# **Original Research Article**

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# Professional outcome of medical graduates: a 17 year cross-sectional study from India

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#### **ABSTRACT**

**Background:** In India, long term data regarding professional outcomes and geographical distribution of enrolled medical graduates is lacking. This adversely impacts policy for efficient healthcare delivery.

**Methods:** A cross sectional survey of students enrolled as medical graduates in year 2001 was done at single point follow up after 17 years. Along with demographic data, gender, seat quota, post-graduate qualification, type of practice, discipline of choice and current geographic locations were collected. Logistical regression model with odds ratio was used to analyse association between variables.

**Results:** 192/200 medical graduates were analysed. Male: female ratio was 119: 73. 109 (56%) had post-graduate degree, 35 (18%) had post-graduate diploma, while another 24 (12.8%) completed super-specialty degree.125 (65%) completed post-graduation in clinical disciplines. 103 (54%) are serving government institutes. 54 (28%) practice in metro cities, while 48 (25%) are in non-metro capital urban locations. Only 44 (23%) are serving rural Indian population, while 17 (9%) are at foreign countries. General medicine (12.5%), obstetrics (8%), paediatrics (8%) anaesthesia (7%) and general surgery (6.7%) were the most common broad clinical specialities. Females had high likelihood to pursue obstetrics/ gynaecology {OR-11.4 (95%CI-2.6-48.7)}; while males were more likely to select medical {OR-0.54 (95% CI-0.25-1.0)} and surgical disciplines {OR-0.42 (95% CI-0.18-0.98)}.

**Conclusions:** Majority of medical graduates complete post-graduation courses, with preference for clinical disciplines. Less than one fourth of doctors serve rural population.

**Keywords:** Medical graduates, Professional outcome, Urban-rural practice

# INTRODUCTION

India is country with 1.2 billion people with 71% population residing in rural areas. As per statistics by World Health Organisation (WHO), doctor population ratio in India is 0.6:1000, which is nearly half of desired 1:1000, while bed to population ratio is equally alarming at 0.9:1000. Healthcare system in India is mixed where

public and private healthcare delivery co-exists. Currently, government (public) expenditure on health is 1.3% of GDP (Gross domestic product), while private expenditure is fourfold higher at 4.5% of GDP.<sup>3</sup> Despite such meagre public expenditure, about 65,000 medical graduation seats are filled yearly through 470 medical colleges in India.<sup>4</sup> There are no long term prospective data regarding their future professional attributes and territorial dispersion after medical graduation through

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state funded seats. We present 17 year follow up cross sectional study of medical graduates who were enrolled under government medical college in year 2001.

#### **METHODS**

The subjects for this study were all students who got enrolled in Medical, M.B.B.S. (Bachelor of Medicine, bachelor of surgery) course in year 2001 in Government Medical College (GMC) Nagpur. Nagpur is the biggest non-metropolitan urban city located in centre of India and GMC Nagpur is the one of largest government medical teaching Institutes. Selection of 200 students per year batch were exclusively done through merit based common entrance test with 15% seats reserved exclusively from All India entrance test while remaining were filled based on State common entrance test scores. A survey of standardised questionnaire at single time point (December 2016) was given to all graduates though electronic mails, personal contacts, visits and social networking groups.

Demographic data including gender, age at course enrolment, seat quota (All India/State), post graduate degree/diploma course undertaken, super-specialty training, discipline of medical science, current occupation details and geographical location were collected. The complied data was again distributed through electronic mails for verification with each individual graduate after 12 weeks (March 2017). Final corrected data was then tabulated for analysis.

For geographical stratification of practising locations, cities with population above 10 lacs were classified at metropolitan urban e.g. Delhi, Mumbai, Kolkata, Chennai, Banglore, Pune and Hyderabad, while those having less than 49000 were labelled as rural, as per definition given under 'The constitution Act, 1992 and Reserve Bank of India respectively. 5,6 Other cities with population more than 49000, but less than 10 lac were named as non-metropolitan urban. They were further characterised as non-metropolitan state capitals versus other non-state capital cities. Post graduates were defined as those who completed their post-graduation degree/ diploma courses from recognised institutions, while those who pursued education beyond post-graduation e.g. D.M. (Doctor of Medicine) or M.Ch. (Magister Chirurgiae) were labelled as super- specialists. Those who did not pursue further education beyond MBBS degree were classified as graduates only.

