**Introduction**

Health being a state subject under the constitution of India, it is imperative that states should be equipped to deal with the health care challenges in all specialties. The capacity to negotiate with the mortality and morbidity due to prevalent causes must be developed equally and suitably in all states and territories.

Medical Council of India(MCI), the body entrusted to regulate the standards of medical education in the country has defined in its regulations that the goal of postgraduate medical education shall be to produce competent specialists and/or Medical teachers who shall recognize the health needs of the community, and carry out professional obligations ethically and in keeping with the objectives of the national health policy.(1) In addition to Government Medical College Hospitals, health care delivery by state governments in different states of India is provided through District Hospitals, Community Health Centers , Primary Health centers and Dispensaries run by Public Health and Family welfare department. Medical Education and medical colleges in some of the states are governed by Department of Public Health and Family Welfare and in some states medical education is governed by a separate Medical Education Department which is the case for Madhya Pradesh.

Madhya Pradesh is the geographically second largest state of India after Rajasthan with a population of more than 72.6 million as per 2011 census.(2) The population of Madhya Pradesh has gone up from 23.2 millions (Madhya Pradesh and Chhatisgarh both) in 1961 to 72.6 millions in 2011(Madhya Pradesh alone) and a combined population of 98.1millions.More than 70% of Madhya Pradesh population lives in villages.

In Madhya Pradesh, the field of Respiratory Medicine is also widely known as Tuberculosis and Chest Disease or Pulmonary Medicine and deals with vast majority of illnesses like Tuberculosis (TB) ,both pulmonary and extra-pulmonary and its variants such as Multi Drug Resistant (MDR) and Extensively Drug Resistant (XDR) TB. It also includes Lower Respiratory Tract infections (LRTI), Asthma, Chronic Obstructive Pulmonary Diseases (COPD), Lung Cancers, Sleep Related Breathing Disorders, Cigarette smoking related problems, Allergic and Pollution problems of respiratory system

During the clinical practice it was felt that the availability of specialists, medical education and treatment facilities in the field of Tuberculosis and Respiratory Diseases (TBRD) in the state of Madhya Pradesh might not be adequate, as frequently patients were either had to be referred to higher centers in other states or they had to surrender to their fate and succumbing to death or had to face long term morbidity.

In the background of above facts it is worthwhile to assess whether the present medical education and healthcare facilities are adequate or not, hence the present study was thus taken to do a status review of availability of Specialists, medical education and Infra structural health care facilities in the field of Tuberculosis and Respiratory Diseases in the state of Madhya Pradesh.

**Methodology**

Data collection about the current scenario of Respiratory specialist Training programmes and available Respiratory care related infrastructural facilities in Public sector and medical colleges was obtained from various documents found by the internet search and also by the information provided by various faculty members working at the state medical colleges in the state of Madhya Pradesh.The authenticity of the data was judged according to the actual source of information, i.e. the websites from which this data was found.

**Ethical Approval:** Ethical Approval for present study was not requiredas it did not involve patients as subjects of the study.

**Findings**

**Medical education:**

Madhya Pradesh state has presently 13 medical college, out of which 6 are government/autonomous medical college of the state and 7 are private medical college.(3) The 13 colleges included here are those who have been successfully running the MBBS course and at least awarded degrees to their first batch. Those colleges who have yet to produce their first batch of MBBS have not been included here.In addition to the above, the state government has announced 4 more medical college at Vidhisa, Ratlam, Shivpuri and Seoni in last 2 years, but these colleges are yet in the process of fulfilling the faculty requirements and developing other infrastructure as per MCI norms, similarly, there are few private colleges at Jabalpur, Guna and Bhopal are going through the process and waiting for MCI nod to start MBBS course. In the government set up only one functional medical college has been set up in recent years, at district Sagar in year 2008. Madhya Pradesh with its 72.6 million population and an area of 308252 square kilometres has a total of 1850 MBBS seats per year. Out of these 1850 seats 800 are in Government medical colleges and the rest 1050 are in the private medical colleges.(3)

There are a total of 10 postgraduate MD seats in the state of MP in speciality of TBRD. Table No. 1 shows the number of MBBS seats and post Graduate seats in TBRD in each medical college of state of MP.

