the period (6, 7). Based on data collated from the Medical Council of India on the number of intakes for each degree or diploma course in surgical specialties across medical colleges

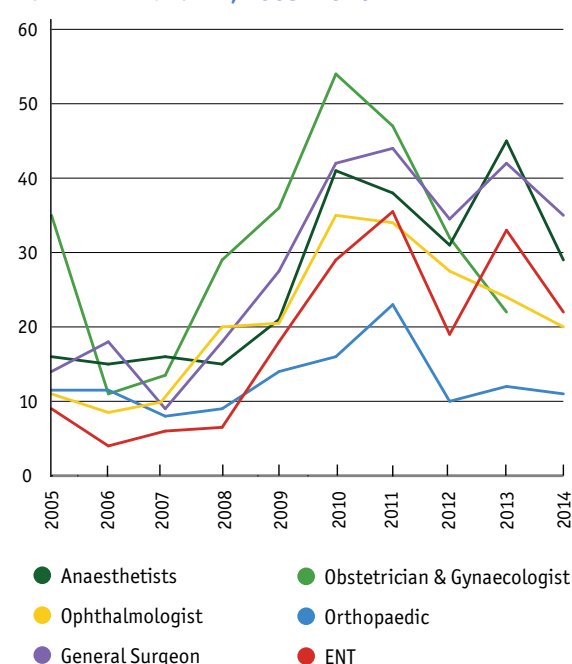
in the country, the production capacity of the surgical workforce in India in 2015 is estimated to be 9048 (Table 2). This includes 6845 trained surgeons, 2192 anaesthetists and 11 physicians trained in transfusion medicine.

Kerala

The state of Kerala has 25 medical schools, with 19 providing training in postgraduate specialties. The annual production capacity of the state, for the surgical workforce, is estimated to be 412, with 315 surgeons and 97 anaesthetists. Moreover, institutions in the public sector train about two thirds of the surgical workforce in Kerala. Given the paucity of postgraduate seats in medicine in India, it is assumed that all designated seats are filled every year and hence information on annual intake for each programme is a sufficient proxy for production of surgeons and anaesthetists. In addition to the Doctor of Medicine and Master of Surgery degrees and diploma listed below, physicians can also receive a Diplomate of National Board degree for postgraduate specialties given by the National Board of Examinations. For 2015, the National Board of Examinations authorized one seat each for Diplomates of National Board in Ophthalmology, Anaesthesiology and Orthopaedic Surgery and two seats for General Surgery across colleges in Kerala (12).

Table 3 and Figure 2 show trends in the production of doctors with surgical specialization between 2005 and

FIGURE 2. SURGEONS AND ANAESTHETISTS TRAINED IN KERALA, 2005–2014



3 This has been introduced at the request of the United States.

TABLE 2. SURGICAL SPECIALTIES AND NUMBER OF SEATS: KERALA AND INDIA

Course	Kerala			India
	Total	Public	Private	
MD Anaesthesia	62	34	28	1567
MS General Surgery	84	59	25	2131
MD/MS Obstetrics and Gynaecology	56	39	17	1401
MD/MS Ophthalmology	40	23	17	838
MS Orthopaedics	40	24	16	991
MS Otorhinolaryngology	–	–	–	–
MD Transfusion Medicine	1	1	0	11
Diploma in Ophthalmology	15	9	6	339
Diploma in Orthopaedics	28	22	6	300
Diploma in Obstetrics and Gynaecology	37	31	6	636
Diploma in Laryngology and Otology	14	11	3	209
Diploma in Anaesthesia	35	22	13	625
Total	412	275	137	9048
Total as a percentage of India (%)	4.55	3.04	1.51	100
Yearly number of surgical specialist postgraduates per 100 000 population	1.23			0.75

Key: MD = Doctor of Medicine; MS = Master of Surgery.

Source: Medical Council of India, 2015.

TABLE 3. REGISTRATION OF POSTGRADUATE EDUCATION AT TRAVANCORE-COCHIN COUNCIL OF MODERN MEDICINE, KERALA (MEDICAL COUNCIL OF INDIA)

Year	Anaesthetists	General surgeons	Obstetricians/gynaecologists	Ophthalmologists	Orthopaedic Surgeons	ENT Surgeons	Total
2005	16	14	35	11	12	8	98
2006	15	18	11	8	12	4	68
2007	16	8	14	10	7	6	63
2008	15	18	15	8	20	6	84
2009	21	27	29	14	21	18	138
2010	41	29	36	16	35	29	189
2011	38	43	53	24	34	36	230
2012	31	45	47	10	27	19	183
2013	47	42	35	13	24	33	142
2014	28	34	22	12	20	22	142
Total	268	278	297	126	212	181	1391

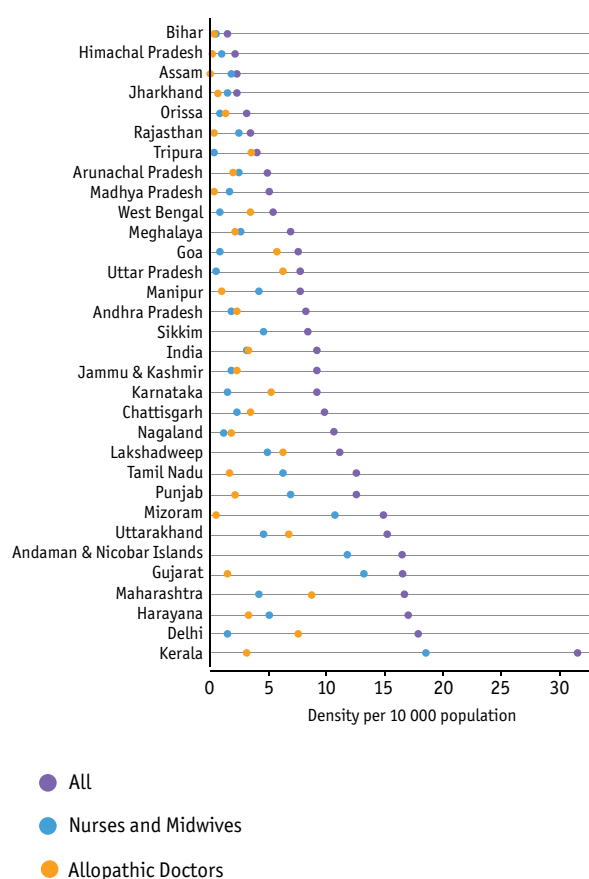
2014 based on data received from the Travancore-Cochin Council of Modern Medicine. A total of 1391 surgeons and anaesthetists were trained in Kerala over this period of 10 years. There was an upward trend in production of all types of surgical specialists between 2008 and 2011 (Figure 2). In more recent years (2012–2014) there has been a dip in registration. The increase in registration, particularly between 2008 and 2011, could be due to the

