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# Indian Journal of Preventive Medicine

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## Contents

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### Original Articles

- Pattern of Mobile Phone Usage and Its Association with Stress, Sleep Disturbance & Depression** 5  
Megha Moni Thomas  
Rajalakshmy Aiyappan  
Nadha E  
Mufna VK  
Rajeev Aravindakshan
- Internet Addiction among High School Students of Rural Area: A Descriptive Cross Sectional Study** 11  
Shwetha  
Tejashwini K
- Determination of Real Leprosy Burden Through Epidemiological Validation Drive in Turbulant Areas of Gadchiroli District** 15  
Vasudev K Rokade  
A. B. Prabhavalkar
- Method for Estimating of Perinatal Mortality Rate by Using Multiple Regression Approach for India** 23  
Sachin Pandey  
Hemlata Thakur  
Sumit Dhruv  
Ashish Baghel
- Tuberculosis Trends Over A Five-Year Period at A Tertiary Care Hospital in Mangaluru, Karnataka** 29  
Brig Hemant Kumar  
Heena Lalwani  
Prajna Kini
- Guidelines for Authors** 57

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Journal of Global Medical Education and Research	Semiannual	5900	5500	440	410
Journal of Global Public Health	Semiannual	12000	11500	896	858
Journal of Microbiology and Related Research	Semiannual	8500	8000	664	625
Journal of Nurse Midwifery and Maternal Health	Triannual	5500	5000	430	391
Journal of Orthopedic Education	Triannual	5500	5000	430	391
Journal of Pharmaceutical and Medicinal Chemistry	Semiannual	16500	16000	1289	1250
Journal of Plastic Surgery and Transplantation	Semiannual	26400	25900	2063	2023
Journal of Practical Biochemistry and Biophysics	Semiannual	7000	6500	547	508
Journal of Psychiatric Nursing	Triannual	5500	5000	430	391
Journal of Social Welfare and Management	Triannual	7500	7000	586	547
Medical Drugs and Devices Research	Semiannual	2000	1800	156.25	140.63
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## Pattern of Mobile Phone Usage and Its Association with Stress, Sleep Disturbance & Depression

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### Abstract

*Objective:* Psycho-social problems associated with the use of mobile phones are common among medical students. There is overuse of mobile phones among medical students which would have led them to deteriorate in academics due to stress, sleep disturbance or depression. This study was conducted to assess the pattern of mobile phone usage, its psycho-social impact namely stress, sleep disturbance and depression among professional college students and to find any association between usage pattern and the psychosocial impacts. *Methods:* After the ethical and departmental clearances were received, 100 medical students using a smart phone or feature phone and those willing to take part in the study were selected by purposive sampling. A cross-sectional type of study was conducted. An informed consent was given to each of them and questionnaires were administered by hand. It was then collected and analyzed using Epi Info 2007. The responses from 92 students out of 100 were received of which 71 were from girls and 21 were from boys. Frequency distribution of variables such as age groups and sex were worked out and tabulated. Mean and standard deviations of continuous variables were calculated. T-test was used to test the differences. Outcomes variables were categorized using known class intervals and cross-tabulated with usage pattern. Chi-square test was used to test the association. P-value was considered as significant when it was less than 0.05. *Results:* The results obtained were in accordance to the objectives i.e. increase in the number of hours of mobile phone usage led the students to have sleep disturbances such as reduced sleep, fragmented sleep or insomnia. Also there was a positive association the same with depression. But a third variable, stress was seen to be an incidental finding. Medical students are generally stressed as part of their busy schedule and use of mobile phones does not directly increase their stress levels. It may, thus, be concluded that there is a positive association between usage pattern of mobile phones, sleep disturbance and depression. Stress is an incidental finding unrelated to the use of mobile phones as such.

**Keywords:** Psycho-Social Problems; Mobile Phone Usage; Depression; Sleep Disturbance; Stress.

### Introduction

Twenty-first century belongs to information technology and the communication channels

opened by the inventions have connected people thousands of miles apart. The classical telephones had only managed to connect continents in 19th century which was just a shadow of things to come.

Now, individuals are connected regardless of where they are, thanks to mobile telephony. Portable mobile phones have become an integral part of the life in this modern era such that socialization, academics and entertainment are all carried out using the medium, including at times, issues of safety, privacy and status [1].

Motorola brought out the first ever mobile phone and the usage by 2015 has touched above 975 million in 3 decades [2-3]. Smart-phones are the touch-screen-enabled models which have changed the lives of people like never before. As compared to feature phones, these devices are able to mimic the daily life of people and change the way they relate to each other [3]. Obviously, this has resulted in some harmful effects as well. More than the radiation-induced health effects of mobile devices, it is the psychosocial effects such as stress, depression and sleep related problems which have been worrying the mental health professionals for some time [2].

This study was set up to investigate the possible psychosocial effects in association with the use of mobile phones among a group of professional college students. Stress is perceived as the state of emotional strain or tension resulting from the demanding circumstances possible induced by the connectivity offered by the devices; depression being the effect of severe dependency and rejection as a result of intense personal interactions offered by the smartness of technology. Sleep disturbances are self-induced or otherwise brought on by the excessive use of the phones interfering with the wellbeing of the individual concerned. Mobile phone use is very much prevalent in this age group and students should be aware of the ill effects due to its addictive use [4]. Hence, this study attempts to examine possible associations between mobile phone use and the resultant psychosocial impacts.

## Methods

This was a cross-sectional study knowing very well that the temporal association of perceived effects of mobile phone use could not be established by such a study design. The study sample came from a population of 19 to 23 year-old professional college students from which 100 individuals, who were using the phones such as feature or smart varieties, consenting to be part of the study were purposively included. Gender was not a criterion for selection but the students had a higher share of females which could not be avoided. Previously diagnosed cases of depression, stress or sleep

disturbance, if any, found by treatment history were excluded from the study to provide a context for establishing causality. All medical institutions in the locality were covered for the study.

Ethical approval was obtained from the institutional ethics committee and the principal as well as the departmental heads were approached before starting the surveys. Informed consent was obtained from each of the study participants which made it purposive. The study tools developed based on a work reported by Thomee S et al on Finnish students were given to the subjects and included the following validated tools [5].

1. Perceived stress scale [6]
2. Pittsburgh sleep quality index [7]
3. Patient health questionnaire [8]

Grading of the surveys was conducted as per the previously coded items. Usage options (a,b,c, d) were scored as 1, 2, 3 and 4 points respectively. Total score being between 5 and 20, the classification was done as 5-10 = low usage; 10-15 = medium usage and 15-20 = high usage. Stress was given a score based on perceived stress scale (0 for A; 1 for B; 2 for C; 3 for D and 4 for E) and score between 0-10 representing mild stress; scores between 10-20, moderate stress and 20-30 representing severe stress. Sleep disturbance was scored as 0, 1, 2, 3 for options a,b,c and d respectively and on adding up these individual scores, a total score obtained was graded based on Pittsburgh Sleep Quality Index as 0-5 - sound sleep; 6-10 - mild sleep disturbance; 11-15 - moderate sleep disturbance and >15 - severe sleep disturbance. Depression was graded similarly using options (a,b,c,d) representing 0,1,2, and 3 points respectively and the total score based on Patient Health Questionnaire as 1-4 = minimal depression; 5-9 = mild depression; 10-14 = moderate depression; 15-19 = moderately severe depression and 20-27 = severe depression.