All subjects who serve in Government medical colleges, municipality or community health centres, Government hospitals and peripheral health centres (PHC) were categorised under 'Government Institutional service', while those who work for non- government institutes and self-run clinics/nursing homes were clubbed into 'non-government/self-practice' group. These subjects were further categorised into self-clinic/nursing home versus private/corporate hospitals. All those who pursued post-graduation in several medical and surgical disciplines,

namely general medicine, general surgery, ophthalmology, orthopaedics, radiology, anaesthesia, obstetrics and gynaecology, ear nose throat, family medicine, emergency medicine and paediatrics along with all superspeciality disciplines were placed under 'clinical', while those who pursued all except the above mentioned disciplines were clubbed under 'non clinical/paraclinical'.

Data was assorted on SPSS version 20, and basic statistical tools including frequency distribution, descriptive statistics, grouping, crosstabs, charts and graphs were used for tabulation and comparison among variables. Odds ratio logistical regression model was used to investigate association between several demographic and geographical variables.

#### **RESULTS**

Out of 200 students enrolled in medical graduation course in year 2001, 1 died due to road traffic accident while 1 left course mid- term. 6 students did not participate for the survey as their whereabouts could not be traced. Finally, 192/200 students who willingly participated in this cross sectional survey, done in year 2017, were considered for final data analysis. 27/192 (14%) students were those who had taken open merit seat through All India common entrance test, while remaining 165/197 came through Maharashtra state common entrance test. Median age at time of enrolment to medical college was 20 years with range from 18-26 years (Table 1).

Table 1: Demographic variable of medical graduates enrolled in 2001 batch medical graduation course.

S. no.	Demographic variables (n=192)	Values
1	Age <sup>#</sup> (years)	Median 20 (18-26)
2	Sex	
	Male	119 (62%)
	Female	73 (38%)
3	Seat quota	
	State	165 (86%)
	All India	27 (14%)
4	Current education	
	status	
	Post graduate degree	108 (56%)
	Post graduate diploma	35 (18%)
	Graduate MBBS alone	25 (13.2%)
	Super-speciality	24 (12.8%)
5	Post graduate	
	qualification type	
	Clinical	125 (65%)
	Non clinical + Para clinical	42 (22%)
	Graduate alone	25 (13%)

#: at time of enrolment in graduation course.

Table 2 : Demographic variables of medical students with respect to gender.

Sex				
S. no.	Variables with respect to gender	Male (N=119) (%)	Female (N=73) (%)	
1	Post graduation degree and diploma*	80 (67)	63 (86)	
2	Super-speciality only	22 (18.5)	2 (3)	
3	Serving rural population	29 (24)	15 (20.5)	
4	Metropolitan area- India	34 (28.5)	20 (27)	
5	Abroad (foreign countries)	9 (7.5)	8 (11)	
6	Clinical discipline	81 (68)	47 (64)	
7	Government institute	66 (55.5)	37 (50.5)	

<sup>\*</sup>Excluding super-speciality.

Table 3: Professional outcomes and geographical distribution at 17 years of initiation of graduation course.

S. no.	Professional variables (n=192)	Values (%)	
1	Type of healthcare		
	Government Institutes	103 (54)	
	Non government (private hospital + self establishment)	89 (46)	
2	Geographic location		
	Metro	54 (28)	
	Non metro urban	48 (25)	
	Others	73 (38)	
	Abroad	17 (9)	
3	Speciality <sup>#</sup>		
	Medical officer (MBBS only)	27 (14)	
	General medicine	24 (12.5)	
	Obstetrics gynaecology	16 (8.3)	
	Paediatrics	16 (8.3)	
	Anaesthesia	14 (7.3)	
	General Surgery	13 (6.7)	
	Radiology	10 (5.3)	
	Preventive and social medicine	10 (5.3)	
	Others(including clinical, non and para clinical disciplines)	62 (32.3)	
	Urban-rural divide		
4	Urban	148 (77)	
	Rural	44 (23)	

(#-only disciplines with more than 10 individuals are mentioned)

#### Post-graduation

108 (56%) completed post graduate degrees only, while 35 (18%) received post graduate diplomas. 24/192 (12.8%) managed to secure super-speciality qualification beyond post graduate degrees. Post-graduation in clinical disciplines were more common, 125 (65%) compared to 42 (22%) in non-clinical and para-clinical branches. Among broad clinical specialities, general medicine {24 (12.5%)}, obstetrics and gynaecology {16 (8%)}, paediatrics {16 (8%)}, anaesthesia {14(7%)} and general surgery {13(6.7%) were the most common disciplines. Among non-clinical and para clinical post graduate disciplines, preventive and social medicine (10), pathology (8), pharmacology (5), physiology (5) and anatomy (4) were the most common.