initiation of several new private colleges as well as an increase in the number of seats in public ones for surgical specialties during 2006–2008 in Kerala. The subsequent decrease in several specialist areas, particularly in 2014, is puzzling, and might be due to inconsistent recording of information. Further, it is important to note that these data do not fully capture all surgical specialists trained in these years. Given the absence of a live register, the

Travancore-Cochin Council of Modern Medicine does not have updated electronic records of all those who have completed their postgraduate education in the state.

Estimates of seat capacity (412 according to the Medical Council of India and an additional 5 by the National Board of Examinations) in surgical specialization (Table 2) and the number of surgical specialists registering (142) in the latest year with the Medical Council of India (Table 3) are divergent. Reasons for this could include: (a) not all graduates are registering with the Travancore-Cochin Council of Modern Medicine (it is mandatory but not enforced); (b) specialists seats are going vacant; (c) graduates are registering themselves in other states (where they plan to practise); or (d) records digitized by the Travancore-Cochin Council of Modern Medicine are incomplete.

FIGURE 3. DENSITY (PER 10 000 POPULATION) OF QUALIFIED DOCTORS, NURSES AND MIDWIVES, AND ALL HEALTH WORKERS (2012)



Note: "All health workers" includes allopathic doctors, AYUSH doctors, dentists, nurses and midwives, health associates (pharmacists, laboratory technicians, opticians, physiotherapists, other technicians) and traditional practitioners. Source: National Sample Survey, 2012.

4.2 Stock

Doctors in India

As seen in Figure 3, the density of allopathic doctors (including surgical specialists) in India was estimated to be 3.4 per 10 000 population. Note that the level of coding occupations in the National Sample Survey was not fine enough to separately identify surgical specialists. About 85% of doctors were found to be practising in urban areas. Moreover, in both rural and urban areas, more than 80% of doctors are employed by the nongovernmental, private sector.

Doctors in Kerala

The estimated number of doctors (including surgical specialists) in Kerala from the household survey of the National Sample Survey was 10 613.⁴ As seen in Figure 3, Kerala has a density of 3.2 allopathic doctors per 10 000 population, which puts it slightly below the Indian average (3.4 per 10 000 population). About 78% of these doctors were found to be working in urban areas, a pattern seen across other states in the country. While sample sizes used by the National Sample Survey at the state level were too small to estimate the public-private proportion for Kerala, it is likely that it would have a distribution similar to the country as a whole. Finally, Kerala was found to have the highest density of nurses and midwives, compared to other states and to the national average.

Surgeons in India

According to a study published in the *Lancet*, India in 2009 had a total of 81 150 surgical specialists, including 31 560 surgeons (a density of 2.5 per 100 000 population), 20 280 anaesthetists (density 1.6) and 29 310 obstetricians (density 2.4) (13). Data sources cited in the study included various professional associations that maintain directories of members, such as the ASI, the Indian Orthopaedic Association, the Federation of Obstetric and Gynaecological Societies of India, and the Indian Society of Anaesthesiologists. However, the same specialist can be a member of multiple associations, and it is unclear if the study made any adjustments for this. Nevertheless, it represents the "maximum" estimate of surgical specialists in India, translating to 6.76 surgeons

4 Based on Medical Council of India data, the total number of doctors in Kerala is significantly higher and is estimated at around 44 000. See Box 1 for discussion of the challenges in enumerating India's health workforce.

BOX 1. CHALLENGES IN ENUMERATING INDIA'S HEALTH WORKFORCE

Routine sources of information on the number of doctors provide fragmented and unreliable information. Following is a brief description of information available from various routine sources and their limitations:

Government sources provide information on the public sector health workforce in rural areas.

- However, they are silent on those in urban areas (at secondary and tertiary levels), and on the private sector.

The Medical Council of India routinely publishes statistics of the number of registered members.

- However, the absence of live registers casts doubt on the reliability of these estimates, as they do not account for health workers exiting the workforce due to migration, death or retirement.
- The Medical Council of India typically requires only a one-time registration by fresh graduates. This is usually done in the state where they studied, and not where they currently practise.
- The registration of doctors is mandated and ensured largely at the undergraduate level (MBBS); updating qualifications, though required, is less effectively ensured, thereby making this a less reliable source to estimate the number of doctors with postgraduate or other training.

Household surveys and the census offer another avenue to estimate the health workforce.

- These are based on self-reported occupations and so adjusting for qualification becomes important.
- The sample size in household surveys prevents reliably estimating human resources present in smaller states and for subgroups (for example, urban–rural).
- The level of occupation coding is not fine enough to estimate subgroups of health workers, such as surgeons.

per 100 000 population. The ASI, which updated its membership roster in 2010, had 18 216 members across the country. This translates to 2.6 doctors with surgical specialization per 100 000 population. An additional 102 members of the ASI from across India are currently based overseas, with the majority practising in the United States (37 members), followed by the United Kingdom (16), Australia (17) and Germany (1).