Data collected were entered into and analyzed using Epi Info 2007. Frequency distribution of variables such as age and sex were worked out and tabulated. Mean and standard deviation of continuous variables were calculated and compared between groups such as gender. T-test was used to test the differences. Outcomes variables were categorized using known class intervals and cross-tabulated with usage pattern. Chi-square test was used to test the associations. ANCOVA was performed for finding out significant predictors of depression among the study group. P-value was considered as significant when it was less than 0.05.

**Results**

In this study, out of 100 students of the age group 19 to 23 years, 92 consented to participate. The response rate of 92% was deemed sufficiently high to get valid results. Among them 71 (77%) were girls and 21 (22%) were boys. Mean ages were 20.8 ( $\pm 0.65$ ) years among females and 21 ( $\pm 0.89$ ) years among males. Older individuals were more among the males as shown in table 1 (Chi-square test;  $p = 0.0342$ , significant).

**Table 1:** Age and gender distribution of study participants

Age (years)	Females (%)	Males (%)
19	0 (0)	1 (5)
20	22 (31)	3 (15)
21	44 (62)	11 (55)
22	3 (4)	4 (20)
23	2 (3)	1 (5)

Table 2 shows that less than half (40; 43.4%) had

**Table 2:** Usage pattern against stress

		Usage Pattern			
		Low	Medium	High	Total
Stress	Mild	3 (9.4%)	1 (2.5%)	2 (10%)	6 (6.5%)
	Moderate	24 (75%)	25 (62.5%)	9 (45%)	58 (63%)
	Severe	5 (15.6%)	14 (35%)	9 (45%)	28 (30.4%)
	Total	32 (100%)	40 (100%)	20 (100%)	92 (100%)

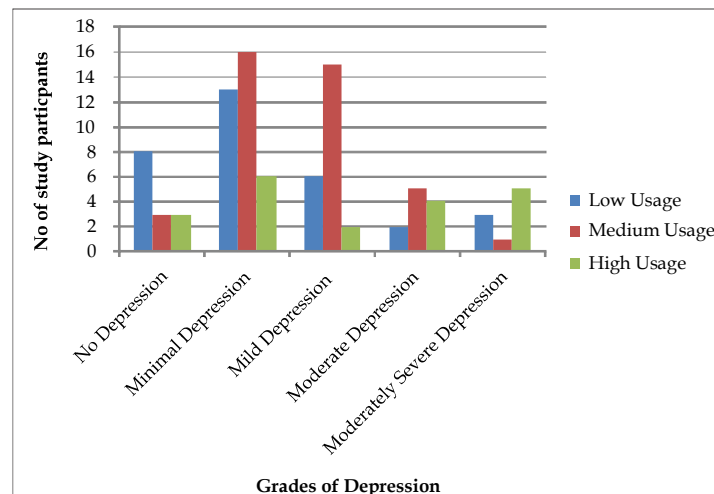
**Table 3:** Usage pattern against sleep disturbance

		Usage Pattern			
		Low	Medium	High	Total
Sleep Disturbance	Sound Sleep	32 (100%)	35 (87.5%)	14 (70%)	81 (88%)
	Mild	0 (0%)	4 (10%)	6 (30%)	10 (10.9%)
	Moderate	0 (0%)	1 (2.5%)	0 (0%)	1 (1.1%)
	Total	32 (100%)	40 (100%)	20 (100%)	92 (100%)

medium usage and 21.7% (20) had high mobile phone usage pattern. Most of the study participants were observed to have moderate stress (58; 63%) and there was higher percentage of severely stressed individuals on the high usage side of phones (Chi-square test,  $p$  value = 0.112, not significant).

As per the coding scheme, sleep disturbance rarely crossed to moderate or severe categories. Even then the mild disturbance category dominated the high usage section of the study subjects as shown in table 3. (Chi-square test,  $p$  value = 0.012, significant).

Out of 92, 14 (15.2%) had no depression, 36 (38%) minimal depression while only 8 (9.8%) and 11 (12%) had moderately severe and moderate depression respectively. Figure 1 shows that the highest usage of mobile phones was among 20 of the subjects and they elicited the highest from moderate to moderately severe depression. (Chi-square test,  $p$  value = 0.02, statistically significant).



**Fig. 1:** Bar diagram showing association of usage pattern and depression

Further when the genders were analyzed separately, it was found that the mean usage score was 11.32 ( $\pm 3.1$ ) in females whereas this was 15.81 ( $\pm 3.0$ ) in males. This proved that males were using the phones to a greater extent than females (unpaired  $t = 5.825$  and  $p = 0.000$ , significant). In females, mean stress score was 17.75 ( $\pm 4.39$ ) and in males, mean stress score was 18.14 ( $\pm 5.64$ ). This difference was not significant (unpaired  $t = 0.340$ ,  $p = 0.735$ ). In contrast, females had a lower mean sleep disturbance score of 2.42 ( $\pm 2.12$ ) compared to males whose mean sleep disturbance score was 4.52 ( $\pm 2.2$ ). (Unpaired  $t = 3.941$ ,  $p = 0.000$ ). Similarly females had a lower mean depression score of 4.99 ( $\pm 4.46$ ) compared to males whose mean score was 8.38 ( $\pm 6.85$ ). (Unpaired  $t = 2.684$ ,  $p = 0.009$ , significant).

It appeared that there was a gender difference in the usage pattern of mobile phones and resultantly there was higher sleep disturbance (of mild variety only) as well as a higher depression score (though of not of the clinical variety) among males.

**Table 4:** ANCOVA tests of Between-Subjects Effects for depression

Dependent Variable: Depression Score					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	808.093	5	161.619	8.116	.000
Intercept	25.475	1	25.475	1.279	.261
Age	13.729	1	13.729	.689	.409
Usage score	7.603	1	7.603	.382	.538
Stress score	18.496	1	18.496	.929	.338
Sleep disturbance score	471.115	1	471.115	23.657	.000
Sex	51.706	1	51.706	2.596	.111
Error	1712.646	86	19.914		
Total	5574.000	92			
Corrected Total	2520.739	91			

a R Squared = .321 (Adjusted R Squared = .281)

A multiple regression ANCOVA model predicted that the depression was a result of sleep deprivation and not mobile phone usage per se or even gender difference for that matter (Table 4).

## Discussion

The present cross-sectional study on 92 professional college students assessed the pattern of mobile phone use, psychosocial impacts and its

association with the former. Mobile phone usage pattern was associated with sleep disturbance and depression but not with stress. A Finnish cohort of young adults included stress, sleep disturbance as well as symptoms of depression and found that these variables had positive association with high usage of mobile phones. Their study design was better because it was prospective, which would have been a probable reason why the present study could not find stress to be an important variable. Stress is a dynamic state which keeps varying over time. Moreover their study also assessed association between the qualitative aspects of phone use with the variables. The study was also done on a bigger population taking 20000 as the sample size [5]. Present study had a small sample size of 100 students only.

A similar study conducted among 203 undergraduate medical students in Tamil Nadu (2016) assessed the effect of mobile phone usage on sleep disturbance, stress and their academic performance. It was observed that major proportion (72.4%) of the study participants had poor sleep quality which was much lower than the present study. Less than three-fourths (66.5%) had moderate stress where as 14.8% severe stress, similar to that of current study findings. A significant association of poor sleep quality with mobile phone usage ( $p < 0.01$ ) in favour for current study findings were also observed [9].