Except one medical college of Indore rest all government college do not even have one functional unit in the specialty of TBRD as per MCI norms and have significant deficiencies in the faculty numbers as can be seen in Table No.2. The TBRD departments of private colleges are recognized by MCI to run the PG course; hence, it is presumed that faculty members are adequate as per MCI norms in such private colleges.

**Situation with regards to treatment of Tuberculosis**

India has the highest burden of TB in the world, an estimated 2 million cases annually, accounting for approximately one fifth of the global incidence. It is estimated that about 40% of the Indian population is infected with TB bacteria, the vast majority of whom have latent rather than active [TB disease](http://www.tbfacts.org/tb-disease.html). It is also estimated by the World Health Organization (WHO) that 300,000 people die from TB each year in India.(4)

In India, Multi Drug Resistance TB levels of about 3% in new cases and around 12-17% in retreatment cases have been reported. However, even such a small percentage of cases in India , still translates into large absolute numbers. (5)

Tuberculosis, both pulmonary and Extra pulmonary, apart from accounting for high number of mortality also cause long term morbidity due to complications like unilateral destruction of lung, hemoptysis , Pleural effusion, Pneumothorax, empyema or Bronchiectasis which can be seen in 30% -60% of patients suffering from active post primary tuberculosis.(6-8)

The state of Madhya Pradesh is covered under Revised National Tuberculosis Control Program(RNTCP) and has a state TB society at State level and has a district TB centre at each District and 158 Tuberculosis Units (TUs) and 756 Designated Microscopy Centers (DMCs) and under the RNTCP more than 3000 Medical Officers, 1000 laboratory technicians, 17000 health care workers and other community volunteers have been trained**.(5)**

Multi drug resistant tuberculosis is a challenge for the RNTCP and acid fast Bacilli Culture and Drug Susceptibility Testing for first line anti Tuberculosis drugs facility is a must in order to treat MDR TB. The service is available at Bhopal, Jabalpur and Indore using Solid and Rapid diagnostics Gene Xpert/Rif test in the government sector. At Jabalpur the service is catered through Indian Council of Medical Research, a central government body. Places like Rewa & Sagar which have government medical colleges do not have this facility in these medical colleges. A patient who needs to avail this facility is to be sent to District TB centre of the concerned district which after evaluation sends the patient for Acid fats Bacilli Culture and Drug Susceptibility Testing to one of the three centres. Even the medical college departments of TB and Respiratory diseases can not send the patient directly to these centres and this result in significant time loss in acquiring proper treatment. The state government claims that by February, 2013, all the 50 districts in the state have been rolled out for Programmatic Management of Drug Resistant TB Cases (PMDT services), free of cost to the confirmed Drug Resistant TB cases. (9)

The treatment for MDR TB cases is provided through DOTS Plus Programme which requires indoor admission for at least one week for initiation of treatment and at present there are only two government functional MDR-TB Centres, namely at TB Hospital at Bhopal, TB hospital Indore & one at a private medical college at Ujjain.(9) Even all the government medical college do not have the indoor treatment facility for MDR TB patients. Many Places such as, Rewa, Gwalior and Jabalpur have been selected as DOTS Plus Sites, but could not become functional for various logistic reasons and lack of co-ordination between various limbs of state governments. Table No. 3 shows availability of MDR TB treatment facility in Government District hospitals and Government Medical Colleges of Madhya Pradesh

**Availability of diagnostic facilities used in Respiratory illnesses**

Chest X ray facility for the respiratory diseases patients is available in all the Government as well as private medical colleges under the department of Radiodiagnosis. Computerised tomography (CT) scan facility is available at all government medical colleges.