Surgeons in Kerala

According to the updated ASI database, a total of 873 or 4.8% of its members were based in Kerala in 2010. However, acute shortages of specialists in rural areas are reported in the most recent *Bulletin of Rural Health Statistics 2014–2015* published by the Government of India, according to which India/Kerala had a shortfall

of 4106/202 obstetricians and gynaecologists and 4427/222 surgeons at community health centres (that is, sub-district hospitals) (14). In Kerala this meant that 91% of community health centres did not have an obstetrician, while none had a general surgeon (14). Table 4 shows the availability of surgical specialists at community health centres in Kerala. There is a huge shortfall of those “in position” compared to “required”. Further, only a small number of those “required” translate to “sanctioned” posts. It is not clear why there are more in-position specialists reported compared to sanctioned, but this could be due to contractual hires. It is important to note that the “required” human resource norms for public sector health facilities are set by the Indian Public Health Standards. However, these are national guidelines for states to follow and

TABLE 4. PUBLIC SECTOR SPECIALIST DOCTORS IN COMMUNITY HEALTH CENTRES IN KERALA

State/union territory	Required (1)	Sanctioned (2)	In position (3)	Shortfall (1–3)
Total specialists at community health centres (surgeons, obstetricians and gynaecologists, physicians, paediatricians)	888	30	39	849
Surgeons at community health centres	222	0	0	222
Obstetricians and gynaecologists at community health centres	222	14	20	202

Source: Government of India (14).

it is not necessary for a state to adopt these national norms. Further, for many states (Kerala is an exception) achieving these national norms for specialists at community health centres is unrealistic, given their low production capacity.

The shortage of rural doctors and specialists is well recognized by state health departments in India. Since health is a “state subject”, the state government recruits doctors (and other health workers) in the public sector. However, in many cases these shortages are attributed to inadequate posts being sanctioned by the state due to budget constraints. Moreover, several strategies that have attempted to retain those in position, namely higher salaries for rural postings, admission to specialist training after some years in rural service, and housing benefits, have been offered as singleton incentives and not uniformly across all states (15). While task shifting for primary care has been attempted on a limited scale, using AYUSH doctors and three-year trained clinicians (in Assam and Chhattisgarh), concerns about quality of care have contributed to restricting further expansion. An important initiative in this direction was the Ministry of Health and Family Welfare’s attempt to introduce “rural health practitioners”,

a non-physician clinician cadre for providing clinical care at health sub-centres. This was met with resistance by the Indian Medical Association. Further, in many states multi-skill programmes provide general doctors in the public sector with specific specialist skills.

4.3 Migration Migration from India

Indian physicians are estimated to be the largest “émigré physician workforce” in the world (16). A recent study (Table 5), triangulating data from both within and outside India, found that over 100 000 doctors trained in India were working abroad, with the largest proportion (about half) employed in the United States, followed by the United Kingdom, Canada and Australia (17). The Organisation for Economic Co-operation and Development (OECD) International Migration Outlook (September 2015) estimated that 86 680 Indian doctors were working in OECD countries alone (18).

Information from overseas professional councils

Information on specialists, particularly those trained in surgery, migrating from India is very limited. Data received from the General Medical Council in the United

TABLE 5. MIGRANT DOCTORS TRAINED IN INDIA

Receiving country	Trained in India	Data reference year	Source
Australia	2143	2005	Mullan (16)
Canada	2515	2005	Dumont et al. (21)
Denmark	6	2005	OECD (2008)
France	16	2004	OECD (2008)
Germany	100	2005	OECD (2008)
Netherlands	9	2007	OECD (2008)
New Zealand	467	2006	OECD (2008)
Poland	3	2005	OECD (2008)
United Kingdom	27 587	2007	GMC/UK
United States of America	51 447	2009	AMA master file
Total of the above (OECD)	84 293		
Gulf countries	20 000		Rough estimate clubbing various media reports
Total	104 293		

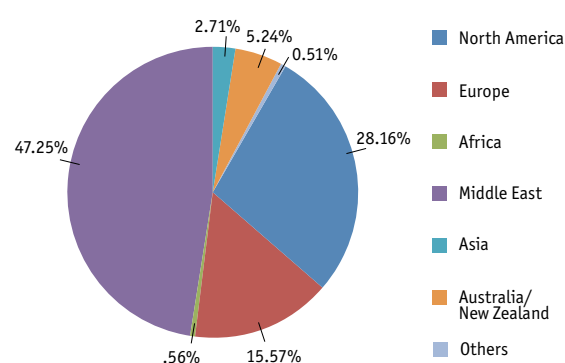
Source: Potnuru, B (2015). Emigration of Indian Medical Doctors: Implications and Policy. Presentation made at the WHO Meeting on Migration of Doctors and Nurses from India on 28 August 2015 in New Delhi

Kingdom show that 2334 Indian-trained surgeons and 1270 anaesthetists are currently working in the United Kingdom (10). Similarly, information from the German Medical Association shows that, as of December 2014, there were 244 Indian physicians in Germany, 200 of whom were employed in hospitals, while 7 worked in a practice, 13 worked in other institutions and 24 were non-practising (19). In addition, information extracted from the Australian Medical Council website suggests that every year, on average, 12 Indian-trained surgeons and 6 anaesthetists have been given a licence to practise independently in Australia for the last four years (20). Nurses form the majority of migrant health workers from Kerala state. There are no mechanisms to monitor, track and document the mobility of doctors, and less so for doctors who have completed their postgraduate degrees in India.

Migration from Kerala

Pravasi Malayali Census (2013). NORKA published a recent report on migration from Kerala, based on the Pravasi Malayali Census of 2013 conducted by the Department of Economics and Statistics, government of Kerala. This is one of the few data sources to have focused on migrants from the state; the survey includes data on self-reported occupation, demographics and place of migration. Doctors and nurses are categories of health workers included in the study. Figures presented in the report do not distinguish between types and qualifications of doctors. Of the total 1 426 853 migrants employed abroad at the time of the survey, 7524 (0.6%) were doctors, while nurses accounted for 90 898 (6%) (22, 23). The Middle East is the main destination region for both doctors and nurses from Kerala (Figures 4 and 5).

FIGURE 4. DESTINATION OF MIGRANT DOCTORS FROM KERALA, BY REGION



Source: NORKA (23).