A study conducted among 362 South African University students, studied four main themes of mobile-phone-use-pattern, purchasing factors, reasons to use and behaviour related issues. Gender based analyses of the above themes were performed and both males and females were found to differ significantly in some areas of mobile phone use. While female respondents had lengthier conversations with their main purpose being to maintain social network, the male respondents made calls that were shorter, directed towards making, cancelling and confirming appointments. [4] A study conducted in Islamabad, Pakistan dealt with each aspect of mobile phone use and mainly the pattern of addiction. They found that these students were very high users and they also had a change in attitude when it came to speaking face to face. They preferred texting or phone calls [2]. Even though the number of male participants in current study was less, usage of mobile phones by males was found to be significantly higher than the females. However, their reasons for using mobile phone were not assessed in current study. Present study findings were consistent with a gender based



analysis study on University students in Ghana. They also found that the young adults used phones mostly to socialize than education or business related activities [10].

Numerous studies exploring the various aspects of mobile phone usage have been conducted in various regions. A study in United States of America in 2004 has focused on identifying the behavioral and psychological aspects of cell phones among college students in the United States. They tried to find the reasons behind adapting to a particular form of technology, mobiles in this context. These reasons according to them were necessity of modern times, cost efficiency, safety or security and dependency. They also laid emphasis on the behavioral and motivational characteristics of cell phones [11]. In 2008, Walsh et al found that it became habitual for the young adults in Australia to constantly check their phones for any messages or missed calls which could not be added to the frequency of phone use [12].

Evidences regarding influence of mobile phone use pattern on mental problems could not be retrieved much on extensive literature search. A Japanese study among 242 youth focused on internet addiction depending on the number hours of usage. Males were found to be more addicted than females. The diagnosis was made using Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Using Internet Addiction Test (IAT), an association was observed between self-esteem and internet addiction [13]. A study conducted in Tamil Nadu also assessed the academic performance of a group of 201 young adults. It focused on influence of mobile phones in parent child relationships [14].

Present study is restricted to psychosocial impacts of mobile phone usage among students. This had tried to illustrate negative impact of mobile phones in students. The positive effects of mobile phone use needs to be explored as well. Hence, current study alone cannot implicate that using mobile phones can have negative impact on students. The sample size in this study was small as a result of which it is not possible to generalize the findings to general population. Moreover, the small sample size did not permit inclusion of participants in all grades and majority of the participants were females.

The present study had not taken into consideration the individual factors that might have a relationship with sleep disturbance, depression and stress. Professional college students are predisposed to the hectic schedule of the course, which itself could have been a reason for developing

psychosocial problems. In that case, this study has not differentiated if the variables were due to the former or latter.

## Conclusion

Based on the findings in study, the usage pattern among medical students of the age group 19 to 23 years varied as 34.7% had low usage pattern, 43.4% medium usage and 21.7% high usage pattern. Among 92 study participants, 6.5% experienced mild stress, 63% moderate stress and 30.4% severe stress. It was observed that usage pattern of mobile phones did not have any impact on stress ( $p > 0.05$ ). More than three fourths (88%) had sound sleep, while 10.9% experienced mild sleep disturbance and 1.1% moderate sleep disturbance and usage of mobile phones. Study of depression among this group showed that 15.2% had no depression, 38% minimal while 25%, 12% and 9.8% experienced mild, moderate and moderately severe depression respectively. A significant association was found between depression and pattern of mobile phone usage.

Limiting the number of hours of using mobile phone is recommended through present study. Students can be advised to resort to educational benefits of mobiles. Stress was observed to be an incidental finding in this study. This implies the need to introduce meditation, counseling and orientation programs under effective guidance to deal with their student life even though that was not the purview of this study.

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## Internet Addiction among High School Students of Rural Area: A Descriptive Cross Sectional Study

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### Abstract

There is rapid growth in the usage of internet globally mainly in urban areas. Usage has been rising exponentially. In Asia around 50% of them use internet with rise in 1.7% between 2000-19. This study was conducted to explore the level of internet addiction among high school students of rural area *Methodology:* it's a cross sectional study conducted in the rural field practice of Dr BR Ambedkar medical College, Bangalore among high school students with the sample size of 206. Data was collected using pretested semi structured questionnaire and Young's internet addiction scale. Data was analysed for frequencies and percentages *Results:* Age group of study subjects ranged from 13-18 years of age. Maximum belonged to Hindu religion and were studying SSLC. Most common gadget used was laptop and purpose was for social networking. In our study only 0.5% had severe level of internet addiction and more than 90% were normal without internet addiction.

**Keywords:** Internet Addiction; Young's Scale; Addiction.

### Introduction

There is rapid growth in the usage of internet globally mainly in urban areas. Usage has been rising exponentially. In Asia around 50% of them use internet with rise in 1.7% between 2000-19 [1].

Addiction is a term used generally for substance use. Dr. Ivan Goldberg coined the term internet addiction for pathological compulsive internet use. Young linked excessive use of internet to pathological gambling. Various types of internet addiction described are cybersexual addiction, cyber relationship addiction, net-compulsions, information overload, and computer addiction [2,3].

With development in technology, number of

online access system like wi-fi & broadband have increased also the number of hours spent on internet usage by youths has also increased. Though internet access has provided widescale opportunities for collecting information excess undisciplined usage of internet has let to its addiction [4,5].

Internet addiction is said to be associated with psychiatric disorders like alcohol abuse, attention deficit and hyperactivity, depression, and anxiety. Increase in stress level in the curriculum is also said to the reason for increase in internet addiction among students [6].

Studies have shown that stress is experienced by all students but the amount of stress in high among medical and dental students [7,8,9].

Youngs internet addiction test is a widely used instrument for assessing internet addiction with good reliability. This study was conducted to understand the level of internet addiction among school students

### Methodology

A cross-sectional descriptive study was conducted in rural field practice area of department of Community Medicine, Dr BR Ambedkar Medical College Bangalore. The study was conducted for a period of two months between October and November 2017. All the areas under the purview of rural field practice area of Dr BR Ambedkar medical college were listed and one area was selected randomly. In the selected area all the schools were listed before initiating the study. Total students in high school were 250. All the students who were available during our study and consented to participate were included. Follow up visit was not done to include students who were not present during our visit. Total students included in our study was 206. Required data was collected using pretested semi structured questionnaire. Questionnaire had of two parts: part I: questions related to socio-demographic information and part 2: information related to internet use, and Young's internet addiction test scale was used to assess internet addiction. This scale has 20 items, with scoring for these items range from 20 to 100. Prior permission from head of the institutions was taken before initiating study. Data was entered in Microsoft excel and analysed for frequencies and percentages.

### Results

Table 1: Among 206 study subjects half of the subjects were in the age group of 13-15 years and half of them belong to age group of 16-18 years (47.1% and 51.9%). Though the number of males were more than females the difference was marginal i.e 53.8% and 45.2% of males and females respectively. More than 3/4th of study subjects belonged to Hindu religion and very few belonged to other religions like muslim and Christian which was around 3.4%. Around half of study subjects were studying in high school (59.6%) and about 1/3rd of them were in 1st and 2nd PUC (40.4%) respectively.