Culture and sensitivity testing facilities for tuberculosis is not available at Rewa and Sagar , but is available at Jabalpur, Bhopal, Gwalior and Indore in government medical colleges.

Fibreoptic bronchoscopy and lung function testing facilities are available only at Bhopal ,Indore and Jabalpur Government medical colleges. None of the government medical college in Madhya Pradesh has advanced equipments such as Polysomnography, Endobronchial Ultrasound, Thoracoscopy and advanced interventional bronchoscopic facilities yet. Only Government medical college at Jabalpur has facility of specialized treatment for controlling hemoptysis by bronchial artery embolisation method. Specialised clinics under department of TB and respiratory diseases for the treatment of Asthma, Respiratory Allergies and Lung cancer are not being run in any of the Government medical colleges.Respiratory illnesses patients who may require specialised major Thoracic surgery procedures such as Pneumonectomy, lobectomy or decortications are usually referred to higher centers outside the state, as the facilities for thoracic surgeries are limited at the Government medical colleges and all these medical colleges lack a dedicated thoracic surgery unit.

**Discussions**

MadhyaPradesh is a large state located geographically at central part of India with sixth largest state in terms of population. It is located at 23° 30' N latitude and 80° 00' E longitude, hence has subtropical climate as in other northern parts of India(10). The burden of Respiratory illness had been studied in India in various studies. The national burden in India of chronic bronchitis was estimated as 14.84 million.(11) India has the greatest burden of pneumonia in the world with 43 millions population being affected.(12) **,**and in India, approximately 63,000 new lung cancer cases are reported each year.(13) India has an estimated 15-20 million asthmatics.(14)20% to 30% of the population suffer from allergic rhinitis and that 15% develop asthma.(15) Occupational lung diseases , Sleep Apnea added to other respiratory problems accounts for a big number of patients, but studies describing their prevalence in India are not available.

Similarly, mortality due to Respiratory illnesses is also high. LRTI and TB accounts for 11% and 4% deaths Respectively, in India.(16). Diseases of Respiratory System other than Tuberculosis is the third leading cause, responsible for 9.5 per cent of deaths in India and 3.7% in Madhya Pradesh of the total medically certified deaths. (17) Tuberculosis deaths are calculated under deaths due to infections and accounts for one third of all deaths due to infectious causes, which is 13.1 % in India and 9.9 % in Madhya Pradesh.(17) These numbers are enormous keeping in view that all deaths in India and Madhya Pradesh are not medically certified deaths and more importantly for the reason that Madhya Pradesh is the geographically second largest state of India after Rajasthan, with a population of more than 72.6 million as per 2011 census**.** Table No. 4 shows the top 10 causes of deaths in India as per the census data.Considering these studies it can be extrapolated that Madhya Pradesh state also might be having similar number of patients of various respiratory disorders, although we could not find any studies in literature which have specifically evaluated the individual respiratory disease burden in state of MP.

In India, there are a total of 392 medical colleges in all the states(17). With an area of 3287240 square kilometers in India , it can be calculated that there is one medical college per 8385 square kilometer(sqkm) in India. If this figure is calculated for MP state which has 308252 sq km of area and total 13 medical colleges, it comes out to be one medical college per 23700 square kilometers of area ,which is much less to the national average value. If we compare this situation with other big states, Andhra pradesh has 1 per 6112 sq km, Uttar Pradesh has 1 per 7771sq km and Maharastra has 1 per 7000 sqkm medical college, where as Rajasthan which is the largest state in terms of area has 1 medical college per 31000sq km. Some smaller states, such as Delhi, Haryana ,Punjab and union territories Puducherry and Chandigarh can boast of much better situation in terms of number of medical colleges as shown in table No 5. This comparison also highlights that the medical colleges in India are not uniformly located, with some areas having conglomeration of colleges and other areas managing with scarce numbers. Similar is the situation in MP also with Bhopal alone having 5 medical colleges and Indore having 2 medical colleges , while most of districts have no medical colleges at all.The post graduate MD seats in TBRD in India is 307 per year that extrapolates to about 1seat per 4 lac population.Madhya Pradesh with 13 post graduate seats, including both Diploma and MD in Specialty of TBRD has 1 postgraduate seat per 5.6 lacs population, which is again lesser that the National values.