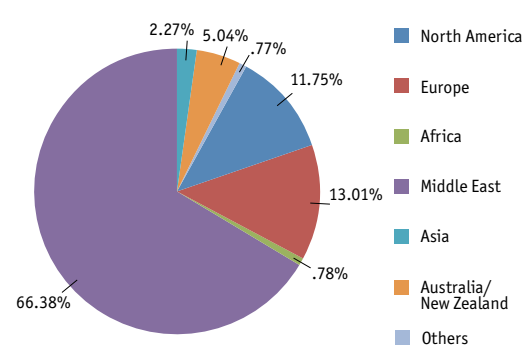
Of those surveyed, doctors formed more than 3% of the Malayali migrant workforce in the United States, Canada and the United Kingdom. In Germany, almost 4% of the total migrants from Kerala worked as doctors. Within the European Union, the largest number of doctors from the state of Kerala were found in the United Kingdom (1024), followed by Germany (77). An estimated 69 Keralite doctors were based in other European Union countries (Figure 6). A similar pattern is seen for nurses (Figure 7). North America had almost twice as many doctors as the United Kingdom from Kerala at 2116 doctors across the United States and Canada. The majority of doctors from Kerala working overseas were aged 35–44 years, closely followed by those aged 25–34 years. In the case of nurses, the majority were aged 25–34 years (23).

According to the Pravasi Malayali Census, a total of 7524 doctors from Kerala migrated during their working years. Further, the total stock of doctors working in Kerala was 10 613, according to the National Sample Survey estimate presented in the previous section. Therefore, a rough estimate of the cumulative migration rate is around 40%.⁵ This figure should be interpreted with caution, since estimates of migration and currently present doctors in Kerala are based on self-reports. Within that context, it should be noted that the outmigration rate would be around 14% if the Medical Council of India data are used to estimate the stock of doctors in Kerala.⁶

⁵ $(7524)/(10\,613 + 7524) \times 100$.

⁶ $(7524)/(44\,515 + 7524) \times 100$.

FIGURE 5. DESTINATION OF MIGRANT NURSES FROM KERALA, BY REGION



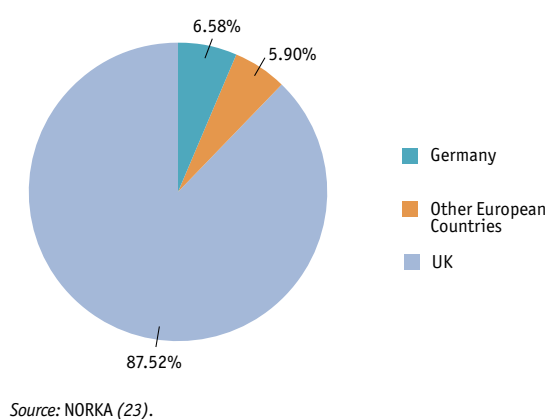
Source: NORKA (23).

College rosters

Details of students who have already graduated (from postgraduate programmes) are largely kept with the degree-granting university. Student rosters were sourced from two colleges – one private (Amrita School of Medicine, Kochi, postgraduate surgical batch of 2014) and one public (Government Medical College, Thiruvananthapuram, enrolled in postgraduate surgical programmes in 2010). Students were contacted to ascertain where they were currently employed and located (Table 6). Overall, the information that was gathered was not very informative to ascertain migration. In both medical schools those who had graduated in 2013–2014 were contacted, and most had not made any migration decisions yet. Further, there was considerable non-response (63%) in the case of the Government Medical College. It is difficult to ascertain whether the non-response, particularly in cases where phone numbers were found to be out of service, was due to outdated contact details or due to change of residence and hence phone number.

The broad finding from the responses received was that all but one of the graduates of postgraduate surgical programmes from the two institutions were employed in Kerala. No one had migrated to another state or abroad for employment. This finding corresponds with informal discussions with surgeons and heads of institutions based in Kerala – that limited postgraduate seats for MBBS graduates is an important reason for doctors to migrate overseas for academic and professional opportunities. The local demand for specialists, implying better professional opportunities for those with a postgraduate degree, could be another factor why many of those contacted continued to practise and serve within the country.

FIGURE 6. DOCTORS FROM KERALA PRACTISING IN EUROPE



5. Discussion

5.1 Estimation of production, stock and migration of surgical specialists

This case study has attempted to estimate the production, stock and migration of surgical specialists in India and the state of Kerala. Secondary data sources were used to arrive at estimates; primary data were also collected from two medical schools in Kerala. The templates outlined in the broader protocol were adapted and used as part of the methods employed under this study; relevant elements from the templates were used to identify stakeholders and key informants and to examine data sources. Forms with relevant variables for each data source were created for data collection. One of the main findings from this exercise is the lack of reliable and accurate data on the Indian health workforce. Moreover, even though it appears that a large numbers of Indian health workers are migrating abroad, there is very little documentation of this, particularly when it comes to the surgical workforce. Significant gaps in information identified as core data in the templates on the workforce (template D specifically) were highlighted.

The production capacity of the surgical workforce in India in 2015 is estimated to be 9048. Kerala, much like its other neighbouring states in the southern part of India, has a large number of medical schools. There are 19 medical colleges in Kerala that provide training in postgraduate specialties; there are approximately 412 seats for surgical specialties, including in anaesthesiology. This sets the upper limit on the production capacity of surgical specialists in the state. The majority of these seats are in publicly funded medical colleges. Even as this production capacity