**Table 1:** Socio demographic characteristics of study subjects

Socio demographic characteristics		Number	Percentage
Age in years	13-15	98	47.1
	16-18	108	51.9
Gender	Male	94	45.2
	Female	112	53.8
Religion	Hindu	199	95.7
	Muslim	5	2.4
	Others	2	1.0
Year of study	SSLC	124	59.6
	1st PUC	37	17.8
	2nd PUC	45	21.6

Table 2: Among 206 study subjects more than 90% of them used internet for around less than or equal to 4 years and very few used it for more than 4 years (6.8%). Around 2/3rd of study subjects used internet before 15years of age and they were more among males compared to females (51.4% and 31.6%). Maximum of them used internet for less than 4 hours and very few for more than 5 hours per day (97.6% and 2.4%). Most common gadget used to assess internet in our study was laptop/desktop (83.5%) and very few (16.5%) used mobile phone/desktop/tab. Around 87.4% of them spent less than 300 rupees per month to have access to internet and very few spent more than 300 rupees per month (6.3%)

**Table 2:** Distribution of subjects according to pattern of internet use

Pattern of use		Male	Female	Total
Years of internet use	1-4	91	34.9%	192
		44.2%		93.2%
	5-8	3	11	14
		1.5%	5.3%	6.8%
Age of first use of internet	Not used at all	4	8	12
		1.9%	3.9%	5.8%
	9-15 years	106	65	171
51.4%		31.6%	83.0%	
16-19 years	10	13	23	
	4.8%	6.3%	11.2%	
Internet usage per day in hours	0- 4	90	111	201
		43.7%	53.9%	97.6%
	5-10	4	1	5
		1.9%	0.5%	2.4%
Gadget used to access internet	Desktop	0	9	9
		0.0%	4.4%	4.4%
	Laptop	86	86	172
		41.7%	41.7%	83.5%
	Mobile	7	5	12
3.4%		2.4%	5.8%	
Others	1	12	13	

Expense on internet use in rupees		0.5%	5.8%	6.3%
	<300	83 40.3%	97 47.1%	180 87.4%
	300- 600	9 4.4%	4 1.9%	13 6.3%

Table 3: Study subjects were assessed for purpose of internet use like social networking, email, entertainment, search engine etc. Among females internet was used most often for social networking, search engine, news and online shopping (51%, 48.1%, 47.6% and 46.6%) compared to other purposes like watching videos, games and music. Overall utilisation of internet for all the purposes was used often by females compared to males.

**Table 3:** Distribution according to the purpose of usage of internet

Purpose of use		Males	Females	Total
Social networking	Often	84 40.8%	105 51.0%	189 91.8%
	Rarely	10 4.9%	7 3.4%	17 8.3%
E-mail	Often	74 35.9%	87 42.2%	161 78.2%
	Rarely	20 9.7%	25 12.2 %	45 21.9%
Search engine	Often	86 41.7%	99 48.1%	185 89.8%
	Rarely	8 3.9%	4 6.3%	12 10.2%
Watching Videos	Often	73 35.4%	77 37.4%	150 72.8%
	Rarely	21 10.2%	35 17.0%	47 27.2%
Games	Often	72 35.0%	81 39.3%	153 74.3%
	Rarely	22 10.7%	31 15.1%	53 25.8%
News site	Often	85 41.3%	98 47.6%	183 88.8%
	Rarely	9 4.4%	14 6.8%	23 11.2%
Music	Often	70 34.0%	77 37.4%	147 71.4%
	Rarely	24 11.7%	33 17.0%	57 28.7%
Online shopping	Often	86 42.2%	95 46.6%	181 88.7%
	Rarely	8 3.9%	15 7.3%	23 11.1%

Table 4: Youngs internet addiction scale was used to assess the level of internet addiction among high school students. According to Youngs scale score of

0-30 points considered as normal level of internet usage, 31-49 as mild level of internet usage, 50-79 and 80-100 as moderate and severe dependence on internet respectively. In our study more than 3/4th of study subjects were under category of normal usage (97.1%) and very few belonged to mild/moderate category and severe dependence on internet respectively (2.4% and 0.5%).

**Table 4:** Grading of students according to young’s internet addiction test scale

IAT grading	Males N (%)	Females N (%)	Total N (%)
None/normal usage	91 44.2%	109 52.9%	200 97.1%
Mild/moderate	2 1.0%	3 1.5%	5 2.4%
Severe	1 0.5%	0 0.0%	1 0.5%

### Discussion

In our study the study subjects were in the age group of 13-18 years of age and proportion of male and female subjects were almost equal. maximum number of study subjects belonged to Hindu religion. Findings of our study were similar to the study done by Sowndarya T among school students of Mangaluru [10].

In present study maximum number of students used internet for less than 4 years and few for more than 4 years. While very few percentage of study subjects never used internet at al (5.8%), around 3/4th of them had access to internet before 15 years of age (83%). More than 90% of them used internet for about 4 hours and only around 2.4% used it for more than 4 hours per day. In our study variety of gadgets were used to access internet like laptop, mobile, desktop etc but the most common gadget used was laptop (83.5%). Around 2/3rd of them spent less than 300 rupees per month to access internet (87.4%) and very few spent more than that. Findings of our study in terms of years and hours of internet usage and expenditure per month was similar to findings of study in Davangere, Karnataka. The most common gadget used in there study was mobile phones and in our study it was laptop. Both the gadgets depict gadgets of personal use. Internet usage is more on personal gadgets/ used for personal use than the gadget which are used/shared among others.

The purpose of usage of internet usage mentioned in our study include Social networking, Email, Search engine, Watching Videos, Games,

News site, Music, Online shopping. Which included combination of social network, academic, entertainment but a study done in Davangere showed maximum utilized internet for social networking. Various studies across different parts of country have found male preponderance of internet addiction suggesting increasing access of internet to males compared to males but its not the same in our study [11].

### Conclusion

Number of study subjects with internet addiction were very low. This may be due to their location or freedom/accessibility/due to affordability to use internet itself.

*Conflict of interest:* NONE

*Source of support:* NIL

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## Determination of Real Leprosy Burden Through Epidemiological Validation Drive in Turbulant Areas of Gadchiroli District

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### Abstract

*Background and Aim:* More thrust is being given by the National Leprosy Eradication Programme (NLEP) of the Government to achieve the goal of leprosy elimination in the districts and blocks reported to be high endemic for leprosy in the country. Present study was done with an aim to determine current epidemiological situation in context of social-political disturbance and difficult geographical terrain of Gadchiroli district and to identify and assess factors and determinants for leprosy endemicity in Gadchiroli district. *Material and Methods:* The study was conducted during 2013-14 (April to June 2013) in 10 PHCs in 3 blocks of Gadchiroli district. As per the guidelines of EVD, average 5000 population per Primary Health Center (PHC), (total-50,000 population) was the target for the study in 10 PHCs. To reach these population 129 villages from 29 sub-centres under 10 PHCs in 3 blocks of the district were selected. The leprosy suspects were screened by experienced NLEP personnel and leprosy diagnosis was confirmed. *Results:* 44,650 (95.3%) people were examined out of 46,862 people enumerated of by the trained PHC staff under the guidance of NLEP staff. No significant difference was observed between the genders among the population examined. The block wise population examination ranges from 93.6% to 96.6% and highest was achieved in Aheri block. The mean NCDR was 31.4 per 100,000 populations in the 3 selected blocks of Gadchiroli district. Maximum NCDR (16.2) was reported from Etapalli block while lowest NCDR (54.4) was reported from Aheri block per 100,000 populations. *Conclusion:* The study concludes the imperative need for periodical validation of the leprosy burden in areas with uneven distribution of leprosy especially in difficult terrain and affected by socio-politically disturbance as revealed in the study.