Tuberculosis is a respiratory disease which is a major public health problem in India, although facilities for the diagnosis and treatment are being developed in MP, still many other respiratory illnesses coming under the preview of pulmonary medicine are still widely under-diagnosed and under treated. The reasons for this can be largely attributed not only to lack of appropriately qualified and adequately trained respiratory specialists, but also due to inadequate modern equipments in most of the government run medical colleges, thereby, limiting the opportunity of learning the use of these equipments to diagnose and treat patients with pulmonary diseases by the budding students in this specialization. On the one hand the state run medical colleges have shortage of experienced senior medical teachers i.e. at the rank of professors in the specialty of TB & chest diseases, where as inadequate infrastructure and lack of modern equipment can also be one of the reason for the refusal of permission for running post graduate program in this specialty by the medical council of India.

**Conclusion**

This study thus brings to light, the need for increasing the medical education facilities as well as improving the availability of Post graduate specialist in Specialty of Pulmonary medicine to cater to a large state with a large population is need of the hour and may require further efforts and determination from various bodies and authorities involved in policy making and implementation of Medical education and health care needs of the state.

**References**

1. Post Graduation medical education regulations 2010 [Internet] 2010 [cited 2014 December14]. Available from:<http://www.mciindia.org/RulesandRegulations/PGMedicalEducationRegulations2000.aspx>

2. State wise Information. Madhya Pradesh. State profile [Internet] 2013 [update 2014 Dec 31; cited 2015 Jan 1] .Available from : http://nrhm.gov.in/nrhm-in-state/state-wise-information/madhya-pradesh.html#state\_profile\_mp

3. Search Colleges and courses [Internet] 2010 [cited 2014 December 14] Available from: http://www.mciindia.org/InformationDesk/CollegesCoursesSearch.aspx

4.TB in India. RNTCP,TB care and drug resistant TB[Internet] 2014 [cited 2014 December 14]. Available from http://www.tbfacts.org/tb-india.html

5. TB India 2012. Revised National TB control programme. Annual status report. [Internet] 2012 [cited on 2014 Dec 31]. Available From: <http://tbcindia.nic.in/pdfs/TB%20India%202012-%20Annual%20Report.pdf>

6. Rajasekaran S, Vallinayogi V, Jeyaganesh D. Unilateral lung destruction: A computed tomography evaluation. Ind. J. Tub., 1999; 46:183-7

7. Sharma SK.Tuberculosis ,2nd Edition,New Delhi. Jaypee brothers Medical Publishers 2011

8. [M. Monir Madkour](http://link.springer.com/search?facet-author=%22M.+Monir+Madkour%22), [Y. Abusabaah ABIM](http://link.springer.com/search?facet-author=%22Y.+Abusabaah+ABIM%22), [Ali Ben Mousa MD](http://link.springer.com/search?facet-author=%22Ali+Ben+Mousa+MD%22),[Ali Al Masoud MD](http://link.springer.com/search?facet-author=%22Ali+Al+Masoud+MD%22). Post-primary Pulmonary Tuberculosis.In.M.Monir Madkour. Tuberculosis. Springer Berlin Heidelberg;2004. p313-327

9. Revised National Tuberculosis control programme( RNTCP). Directorate of health services. Madhya Pradesh. [Internet] [cited 2014 Dec 14]. Available from : <http://www.health.mp.gov.in/tb.htm>

10. Lattitute and longitude of Madhya Pradesh[Internet]2014 [cited on 2015 January 15]. Available from : http://www.mapsofindia.com/lat\_long/madhyapradesh/

11. Jindal SK, Aggarwal AN, Gupta D, Agarval R, Kumar R, Kaur T, et al. Indian study on epidemiology of asthma, respiratory symptoms and chronic bronchitis in adults (INSEARCH). Int J Tuberc Lung Dis 2012; 16 : 1270-7.

12. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. Bulletin of the World Health Organization 86**;**5: 408–16.

13. Ganesh B, Sushama S, Monika S, Suvarna P. A Case-control Study of Risk Factors for Lung Cancer in Mumbai, India. Asian Pac J Cancer Prev 2011;12:357-62.

14. [World](http://www.who.int/mediacentre/factsheets/fs206/en/) health organization.Media Centre. Bronchial asthma. FactsheetN206 [Internet] 2015 [cited 2015 February 13]. Available from:http://www.who.int/mediacentre/factsheets/fs206/en/

15. Chhabra SK, Gupta CK, Chhabra P, Rajpal S. Prevalence of bronchial asthma in school children in Delhi. J Asthma 1998;35:291-6.

16. CDC in India Factsheet [Internet] January2013 [cited on 2014 December 14]. Available from: <http://www.cdc.gov/globalhealth/countries/india/pdf/india.pdf>

17. Report on medical certification of cause of death 2010 [Internet] 2011 [cited on 2014 December 14]. Available from: http://www.censusindia.gov.in/2011-Documents/mccd\_Report1/MCCD-Report-2010.pdf

**TABLES**

**Table No. 1:** Number of MBBS seats and Post graduate seats (MD/Diploma) in TB & Respiratory Diseases in medical colleges of Madhya Pradesh

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Medical college** | **Management of college** | **Year of Inception of college** | **MBBS seats** | **PG Diploma seats in TB & RD** | **PG degree(MD) seats in TB & RD** |
| Bundelkhand Medical college,Sagar | Govt. | 2009 | 100 | 0 | 0 |
| GajraRaja medical college,Gwalior | Govt | 1945 | 150 | 0 | 0 |
| Gandhi medical college,Bhopal | Govt. | 1955 | 150 | 0 | 0 |
| MGM medical college,Indore | Govt. | 1948 | 150 | 2 | 0 |
| NSCB medical college,Jabalpur | Govt. | 1955 | 150 | 0 | 0 |
| Shyam shah medical college,Rewa | Govt. | 1963 | 150 | 0 | 0 |
| Sri Aurbindo medical college,Indore | Trust /Private/Non Govt | 2003 | 150 | 0 | 3 |
| Ruxmaniben Deepchand Gardi medical college, Ujjain | Trust /Private/Non Govt | 2001 | 150 | 0 | 3 |
| RKDF med college and research centre,Bhopal | Trust /Private/Non Govt | 2014 | 150 | 0 | 0 |
| Peoples college of medical science&research centre,Bhopal | Trust /Private/Non Govt | 2005 | 150 | 0 | 2 |
| LN med college & research centre,Bhopal | Trust /Private/Non Govt | 2011 | 150 | 0 | 0 |
| Index medical college,Indore | Trust /Private/Non Govt | 2009 | 150 | 0 | 2 |
| Chirayu medical college& Hospital, Bhopal | Trust /Private/Non Govt | 2007 | 150 | 0 | 0 |

**Table No.2:** Medical education facility status as per MCI norms in Government medical colleges in the field of TB & Respiratory Diseases in the state of Madhya Pradesh