Among super-speciality courses, nephrology (5), cardiology (4), neurology (4), plastic surgery (4), cardiovascular thoracic surgery (3), neurosurgery (2) and medical oncology (2) were the common disciplines. 25/192 (13%) did not pursue further specialization beyond graduation.

#### Gender

73/192 (38%) were females while 119/192 (62%) were males. Odds ratio for selecting obstetrics and gynaecology is 11.4 (95% CI- 2.6-48.7) favouring females; while Odds ratio for medical and surgical discipline was 0.54 (95% CI- 0.25-1.0) and 0.42 (95% CI- 0.18-0.98)} favouring males (Table 2).

## Geographical dispersion and urban-rural divide

After 17 years of medical college enrolment, 29/192 (15%) are settled in home city Nagpur, 85/192 (44%) are in rest of Maharashtra state, including Mumbai and Pune. 61/192 (32%) are in other Indian states, excluding Maharashra (Figure 1). 54 (28%) have chosen metropolitan cities for practice, while 48 (25%) are in other non-metropolitan urban state capital cities. 29 (15%) are in smaller towns (non-metropolitan, non-state capital cities).

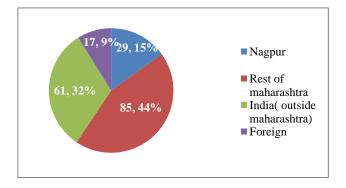


Figure 1: Geographical distribution of medical graduates across the globe- local, regional, national and international

Only 44 (23%) are currently serving in rural India. In rural areas, 24/44 (54%) have post graduate degree, compared to 84/148 (57%) in urban areas. Among all super specialist doctors, only 1/24 (4%) compared to 23/24 (96%) practice in rural India. 31/44 (70%) are working in government run hospitals, while 13/44 (30%) have their own clinic nursing home/hospital among rural population.

## Type of service/practice

103/192(54%) serve under government run hospitals, institutes and medical teaching hospitals, including urban and rural India. Excluding subjects who are settled in foreign countries, in India 48/175 (27%) have self-run private clinics/nursing home/hospitals, while 24/175 (14%) work for major private/corporate hospitals, primarily in urban areas. Government run institutes are served by 16/24 super-specialists, 50/108 Post graduate degree and 17/35 post graduate diploma candidates. 357/125 clinical discipline and 27/42 non clinical discipline post graduates work for government. 18/25 (72%) of medical graduates only, who did not pursue further studies are employed under government institutes primarily at primary health centres, sub-district and district hospitals as medical officers (Table 3).

#### Migration outside India

17/192 (9%) of medical graduates practice outside India after migration. 5/17 (29%) and 12/17 (71%) are from All India and Maharashtra state entrance test quota seats respectively. Majority have settled in Unites State of America, 9/17 (53%), while Canada (2), Middle East (2), Europe (2), Australia (1) and Singapore (1) were other prominent destinations. Majority 14/17 left abroad after completing graduation itself, while 3/17 completed postgraduation from India before migrating abroad.7/8 females have settled and took further education abroad after get married to their spouse practising abroad. Compared to this, only 3/9 males were married before/at the time of going abroad for further studies.

# **DISCUSSION**

Nagpur is the largest city of Central India, with literacy rates exceeding 91%.<sup>7</sup> It is also a major healthcare hub for central India and caters to millions of people draining from surrounding states, extending to Delhi in North, Kolkata in East, Pune in west and Hyderabad in South.<sup>8</sup> Government Medical College (GMC) Nagpur is the largest teaching medical college and hospital in Central India with 1,350 beds which serves 2,89,014 outdoor and 53,721 indoor patients annually.<sup>9</sup> 200 medical graduation seats are allotted yearly in GMC Nagpur with 15% seats reserved for merit students from All India quota, while remaining are filled through state common entrance test.<sup>4</sup>

70% Indian population live in rural India where 7 out of 10 patients are attended by unqualified heath care

providers.<sup>10</sup> Even in urban areas there is a wide gap in healthcare delivery among elites on one end and slums /shanty towns on another.<sup>11</sup> It is a matter of utmost importance to investigate the pattern of geographical distribution and level of expertise of health care providers' decade or two after completion of their basic medical training. We did a cross sectional study at 17 year follow up of medical graduates who were enrolled in year 2001 as medical trainees in GMC Nagpur.