**Keywords:** Geographical; Leprosy; Primary Health Center; Sub-center.

### Introduction

More thrust is being given by the National Leprosy Eradication Programme (NLEP) of the Government to achieve the goal of leprosy elimination in the districts and blocks reported to be high endemic for leprosy in the country. Gadchiroli district in Maharashtra state is known to be high endemic for leprosy since 2005. Despite consistent efforts, the epidemiological trends of leprosy in Gadchiroli district have shown uneven distribution of leprosy

burden. Therefore, it is difficult to ascertain the true epidemiological trend of new case detection due to several prevailing operational and socio-political factors [1-4].

More than 50% of the populations are tribal and the health indicators are below the state average. Moreover the coverage of basic health services including leprosy is relatively poor and many villages are located in remote areas which are inaccessible by public transport. The general health service delivery is very poor due to non-availability

of trained health staff and difficult terrains. The socio-political unrest (anti-establishment movement) and poor development resulted in economic backwardness in the district. Due to these operational constraints, large proportion of population living in difficult to reach area in Gadchiroli district remain neglected from health care services, especially leprosy control services. The uneven distribution of leprosy may be attributed to this operational fact [5,6].

Recent Epidemiological Validation Drive (EVDs) conducted under LEAP (Leprosy Elimination Action Programme, a strategic programme developed by ALERT-INDIA in 2004 to strengthen leprosy integration) in low and high endemic areas in Maharashtra state have revealed many fold hidden disease burden as compared to the data reported by the Government of Maharashtra.[7] Therefore, a joint study was planned in collaboration between ALERT-INDIA and NLEP, Maharashtra. Present study was performed with an objective to determine current epidemiological situation in context of social-political disturbance and difficult geographical terrain of Gadchiroli district and to identify and assess factors and determinants for leprosy endemicity (low/high endemic blocks and areas) in Gadchiroli district.

### *Location of Study*

The study was conducted during 2013-14 (April to June 2013) in 10 PHCs in 3 blocks of Gadchiroli district. The identified blocks in Gadchiroli districts fall under geographically difficult (forest) terrain indicating probably poor accessibility to health facility by the people affected by leprosy. These areas are worst affected by anti-establishment activities and poor socio-economic situation. One sub-centre, farthest from the head quarter of each PHCs was selected for the study.

### *Demographical, Social, Economical & Political Profile of Gadchiroli District*

Gadchiroli district was formed out of Chandrapur district on 26th August 1982 and is situated in the south eastern corner of Maharashtra, and is bounded by Chandrapur District to the west, Gondia District to the north, Chhattisgarh state to the east, and Andhra Pradesh state to the south and southwest.

According to 2011 census, Gadchiroli district has a population of 1,072,942 of which 89% are living in rural areas. Child population in the age 0-6 is 108,521 in rural areas of which males were 55,191

and females were 53,330. The child population comprises 11.47% of total rural population of Gadchiroli district.

The district is largely known by tribe community. Nearly 38% of population of ST is found in the district. Most of the area (85.76%) of district is occupied by the forest and therefore cultivable land is very less. The district is not industrially developed, and hence backward.

### *Social & Economical Profile*

As per Census 2011, literacy rate in rural areas of Gadchiroli district is 72.52 %. Gender wise, male and female literacy is 80.87 and 64.05 percent respectively. In total, 613,771 people were literate of which males and females were 344, 593 and 269,178 respectively. Tribal Community that resides in the district is 38.17%. The district is categorized as a tribal and undeveloped district and 80% of the land is covered with forest. The main profession of the people is farming. In 2006, the Ministry of Panchayati Raj named Gadchiroli one of the country's 250 most backward districts (out of a total of 640 districts in the country).

### *Political Profile*

Naxalites from the People's Liberation Guerrilla Army have taken shelter in the dense forests and hills of this district. Naxalism is highly prevalent in Gadchiroli district and subsequently has been highlighted as part of the Red Corridor, used to describe areas in India that are plagued by Naxalites who took shelter in the dense forest of this district.

### *Leprosy Situation In The Study Area Gadchiroli District (March 2013)*

Name of Block	Administrative units	Population	ANCDR / 100,000
1. Aheri	5 PHCs	126,934	16.33
2. Etapalli	3 PHCs	86,402	05.05
3. Bhamragad	3 PHCs	38,755	16.90
Gadchiroli district	12 blocks	1,087,765	76.06
Maharashtra state	35 districts	114,047,329	16.17
India (35 states)	35 States & UTs	1,230,126,686	10.78

### **Materials & Method**

As per the guidelines of EVD, average 5000 population per PHC, (total-50,000 population) was



the target for the study in 10 PHCs (Table 1). To reach this population 129 villages from 29 sub-centres under 10 PHCs in 3 blocks of the district were selected.

Ten study teams, one per PHC, comprising of one male and one female health workers from each selected PHCs were trained the NLEP staff. They were imparted training on basic facts about leprosy including suspicious signs and methodology of EVD, communication and examination skills.

A plan for EVD was prepared in concurrence with the respective health officials such as Assistant Director of Health Services (Leprosy), District Health Officer and Taluka Health Officer in Gadchiroli district. Official permission was obtained from the Joint Director of Health Services (Leprosy & TB), Govt. of Maharashtra, Pune to implement this project.

The survey team conducted active survey (physical screening to elicit leprosy suspicious signs). Dechalipetta PHC area in Aheri block was

omitted due to social disturbance during the EVD.

The leprosy suspects were screened by experienced NLEP personnel and leprosy diagnosis was confirmed. The data was analyzed using MS Excel version 2013. Further the data was analyzed based on the leprosy endemicity (low & high) of Gadchiroli district in Maharashtra.

### Results and Discussion

Total 46,862 (93.7%) out of 50,000 targeted population could be reached. 44,650 ninety five point three percentage of people were examined out of 46,862 people enumerated of by the trained PHC staff under the guidance of NLEP staff (Table 2).

No significant difference was observed between the genders among the population examined; however maximum coverage of examination was achieved among female adults as compared to male adults (Table 3 & 4 and Chart 1 & 2).

**Table 1:** Population targeted for EVD in selected blocks

Sr. No.	Block	No. of PHC	No. of Sub-centres	No. of Villages	No. of House holds	No. of
Population Targeted						
1	Etapalli	3	7	46	2370	15,000
2	Bhamragad	3	9	44	2660	15,000
3	Aheri	4	13	39	4024	20,000
	Total	10	29	129	9054	50,000

**Table 2:** Population coverage during EVD in selected blocks

Sr. No.	Block	No. of PHC	Population enumerated (%)	Population examined (%)	% of coverage
1	Etapalli	3	13741	12863	93.6
2	Bhamragad	3	14001	13311	95.1
3	Aheri	4	19120	18476	96.6
	Total	10	46862	44650	95.3

**Table 3:** Gender wise population enumerated during EVD in selected blocks

Sr. No.	Block	No. of PHC	Population enumerated (%)				Total	%
			Male adult	Female adult	Male child	Female child		
1	Etapalli	3	4561	4585	2320	2275	13741	29.3
2	Bhamragad	3	4773	4643	2285	2300	14001	29.8
3	Aheri	4	6728	6997	2757	2638	19120	40.9
	Total	10	16062 (34.2%)	16225 (34.7%)	7362 (15.7%)	7213 (15.4%)	46862	100