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Facility | Jabalpur | Sagar | Rewa | Bhopal | Indore | Gwalior |
| Available Faculty strength | 3( but no professor is available hence the unit is not as per MCI norms) | 1 | 1 | 2 | 3 | 2 |
| Minimum requirement of faculty staff 1 Professor 1 associate and 1 Assistant Professor | 3 | 3 | 3 | 3 | 3 | 3 |
| Available strength of Senior Residents(SR) | 0 SR and 0 JR | 0 | 0 | 1 |  | 0 |
| Minimum requirement of Senior Residents staff | 3 | 3 | 3 | 3 | 3 | 3 |
| Minimum requirement of Junior Residents (JR) staff | 3 | 3 | 3 | 3 | 3 | 3 |
| PG Degree MD (TB & RD ) Seats | 0 | 0 | 0 | 0 | 0 | 0 |
| Fully Functional Separate department | No | No | No | No | Yes | No |
| Separate Beds for specialty | 30 | 0 | 0 | 0 | 30 | 60 |
| Separate Daily OPD services for specialty | Yes | Yes | Yes | Yes | Yes | Yes |

**Table No.3:** Availability of MDR TB treatment facility in Government District hospitals and Government Medical Colleges of Madhya Pradesh:

|  |  |  |
| --- | --- | --- |
| Type of Facility | 51 Government  District hospitals | 6 Government Medical Colleges |
| AFB Culture facility (Solid) LJ Media | 0 | 4 |
| AFB Culture facility (Liquid ) BACTEC | 0 | 0 |
| Drug susceptibility testing First Line | 0 | 4 |
| Drug susceptibility testing Second Line | 0 | 0 |
| Indoor admission facility | 0 | 0 |
| Gene X-pert/Rif Test | 1 (at Sagar) | 0 |

AFB –Acid Fast Bacilli , LJ- Lowenstein Jensons

**Tables No 4** : Top 10 causes of deaths in India

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Cause** | **% of total number of deaths** |
| 1. | Ischaemic heart diseases | 15% |
| 2. | Lower respiratory infections | 11% |
| 3. | Cerebrovascular disease | 7% |
| 4. | Perinatal conditions | 7% |
| 5. | Chronic obstructive pulmonary disease | 5% |
| 6. | Diarrheal disease | 4% |
| 7. | Tuberculosis | 4% |
| 8. | HIV/AIDS | 3% |
| 9. | Road traffic accidents | 2% |
| 10. | Self-inflicted injuries | 2% |

**Table No.5**: State wise population and number of MD TB and Respiratory Diseases Seats

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | India | Population(1,210,193,422) | Area square km(3287240) | Number of MD TB & Respiratory medicine seats(307) | Number of medical colleges offering MD TBRD(134) | Number of medical colleges in state (392) | Number of seats of MBBS |
| 1. | All union territories(including Lakshadweep,Daman&Diu,Dadra & Nagar Haveli,Andaman & Nicobar,Chandigarh,Puducherry) | 3,335,413 | 9485 | 7 | 5 | 10 | 1375 |
| 2. | North East India region(Sikkim,Mizoram,Arunachal Pradesh,Nagaland,Manipur,Meghalaya,Tripura) | 13,035,853 | 184231 | 2 | 1 | 6 | 500 |
| 3. | Jammu & Kashmir | 12,541,302 | 222236 | 0 | 0 | 4 | 500 |
| 4. | Delhi | 16,787,941 | 1483 | 7 | 2 | 8 | 1050 |
| 5. | Haryana | 25,351,462 | 44212 | 3 | 2 | 7 | 700 |
| 6. | Chhattisgarh | 25,545,198 | 135192 | 0 | 0 | 6 | 700 |
| 7. | Punjab | 27,743,338 | 50362 | 10 | 3 | 10 | 1145 |
| 8. | Gujarat | 60,439,692 | 196,244 | 23 | 10 | 22 | 2930 |
| 9 | Rajasthan | 68,548,437 | 342239 | 27 | 8 | 11 | 1800 |
| 10 | Madhya Pradesh | 72,626,809 | 308,252 | 8 | 3 | 13 | 1740 |
| 11 | Andhra Pradesh | 84,580,777 | 275045 | 59 | 27 | 45 | 6100 |
| 12 | Maharashtra | 112,374,333 | 307713 | 42 | 20 | 44 | 5710 |
| 13 | Uttar Pradesh | 199,812,341 | 240928 | 29 | 11 | 31 | 3312 |