FIGURE 7. NURSES FROM KERALA WORKING IN EUROPE

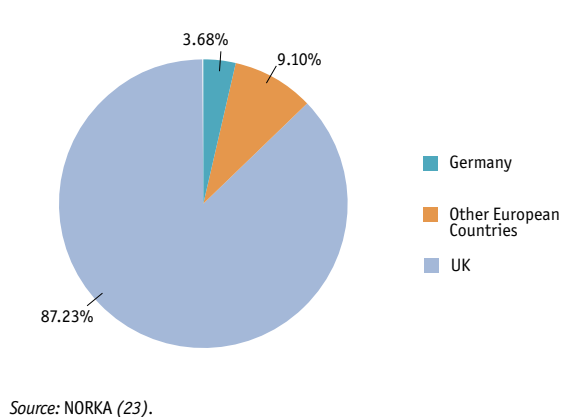


TABLE 6. EMPLOYMENT OUTCOMES OF SURGICAL SPECIALISTS GRADUATED IN 2013–2014

Data sought	Government Medical College, Thiruvananthapuram	Amrita School of Medicine, Kochi
Total students (postgraduate, surgical)	96 (female 52, male 44)	20 (female 14, male 6)
Average age	30 years	31 years
Employment after graduation	<ul style="list-style-type: none"> • 32 of 36 • Of the 36 graduates contacted, 32 were working as medical doctors in Kerala; 2 were not working; 2 were studying and employed in non-clinical, health service delivery with the Department of Health and Family Services in Kerala. 	5 of 20
Place of employment	<ul style="list-style-type: none"> • 31 doctors were working in Kerala after graduation. • One graduate (Diploma in Gynaecology and Obstetrics) was based in Abu Dhabi. 	Kerala
Degrees included	<ul style="list-style-type: none"> • MD Anaesthesia • MS Obstetrics and Gynaecology • MD Transfusion Medicine • MS ENT (Otorhinolaryngology) • MS General Surgery • MS Ophthalmology • Diploma Anaesthesia • Diploma Otorhinolaryngology • Diploma Gynaecology and Obstetrics • Diploma Orthopaedics 	<ul style="list-style-type: none"> • MD Anaesthesiology • MS General w • MS Ophthalmology • MS Obstetrics and Gynaecology • MS Otorhinolaryngology • Diploma Anaesthesiology • Diploma Gynaecology and Obstetrics • Diploma Orthopaedics • Diploma Ophthalmology • Diploma Otorhinolaryngology

Source: List of postgraduate medical students to have joined in 2010 (graduated 2013–2014). Details on employment after graduation were collected over the phone—contact was established with 36 postgraduates in surgical specialties out of 96.

Source: List of postgraduate medical students to have graduated in 2014. Details on employment after graduation were provided by the institute.

might seem substantial, many of these graduates may not remain in the state.

In terms of current levels of stock, according to a study published in the *Lancet*, India had a total of 81 150 surgical specialists in 2009 (22), which translates to a density of 6.8 per 100 000 population. These estimates were based on membership of professional associations, and because the same specialists can be a member of multiple associations, this can be interpreted as the “maximum” estimate of the number of surgeons in India. The ASI, which updated its membership roster in 2010, had 18 216 members across the country, and this translates to a density of 1.5 surgeons per 100 000 population. This is an underestimate (see below), since membership of other associations is excluded. Further, the ASI estimate is substantially (4.5 times) below that of the *Lancet* study, and is clearly an underestimate as it

represents only one (major) professional council. Based on these two estimates, it can be concluded that the stock of surgeons in India lies between 1.5 and 6.8 per 100 000 population. A recent study by the Lancet Commission on Global Surgery proposed a target of at least 20 surgeons, obstetricians and anaesthetists per 100 000 population to meet the targets of universal access to safe, affordable surgical and anaesthesia care. By this benchmark, India has a substantial deficit in surgical specialists, by either the *Lancet* or the ASI estimates.

The current stock of surgical specialists in Kerala is 873 (or 2.3 per 100 000 population), according to ASI membership. If it is assumed that the maximum number of surgical specialists in Kerala is 4.5 times this (that is, the ratio of Lancet and ASI estimates for India reported above), then the maximum number of specialists in Kerala is 3929 or 10.2 per 100 000 population. Therefore,

it appears that the density of surgical specialists in Kerala ranges from 2.3 to 10.2 per 100 000 population. This indicates that Kerala, a state with high production capacity of surgical specialists, falls short of the recent Lancet Commission on Global Surgery benchmark of at least 20 surgeons, obstetricians and anaesthetists per 100 000 population (24). Moreover, there is an acute shortage of rural specialists in the state, and all surgical positions are vacant in community health centres.

It is of interest to relate production capacity (estimates of which are more reliable) with estimates of stock. Of the 9048 surgical specialists produced annually in India, current stock levels range between 9 times (for the *Lancet* stock estimate of 81 150) and 2 times (for the ASI estimate of 18 216) production capacity. In Kerala, the production capacity of 412 surgical specialists is about half the stock of 873 surgical specialists (ASI estimate), which is similar to the India ratio. The lower bound of the ASI estimate would suggest that every year there is a significant loss of the surgical workforce. However, caution should be exercised, as the ASI figures do not capture all surgical specialists practising in Kerala. If the upper bound is considered, that is, 3929 surgical specialists in Kerala, attrition of the surgical workforce becomes less of an issue.

India has, for many decades, been one of the major source countries for doctors, especially in the English-speaking countries of Australia, Canada, the United Kingdom and the United States, though other non-English-speaking countries in the European Union are also starting to attract health workers, especially doctors, in greater numbers. While countries in the Middle East are also an important destination of health workers (particularly from Kerala), the lack of information from these destination countries might make them seem less important than those in Europe and North America. Estimates from the literature suggest that around 100 000 doctors trained in India work abroad; but limited information restricts the ability to estimate whether these doctors migrated after training in medicine in India. Medical councils and professional associations based in host countries offer some estimates of the number of surgical specialists of Indian origin. Data sourced from some countries, such as those from the General Medical Council in the United Kingdom, indicate that 3604 surgeons and anaesthetists from India are working in the country. Similarly, information from the German Medical Association shows that, as of December 2014, there were 244 Indian physicians in Germany, 200 of whom were employed in hospitals.

Kerala has a long tradition of sending health workers, particularly nurses, to other parts of India and the world. Estimates based on a migration survey in the state suggested that a total of 7524 (0.6%) out of 1 426 853 migrants were doctors, whereas an estimated 90 898 nurses from Kerala are believed to be employed overseas. This suggests that around 40% of doctors in Kerala have migrated abroad. Informal interactions with practising health professionals in Kerala suggest that the overseas migration of specialist doctors is less than that of general doctors. Indeed, the study team's crude estimate of surgical specialist migration (ranging from a low 10% to a high 50% for both internal and external migration) suggests that external migration of surgical workforce is likely to be below or close to that of overall doctor migration (40%) to foreign countries. This suggests that if doctors complete their postgraduate degree in the state or country, they are less likely to migrate overseas. This might be due to the opportunity cost of transferring the Indian specialist training abroad, due to the effort and time required in taking examinations and training to get accreditation abroad by the migrating specialist. However, falling demand for surgical specialists (but not for general practitioners) abroad could also be contributing to specialists having a greater tendency to remain in India compared to general doctors. In fact, it is plausible that the stiff competition that exists in securing specialist training seats in India could be an incentive for doctors to go abroad for specialist training opportunities.