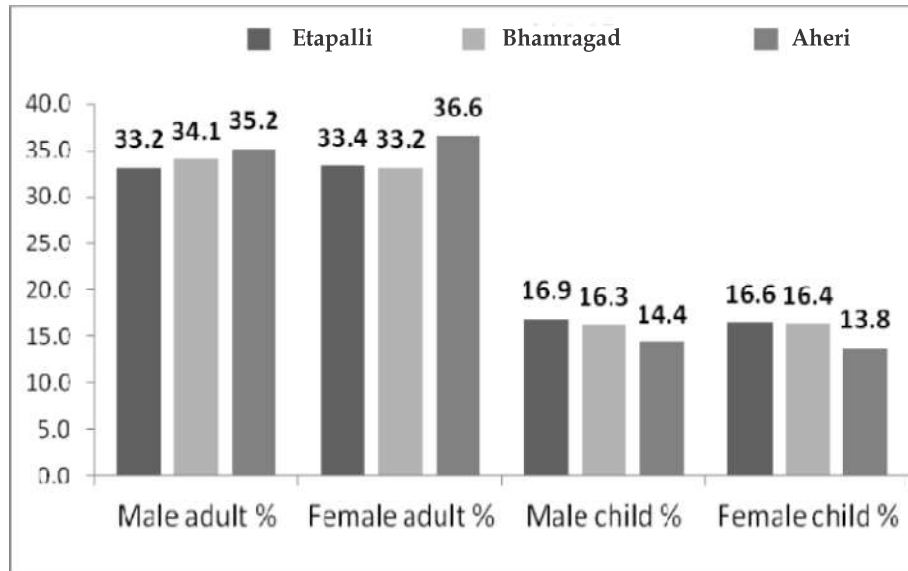


Chart 1: Gender wise proportion of population enumerated during EVD

Table 4: Gender wise population examined during EVD in selected blocks

Sr. No.	Block	No. of PHC	Population enumerated (%)				Total	%
			Male adult	Female adult	Male child	Female child		
1	Etapalli	3	4344	4278	2178	2063	12863	28.8
2	Bhamragad	3	4531	4454	2193	2133	13311	29.8
3	Aheri	4	6462	6796	2680	2538	18476	41.4
	Total	10	15337 (34.3%)	15528 (34.7%)	7051 (15.8%)	6734 (15.2%)	44650	100

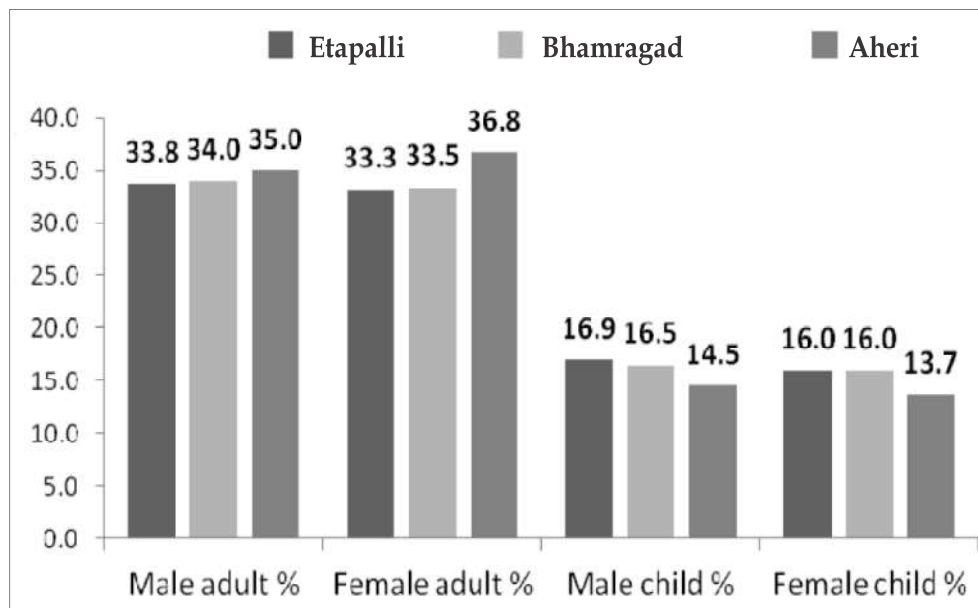
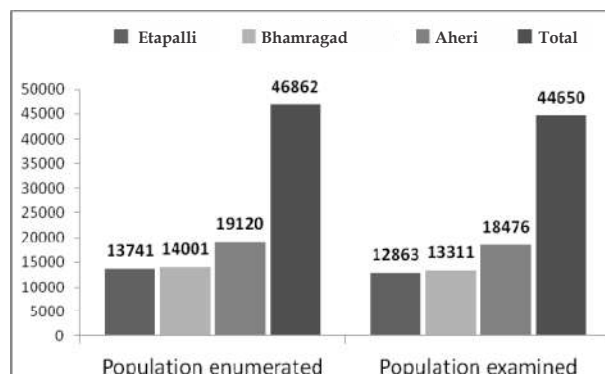
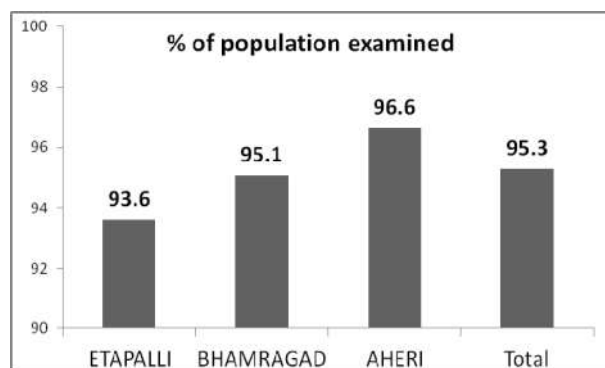


Chart 2: Gender wise proportion of population examined during EVD



**Chart 3:** Block wise population enumeration and examination during EVD



**Chart 4:** Proportion of population examined in selected blocks

The block wise population examination ranges from 93.6% to 96.6% and highest was achieved in Aheri block (Chart 3 & 4) and the lowest in Etapalli block due to difficult terrain.

One Hundred forty two (142) people with suspect signs of leprosy were identified and referred for confirmation of diagnosis by the trained NLEP staff

**Table 5:** New case detection during EVD in selected blocks

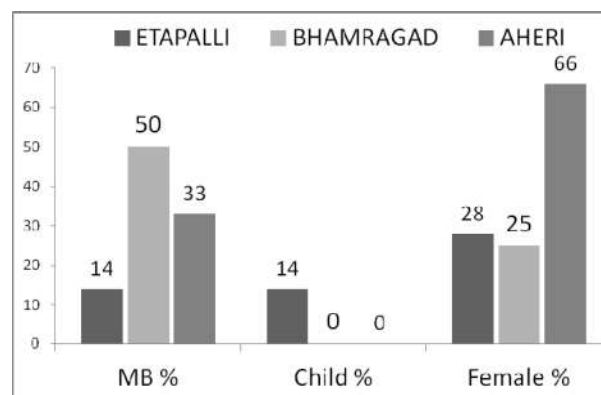
Sr. No.	Block	Population examined	Suspects referred	New cases detected	NCDR/1 lac population
1	Etapalli	12863	32	7	54.4
2	Bhamragad	13311	50	4	30.1
3	Aheri	18476	60	3	16.2
	<b>Total</b>	<b>44650</b>	<b>142</b>	<b>14</b>	<b>31.4</b>