With about 22,500 post-graduation seats available yearly, the ratio of graduate's to postgraduate's quota is 2:1 in India. 12 Moreover, one-third of these post graduate seats are in non-clinical and para-clinical disciplines which are favoured less compared to clinical disciplines. 12,13 Clinical discipline specialties including surgery, internal medicine, obstetrics are often the most common choices across the globe. 14-16 Similarly, in our study general medicine was the most preferred choice followed by obstetrics, paediatrics, anaesthesia and general surgery. Despite low preference and poor response to choice of community medicine mentioned in literature, our study showed preventive and social medicine (PSM) as the most preferred discipline among non and para clinical choices. 17,18 Similar to speciality choices in West, cardiology, neurology and nephrology was among the top three super-speciality choices in our study. 19

Male to female doctor ratio in India is 5:1 and of all health care workers, 38% are females.<sup>20</sup> Moreover, among allopathic doctors only 17% are female. 20 In our study male to female doctor ratio was 1.6:1 with 38% female, which is much higher when compared to few decades back (15%).<sup>21</sup> 89% of female did postgraduation, while 64% pursued clinical disciplines which are comparable to male graduates. However, only 3% female doctors compared to 12% male successfully completed their super-speciality training. This may be attributed to their personal choices, socio-familial, cultural, peer pressure, marriage with settlement issues, ambition, work - life balance and gender bias prevalent in society.<sup>22-24</sup> Several studies which reported gender preferences in selecting specialities across the globe, our study too showed a similar trend with higher Odds ratio favouring females in obstetrics and gynaecology while more male in surgical and medicine disciplines. 1

It is a paradox that In India where more than 70% population live in rural areas, urban rural physician ration is 4:1.<sup>29</sup> The problem further compounds by the fact that 90% health care workforce in rural India are provided by Non-government/private clinics and hospitals compared to 75% in urban cities.<sup>30</sup> One of the prime reasons is that 10-50% medical post are vacant at primary health centres across rural India depending upon the State along with 40-50% of specialist post at public sector peripheral hospitals.<sup>31</sup> Our study too, showed a similar urban rural doctor ratio with only 23% working in rural areas. However, on brighter side more than half of doctors serving rural populace have post-graduation degree. This

could be attributed to surplus graduates produced in Maharashtra state and improved doctor population ratio over past two decades. <sup>32,33</sup> Out of all super-speciality doctors only 4% work in rural India. Various reasons such as lack of professional development opportunities, good housing, better salaries and access to even basic medical resources necessary to perform an effective role could be the reason for such disparity. <sup>34,35</sup>

Indian doctors constitute one of the largest group among international medicate graduates emigration pool.<sup>36</sup> As per Kaushik et al, 54% of All India institute of Medical Sciences (AIIMS) students who graduated during 1989-2000 reside outside India, with 86% in United State of America and no gender bias in migration.<sup>37</sup> Among the prominent reason for this are pursuit of higher education, financial incentives, congruence of Indian medical training with Western methods due to colonial link and material benefits with improvement of working conditions and facilities. 38,39 Though these migrated physicians form a backbone of National Health system in western countries, for developing and under developed nations it is a matter of significant concern in terms of both, loss of skilled manpower and wasteful utilisation of scarce resources. 40,41 Contrary to that reported by Kaushik et al, our study showed doctor external migration of 9%, with majority of them leaving India just after graduation.<sup>37</sup> United State of America happens to be the most favoured destination and majority of female graduates left India after getting married to emigrant spouses. Our study was done in Nagpur, which is a nonmetropolitan city, where aspiration and ambition of young population is different compared to those in major metropolitan cities where socio-cultural bias is more towards external migration can explain this low overall external migration result. 42-45

Being a cross sectional study, this single point data cannot capture past trends at any time points before the survey. Similarly, it also cannot predict with any certainty as to what and how the future course of study population would be. We also do not claim that our selected time point of 17 years post allotment in medical college is an ideal time point for measuring academic proficiency, practice trends and geographical distribution. As each subject data including details was given by them voluntarily in this survey, they were not verified with respected post graduate institutions, assuming them to be true as all subjects were professional doctors. Hence, we do not reject any minor possibility of inflation of professional efficiency, practice patterns and residence.

As per knowledge of authors, this is the only long term follow up cross sectional study of professional outcome, practice trends and territorial dispersion of medical graduates from Central India. Among prominent insights of this study is the fact that three forth of medical graduates pursue post-graduation qualification, majority in clinical disciplines. More than half of graduates serve government institutes on long term follow up. Half of

doctors prefer to settle in metropolitan and capital cities. Only one-fourth of them serve rural population. Obstetrics is the primary choice among female graduates while general medicine and surgery lure males. External migration is 9% with majority leaving India after graduation predominantly to United States of America.

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