India's workforce, for the most part, enjoys unrestricted mobility from the country. The country's migration policies (Box 2) focus more on the mobility of India's unskilled and semi-skilled workforce, largely with the intention of limiting vulnerability to exploitation and trafficking. Migrant health workers have featured in the broader mobility of migrant workers with associations between India and some European Union countries. In early 2015, nurses were included in the "emigration check required" (ECR) category of migrant workers travelling to 18 ECR countries. In addition, attempts to regulate the recruitment of nurses for employment overseas is now restricted to two state-run recruitment agencies, both based in Kerala – NORKA-Roots and ODEPC. While the "brain drain" entailed in doctor migration has been recognized by the government, systems for documentation or enforcement have been weak. An example of this is the mandatory statement of need or exceptional need certificate required by Indian students applying to study medicine in the United States. The document issued by the home government states the applicant's agreement

BOX 2. MIGRATION: POLICIES AND DEPARTMENTS

- **Emigration Act (1983).** Largely geared towards the protection of unskilled migrant labours. Emigration clearance mandatory for certain countries and categories of migrant workers.
- **Emigration Management Bill (2010).** Ethical recruitment practices, welfare of migrant workers and students.
- **Ministry of Overseas Indian Affairs.** Established in 2004 to oversee emigration policies and processes. Provides a range of migration services, diaspora services, management and financial services for persons of Indian origin and non-resident Indians.
- 2015: Included nurses in the category of those needing emigration clearance for employment in 18 ECR countries.
- **Ministry of External Affairs.** Passport-issuing authority; diplomatic relations; citizen service activities undertaken by Indian missions. The Consular, Passport and Visa Division is part of this ministry.
- **Ministry of Home Affairs.** Domestic and internal policies; immigration processes, including ECR checks; Overseas Citizens of India scheme.
- **India Centre for Migration** (formerly Indian Council of Overseas Employment). Not-for-profit think tank on international migration under the Ministry of Overseas Indian Affairs.

to return home after completion of study. On the other hand, the Ministry of Health and Family Welfare has since 2015 stopped issuing the no obligation to return to India (NORI) certificates for students of medicine going to the United States for academic purposes (25, 26).

Migration of health workers, especially from resource-constrained settings, to richer countries has gained much visibility within the context of the shortage of health workers in many of the source countries. The migration of health workers has been held responsible for shortages of the surgical workforce (surgeons, anaesthesiologists and obstetricians) in low-resource settings. At the same time, mobility of health professionals has been credited with “brain gain” – exchange or transfer of technical skills and knowledge to source countries – and making available funds for such initiatives as opening new health centres in source countries (27–29).

5.2 Information systems

The absence of comprehensive, reliable and updated sources of information on health workers in India, both at the central and state levels, is a reflection of India's poor information systems for health. This study highlights several areas where information systems on the health workforce in Kerala can be strengthened.

Routine sources of information on the number of doctors provide fragmented and unreliable information.

Government sources provide information on the public sector health workforce in rural areas, but are silent on those in urban areas (at secondary and tertiary levels) or in the private sector. The various professional councils routinely publish statistics of the number of registered members; however, the absence of live registers casts doubt on the reliability of these estimates, as they do not account for health workers exiting the workforce due to migration, death or retirement. Moreover, in the case of doctors, the Medical Council of India typically requires only a one-time registration by fresh graduates, and this is usually done in the state where they studied, and not where they currently practise. In addition, this registration is mandated and ensured largely at the undergraduate level (MBBS); updating qualifications, though mandated, is less effectively ensured, thereby making this a less reliable source to estimate the number of doctors with postgraduate or other training. The Medical Council of India, and the respective state councils, are essential sources of information on the production of health workers in India, yet their potential is limited by the lack of standardization and detail in the type of information collected and stored. The lack of a standard software platform and limited integration with other points of use (such as real-time, live updates with medical colleges and other medical education bodies) inhibit its potential for use across chapters and organizations. Registration numbers across states should be unique, created to reflect the state where the medical professional is registered; information and updates on qualifications and additional skills should be made mandatory and recorded as a separate variable.

Household surveys and censuses offer another avenue to estimate the health workforce. However, these are based on self-reported occupations and so adjusting for qualification becomes important. Further, the sample size in household surveys prevents reliable estimation of the human resources present in smaller states and for subgroups (for example, urban–rural). Finally, the level of occupation coding is not fine enough to estimate numbers in subgroups of health workers, such as surgeons.

Information on the migration (both internal and external) of health workers is surprisingly scarce in India. This is even so in Kerala, which has a long history of its citizens working out of the state. Mechanisms to document the mobility of health workers, especially migration to other countries, are almost non-existent. Discussions with key government officials suggest that the Government of India has been considering introducing submission of additional paperwork at the time of migration (either at the airport or before) to enable better mapping of migrants. This could be a valuable source of information for understanding migration of health workers, especially if migrants are asked to describe their qualifications, destination country, purpose of migration and expected length of stay.

6. Conclusion

India and Kerala have a substantial capacity for producing surgical specialists. However, estimates of current stock indicate a significant deficit in their availability. Overall, across India, the migration of health workers is considerable for both doctors and nurses. The consequences of such migration should not be underestimated, as India and Kerala have a large deficit in surgical specialists, especially in rural areas. However, with several destination countries in Europe and North America producing increasing number of doctors to meet their needs, it could reduce doctor migration from India.

There are limited restrictions on the mobility of health workers; the already substantial migration will influence

health worker availability in India. Potential policy actions for the government include creating more and better professional opportunities for surgical specialists to work in India. These can include financial remuneration (salary increases for government surgical specialists, tax breaks for those in private service) and opportunities for further training and exposure. Further, creating more opportunities for postgraduate training might encourage the retention of doctors, as one factor behind the migration of general doctors is the difficulty of getting a specialist seat. In addition, to bridge the rural deficit of surgical specialists, multiskilling of doctors at community health centres can be considered, as well as policies to enhance recruitment and retention of the surgical workforce in rural areas. Framing a comprehensive policy on human resources for health would be a step in this direction.