**Table 6:** Indicators among new case detection during EVD in selected blocks

Sr.No.	Block	Population	New cases detected	Key indicators			
				MB (%)	Child (%)	Female (%)	Gr. II (%)
1	Etapalli	12863	7	1 (14%)	1 (14%)	2 (28%)	0 (0%)
2	Bhamragad	13311	4	2 (50%)	0 (0%)	1 (25%)	0 (0%)
3	Aheri	18476	3	1 (33%)	0 (0%)	2 (66%)	0 (0%)
	<b>Total</b>	<b>44650</b>	<b>14</b>	<b>4 (29%)</b>	<b>1 (7%)</b>	<b>5 (36%)</b>	<b>0 (0%)</b>

in the district. 14 (10%) out of 142 leprosy suspects from 8 (28%) out of 29 health sub centres were confirmed as new untreated leprosy cases. These 8 sub-centres were spread over 7 (70%) out of 10 PHCs. Three PHCs reported zero new cases. The mean NCDR was 31.4 per 100,000 population in the 3 selected blocks of Gadchiroli district. Maximum NCDR (16.2) was reported from Etapalli block while lowest NCDR (54.4) was reported from Aheri block per 100,000 population (Table 5).

However, the mean NCDR during study in 8 out of 29 sub-centres where new cases were detected was 108 which (range - 37.74 to 262.12 per one lack population). The proportion of MB among new cases detected was 28%, but none of the new cases detected had visible (grade II) disability. No child cases were reported from Bhamragad and Aheri block (Table 6 & Chart 5).



**Chart 5:** Proportion of indicators among new case detection

\* Grade II disability among new case detection was nil.

Nine (9) out (64%) of 14 new cases were male and

29% (4 out of 14) were MB cases. Proportion of MB cases was more among female cases (Table 7). 58% of cases were between 15 to 40 years of age (Table 8).

**Table 7:** Type of leprosy and gender distribution of new cases detected

Type of leprosy	Male	%	Female	%	Total	%
Paucibacillary (PB)	7	78	3	60	10	71
Multibacillary (MB)	2	22	2	40	4	29
Total	9	64	5	36	14	100

**Table 8:** Gender & age distribution of new cases detected

Gender	0 - 14	%	15 - 40	%	41 - 60	%	>60	%	Total	%
Male	0	0	6	75	2	67	1	50	9	64
Female	1	100	2	25	1	33	1	50	5	36
Total	1	7	8	58	3	21	2	14	14	100

**Table 9:** Education status & gender distribution of new cases detected

Education status	Male	%	Female	%	Total	%
Illiterate	4	44	4	80	8	57
Primary	1	12	1	20	2	14
Secondary	4	44	0	0	4	29
Graduate	0	0	0	0	0	0
Technical	0	0	0	0	0	0
Total	9	64	5	36	14	100

**Table 10:** Knowledge and awareness about leprosy

Response to questions	No (%)	Yes (%)	Total
Do you know what causes leprosy?	14 (100)	0 (0)	14
Do you know how leprosy spread?	14 (100)	0 (0)	14
Do you know what are the signs & symptoms of leprosy?	14 (100)	0 (0)	14

**Table 11:** Comparative NCDR - Average PHC NCDR vs NCDR during Study

Sr. No.	Block	PHC	New Case Detection during 2012-13*		New Case Detection during Study (EVD)**		Diff (%)
			New	ANCDR	EVD Cases	EVD NCDR	
1	Aheri	Mahagaon	12	18.07	1	20.99	16.2
2		Kamlapur	3	15.6	0	0	-100.0
3		Jimalgatta	3	23.09	1	22.23	-3.7
4		Perimili	1	10.44	1	22.21	112.7
<b>Block Total</b>	<b>19</b>	<b>16.33</b>					
5	Eatapally	Todasa	2	6.03	4	87.13	1344.9
6		Gatta	1	6.15	2	45.76	644.1
7		Kasanoor	1	3.36	1	25.63	662.8
<b>Block Total</b>	<b>4</b>	<b>5.05</b>					
8	Bhamaragad	Arewada	1	5.19	0	0	-100.0
9		Laheri	5	55.67	4	86.17	54.8
10		Mannerajaram	0	0	0	0	
	<b>Block Total</b>		<b>6</b>	<b>16.9</b>	<b>4</b>		

\*New Case Detection reported in entire PHC area and New Case Detection Rate calculated on PHC population.

\*\* New Case Detection during study in the covered population and New Case Detection Rate calculated on actually examined population during study.

However, among them 75% (6 out of 8) were male. 8 (57%) among 14 new cases were illiterate. The illiteracy among female was two fold more than in male (Female-80%, Male-44%). Proportion of females with above primary level education was zero against 44% in male.

It was observed that the awareness and knowledge about leprosy is very poor among the majority of new cases detected (Table 10). Basic scientific facts pertaining to cause, spread and signs & symptoms about leprosy were not known to any of the new case detected during the study.

The study revealed many fold high NCDR in area covered under study against average reported ANCDR of the PHC (Table 11). While four PHC area under study recorded difference of more than 100% against reported average NCDR of PHC, two PHCs showed 16% and 55% increase. The results of this study goes in line with earlier studies [1,2] EVD conducted in 8 PHCs/UHPs from 8 selected districts of Maharashtra by ALERT-INDIA, the average NCDR in urban areas was 3.5 and in rural areas were 17.9 per 10,000 population, while the reported NCDR of Maharashtra was 1.6 per 10,000 population as on March 2010. Similarly EVD conducted in 31 low endemic blocks revealed 8 times higher NCDR than reported [8,9,10].

The study further confirms that the leprosy case detection is affected by determinants like education & literacy, accessibility, in addition to prevailing socio-political factors in the area.

### Conclusion

The study concludes the imperative need for periodical validation of the leprosy burden in areas with uneven distribution of leprosy especially in difficult terrain and affected by socio-politically disturbance as revealed in the study.

This will emphasize the need to focus leprosy control measures uniformly and proposes to involve the GHC system effectively for new case detection and to strengthen the surveillance system during the integration phase. This study also reaffirms the feasibility and suitability of adopting EVD as reliable tool for estimation of disease burden of leprosy among the underserved population living in difficult terrains with a view to scale it up at the national level.

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## Method for Estimating of Perinatal Mortality Rate by Using Multiple Regression Approach for India

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### Abstract

Perinatal deaths are responsible for about 7% of the total global burden of disease. The present study was conducted in tertiary referral institute in Western Maharashtra, India, with a aim to study the frequency, classify the types and analyze the risk factors associated with perinatal mortality. Total number of perinatal mortality and analysis regarding maternal and fetal particulars, the mode of delivery, period of gestation, associated maternal risks, fetal parameters such as sex, birth weight, apgar score were recorded. The total number of births during the study period was 6460, with 249 perinatal mortalities accounting to perinatal mortality rate of 50.77 per 1000 live births, comprised of 260 still births and 169 early neonatal deaths. The corrected, extended and factual perinatal mortality rates accounted to 48.14, 66.40 and 19.19 per 1000, respectively. Perinatal mortality rates were highest in teenage group mothers, second gravidae, maternal anemia and preterm delivery group. The present study to estimates of perinatal mortality rate (PNMR) can be derived directly as well as indirectly. The direct estimates are usually based on the number of still deaths and Early deaths reported during the last one year per 1000 live births. The NFHS -4 report adopts this technique for providing the estimates. Indirectly estimates of dependent variable as perinatal mortality rate (PNMR) of region by multiple regression method involving still birth (SBR), and early neonatal mortality rates (ENMR) as independent variables.