This case study on the migration of the surgical health workforce from one state in India, Kerala, draws attention to the country's poor health information systems, and limited policies on human resources for health and medical education. Mechanisms to collect information on the existing and migrant workforce can help the country document the availability and mobility of health personnel. Towards this, the Medical Council of India is taking steps to digitize data and create electronic platforms aiding development of live registers on doctors. Similar efforts towards documenting all cadres of health workers would benefit human resources for health information systems and provide better information for policies. Further, given that migration of health workers from India appears to be progressively increasing, it is important that the government systematically collect information on the numbers and types of health workers leaving the country every year. This information can be collected either at the time when work or education visas are granted from embassies or at the time of exiting India at airport migration counters. Much of this information already exists – a little administrative effort is required in collecting and collating it systematically.

ANNEX 1. ASSOCIATION OF SURGEONS OF INDIA (NATIONAL)

No	State	No. of members	Percentage
1	Andaman and Nicobar Islands	3	0.0
2	Andhra Pradesh	827	4.5
3	Arunachal Pradesh	15	0.1
4	Assam	294	1.6
5	Bihar	899	4.9
6	Chandigarh	62	0.3
7	Chhattisgarh	194	1.1
8	Dadra and Nagar Haveli	1	0.0
9	Daman & Diu	3	0.0
10	Delhi	812	4.5
11	Goa	65	0.4
12	Gujarat	894	4.9
13	Haryana	440	2.4
14	Himachal Pradesh	61	0.3
15	Jammu and Kashmir	218	1.2
16	Jharkhand	333	1.8
17	Karnataka	1640	9.0
18	Kerala	873	4.8
19	Madhya Pradesh	688	3.8
20	Maharashtra	1974	10.8
21	Manipur	93	0.5
22	Meghalaya	25	0.1
23	Mizoram	4	0.0
24	Nagaland	11	0.1
25	Odisha	597	3.3
26	Puducherry	88	0.5
27	Punjab	436	2.4
28	Rajasthan	670	3.7
29	Sikkim	1	0.0
30	Tamil Nadu	2290	12.6
31	Telangana	771	4.2
32	Tripura	27	0.1
33	Uttar Pradesh	1527	8.4
34	Uttarakhand	58	0.3
35	West Bengal	1172	6.4
36	Military	11	0.1
37	0 (entries without an address)	139	0.8
	Total	18 216	100.0

Source: Database of the Association of Surgeons of India.

ANNEX 2. ASSOCIATION OF SURGEONS OF INDIA (OVERSEAS)

Country	No. of members	Percentage
Belgium	1	1.0
Yemen	1	1.0
Iran	1	1.0
Mauritius	1	1.0
Oman	1	1.0
Saudi Arabia	1	1.0
Trinidad and Tobago	1	1.0
Germany	1	1.0
Ireland	1	1.0
UAE	1	1.0
Zambia	1	1.0
Singapore	2	2.0
Malaysia	3	2.9
Canada	4	3.9
United Kingdom	16	15.7
Australia	17	16.7
United States	37	36.3
0	12	11.8
Total	102	100.0

Note: 0 = For whom address had changed/no response.

Source: Database of the Association of Surgeons of India.

ANNEX 3. LIST OF MEDICAL COLLEGES (MBBS): KERALA

Medical colleges

Government Medical College (IDM)
Government Medical College (PKM)
Government Medical College, Malappuram (MLP)
Government Medical College, Kottayam (KTM)
Government Medical College (KKM)
Government Medical College, Thiruvananthapuram (TVM)
Government Medical College, Thrissur (TCM)
TD Medical College, Alappuzha (ALP)

Government-sponsored self-financing colleges

Academy of Medical Sciences, Pariyaram, Kannur (KNM)
Co-operative Medical College, Kochi (CMC)

Private self-financing colleges

Al Azhar Medical College and Super Speciality Hospital (AAM)
Amala Institute of Medical Sciences, Thrissur (AMC)
Azeezia Institute of Medical Sciences and Research, Meyyannoor, Kollam (AZC)
DM Wayanad Institute of Medical Sciences, Wayanad (DMM)
DR Sommervell Memorial CSI Medical College, Karakonam, Thiruvananthapuram (SMC)
Jubilee Mission Medical College and Research Centre, Thrissur (JMC)
Kannur Medical College, Kannur (KNC)
Karuna Medical College, Vilayodi, Palakkad (KMM)
KMCT Medical College, West Mampetta, Manasseripo, Kozhikode (KCM)
Malabar Medical College Hospital and Research Centre, Kozhikode (MMH)
Malankara Orthodox Syrian Church Medical College, Kolencherry, Ernakulam (MMC)
ME Medical College, Perinthalmanna (EMC)
Mount Zion Medical College (MZM)
PK Das Institute of Medical Sciences (KDM)
Pushpangiri Institute of Medical Sciences and Research Centre, Thiruvalla (PMC)
Sree Gokulam Medical College and Research Foundation, Venjaramoodu PO, TVPM (GMC)
Sree Narayana Institute of Medical Sciences, Ernakulam (SIM)
SUT Medical College, Vattappara, Thiruvananthapuram (SUC)
Travancore Medical College, Kollam (TRM)

Source: Commissioner for Entrance Examinations, Government of Kerala.

ANNEX 4. OVERVIEW OF SELECT DATA SOURCES

Name of organization	Type of organization	Data – Entry/ Stock/Exit	Data type	Strengths, limitations and other details
National-level data sources				
Association of Surgeons of India	Professional association	Stock Database of members	Address of members	Updated database of over 18 000 surgeons across India Voluntary Excludes doctors trained in surgical specialties who might not have registered with Association of Surgeons of India, but with other professional associations Strength: recently updated
Indian Medical Association	Professional association	Database of members	List of members	A directory of members Not updated frequently Limited updated information on members (not used)
Ministry of Health and Family Welfare	Government	Exit Statement of need, exceptional need certificate No obligation to return to India	Numbers of statements of need, exceptional need certificates issued, all India	Certificate required for joining training programme/course in medical specialties in medical institutions out of India for the United States Recently started Aggregate figures for the country accessible – not statewide nor by qualification
Kerala (state)-level data sources				
Directorate of Medical Education, Kerala	Government	Entry Number of seats: MBBS and postgraduate	Number of seats (2014) for MBBS courses Number of seats (2014-2010-2005-2005) for postgraduate courses, by specialty	Six colleges directly under the Directorate of Medical Education, thereby excluding details from the other 19 medical colleges in Kerala Number of seats does not necessarily reflect the actual intake of students, as the actual intake may vary. Assumption that all advertised seats are filled annually
Travancore Cochin Council of Modern Medicine (Medical Council of India)	Statutory body	Entry Registration details of doctors	Qualification of doctors by registration number	Registration of all MBBS doctors is mandatory upon graduation; doctors are expected to update information on any additional degrees. The level of enforcement is unknown Additional degrees are not documented separately, but inserted into the same cell as the MBBS degree Additional qualifications to be updated by registered doctors Mechanisms to ensure compliance in the following cases limited: (a) if practising in a state other than where first registered; (b) if retired, deceased or no longer practising; (c) if migrated overseas
Government Medical College, Thiruvananthapuram	Medical college	Stock List of students enrolled for postgraduate programmes in 2010	Enrolment data for the postgraduate class of 2013 & 2014	Low follow-up Cannot find out details on place of work for students who could not be contacted over the phone

continued

ANNEX 4. OVERVIEW OF SELECT DATA SOURCES (CONTINUED)

Name of organization	Type of organization	Data – Entry/ Stock/Exit	Data type	Strengths, limitations and other details
Amrita Institute of Medical Science and Research	Medical college	Stock List of students graduated from a postgraduate programme in 2014	Number of students to have graduated in surgical specialties	Current place of work – state (in India) or country of work obtained, provided by the institute
Non-Resident Keralites' Affairs Department (NORKA)	Government	Exit Report on migrant community from Kerala	Household survey details on occupation, gender, age of migrant workers	Survey on migrants conducted along with sixth Economic Census by the Department of Economics and Statistics Aggregate data on doctors and nurses from Kerala working in other countries Information on surgical staff not available Methodology and questionnaire of survey unavailable Report not available in English
Survey on migration (Kerala state), Centre for Development Studies	Academic, research	Questionnaire	—	Survey not yet published Questionnaire does not capture details on doctors by specialty (not used)
Recruitment agency databases: Overseas Development and Employment Promotion Consultants (ODEPC) Ltd.	Government	List of emigrant nurses	—	Register of nurses recruited and sent overseas by ODEPC Does not capture nurses who have emigrated via private recruitment agencies No database of doctors migrating Facilitate recruitment of migrant workforce – not restricted to nurses only (not used)
Destination country data sources				
General Medical Council	Professional council – overseas	Exit Summary of data	Numbers of Indian doctors Place of medical training in India Specialties trained in	Details on Indian-trained doctors available
Association of Kerala Medical Graduates (AKMG)	Professional association	Exit Database of members	—	Doctors from Kerala working in the United States of America and United Arab Emirates Did not receive information on time (not used)

Key: MD = Doctor of Medicine; MS = Master of Surgery.

Source: Prospectus for Admission to Medical Postgraduate Degree/Diploma Courses 2015, Government of Kerala.

ANNEX 5. LIST OF DEGREES: KERALA

Postgraduate degree courses: 2015 Kerala			
Degree: clinical	Degree: non-clinical	Diploma: clinical	Diploma: non-clinical
MD Anaesthesia	MS Anatomy	Diploma in Anaesthesia	Diploma in Clinical Pathology
MD Dermatology, Venereology and Leprosy	MD Biochemistry	Diploma in Child Health	Diploma in Public Health
MD Emergency Medicine	MD Community Medicine	Diploma in Dermatology and Venereology	
MD Family Medicine	MD Forensic Medicine	Diploma in Obstetrics and Gynaecology	
MD General Medicine	MD Microbiology	Diploma in Laryngology and Otology	
MS General Surgery	MD Pathology	Diploma in Medical Radio Diagnosis	
MS Obstetrics and Gynaecology	MD Pharmacology	Diploma in Medical Radiology Technology	
MS Ophthalmology	MD Physiology	Diploma in Ophthalmology	
MS Orthopaedics	MD Transfusion Medicine	Diploma in Orthopaedics	
MS Otorhinolaryngology		Diploma in Physical Medicine and Rehabilitation	
MD Paediatrics		Diploma in Psychiatric Medicine	
MD Physical Medicine and Rehabilitation		Diploma in Tuberculosis and Chest Diseases	
MD Psychiatry			
MD Radiodiagnosis			
MD Radiotherapy			
MD Respiratory/Pulmonary Medicine			

Key: MD = Doctor of Medicine; MS = Master of Surgery.

Source: Prospectus for Admission to Medical Postgraduate Degree/Diploma Courses 2015, Government of Kerala.

ANNEX 6. OVERVIEW OF SELECT DATA SOURCES

Year	Statements of need	Exceptional need certificates	No obligation to return
2010	709	5	28
2011	692	3	11
2012	614	5	0
2013	538	17	0
2014	1308	16	1
2015 (16 July 2015)	901	11	0

Source: Presentation by Mr Devesh Deval at the meeting on "Migration of doctors and nurses from India: WHO Global Code of Practice on the International Recruitment of Health Personnel", WHO Country Office for India.

ANNEX 7. LIST OF PROFESSIONAL MEDICAL ASSOCIATIONS

Name of association	Year established	No. of current members
Association of Surgeons of India	1938	17000
Interventional Cardiology Council Kerala/Cardiology Society of India	1950	>250
Association of Otolaryngologists of India	1985	88
Indian Association of Physical Medicine and Rehabilitation	2006	170
Interventional Cardiology Council, Kerala	1950	156
Kerala Orthopaedic Association	1983	1000
Thrissur O&G Society (FOGSI affiliated)		200
Cardiology Society of Kerala	1950	400

Source: Details sourced from representatives of the listed associations in Thrissur, Kerala (July 2015).

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