**Keywords:** NFHS- National Health Family Survey; PNMR-Perinatal Mortality Rate; ENMR-Early Neonatal Mortality Rate; SBR-Still Birth Rate.

### Introduction

Perinatal deaths are responsible for about 7% of the total global burden of disease [1]. During the last four decades there has been a marked reduction in maternal & perinatal deaths in a developing country like ours. The perinatal mortality rate is the bed index of existing obstetrical and neonatal services especially with the decline of IMR to low level. The perinatal mortality rate has, in recent years assumed a greater significance as a reliable yardstick of maternal & child health care [2]. Firstly two types of death rates-still birth & deaths within

first week of life are combined, because factors responsible for these two types of deaths are often similar, being those operating before and around the time of birth. Secondly, proportion of death which occurs after birth are incorrectly registered as still births, therefore inflating still birth rate and lowering the neonatal death rate. However, perinatal mortality rate is not influenced by this error, by removing from consideration the dividing line between a still birth & an early neonatal death .

In India, Perinatal mortality has been a problem of serious dimensions. Mudliar & Reddy in 1924 attempted to study the causative factor. Krishna

Menon collected data from the Sample Registration System which provides fairly accurate data & established a figure of 78 per 1000 deliveries in the year 1960. It has shown a steady decline to current perinatal mortality rate of 26 per 1000 births [3].

The Present study to estimates of PNMR can be derived directly as well as indirectly. The direct estimates are usually based on the number of still births & early neo natal morality reported during the last one year per 1000 live births. The civil registration system as well as the SRS adopts this technique for providing the estimates. Besides, the following indirect methods are used in providing the estimates of PNMR.

1. Estimation of Perinatal Mortality from information on Children Ever Born and Children surviving.
2. Estimation of PNMR based on Multiple Regression Methods.
3. Estimation of PNMR from the Birth History of women.

The Second model is applied to obtain the estimates of PNMRs for total, Rural and Urban of India and relevant t test between presented PNMR data and Estimated PNMR Data.

*Objective*

1. To estimate PNMR (per 1000 live births) for three different component as Total, Urban,

Rural with the help of SBR & ENMR of India

2. To comparison between Estimated PNMR and Presented PNMR data with Respect to years.

**Material and Methods**

The proposed methodology of estimation is based on multiple regression approach described (Kumar 5 1981; Aryal and Gautam 4 2001). The methodology of estimation developed here follows the usual path of establishing the relationships between the dependent variable, which in this case is the PNMR and the independent variable as still birth rate and early neonatal birth rate. Several empirical studies show a linear relationship between PNMR and still birth rate (SBR) and early neonatal birth rate (ENMR). Therefore, it was decided to fit a regression model of type:

$$Y = A + B_1X_1 + B_2X_2 + e \dots \dots \dots (1)$$

Where, Y= PNMR (per 1000 live births); X<sub>1</sub>=Still birth rate (per 1000 live births) and X<sub>2</sub>= Early neonatal mortality rate (per 1000 live births) e is a random error term; and A is known as intercept, B<sub>1</sub> and B<sub>2</sub> are slopes which are parameters to be estimated. The next step is to determine the value of the parameters. For this purpose, the multiple regression model is fitted in by the following set of data extracted from NFHS fact sheets (2011-12), Census (2011).

**Results**

**Table 1:** Present data of PNMR, Still Birth and Early Neonatal Mortality Rate (ENMR) for India used for fitting the equation (1)

Year	PNMR (total)	Still Birth (total)	ENMR (total)	PNMR (rural)	Still Birth (rural)	ENMR (rural)	PNMR (urban)	Still Birth (urban)	ENMR (urban)
2004	35	10	21	39	10	22	23	8	16
2005	37	9	22	40	9	23	24	8	17
2006	37	9	20	41	9	22	24	8	16
2007	37	9	19	41	9	20	24	8	16
2008	35	8	18	39	9	19	22	7	15
2009	35	8	16	39	8	17	23	7	13

The table gives the following values of constants needed for estimating the parameters.

Intercept (a) for Total= 33.051	Intercept (a) for Urban=13.273	Intercept (a) for Rural = 40.256
Slope (B <sub>1</sub> ) for Total=-0.41	Slope (B <sub>1</sub> ) for Urban=-0.273	Slope (B <sub>1</sub> ) for Rural= 0.346
Slope (B <sub>2</sub> ) for Total=-0.564	Slope (B <sub>2</sub> ) for Urban= 1.864	Slope (B <sub>2</sub> ) for Rural=-0.865



Using these data, simple regression approach gives the following estimated regression model for computing PNMR for India as for Total and according to residences by SPSS 21.0 Version.

The results are given below

$$Y(\text{total}) = 33.051 + 0.41 X_1 - 0.564 X_2 + e \dots \dots \dots (1)$$

$$Y(\text{urban}) = 13.273 - 0.273 X_1 + 1.864 X_2 + e \dots \dots \dots (2)$$

$$Y(\text{rural}) = 40.256 + 0.346 X_1 - 0.865 X_2 + e \dots \dots \dots (3)$$

n=6, Adjusted. R<sup>2</sup>(total)= 47.4%, n=6, Adjusted R<sup>2</sup>(urban)=14.4%, n=6, Adjusted R<sup>2</sup>(Rural) =13.3%,

Where Y=Estimated PNMR (per 1000 live births), e= residual error

X<sub>1</sub> = Still Birth Rate (per 1000 live births),

X<sub>2</sub> = Early Neonatal Mortality Rate (per 1000 live births)

Where n is denoted no of year wise presented data of PNMR, SBR & ENMR). The coefficient of determination Adjusted (R<sup>2</sup>) is computed for goodness of fit. The value of coefficient of determination for total = 47.7% is very high which indicates the variation in Perinatal Mortality rate as 48% approx variation due to cause by still birth and early neonatal mortality rate of India (total). The value of coefficient of determination for Rural India = 13.3% is very low which indicates the variation in Perinatal Mortality rate as 14 % approx variation due to cause by still birth and early neonatal mortality rate of India of residence in rural. The value of coefficient of determination for India (urban) = 14.4% is very low which indicates the variation in Perinatal Mortality rate as 15 % approx variation due to cause by still birth and early neonatal mortality rate of India (urban). The variation in PNMR amongst the periods appears to explained by the variation in the ENMR and still birth rate.

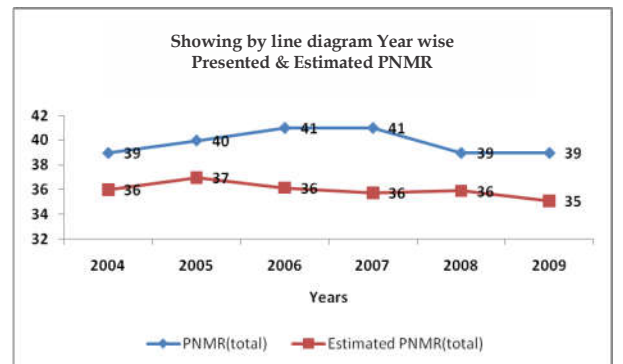
Similarly, the smaller value of computed Standard Error (SE) (Y) for total =0.78 indicates the higher reliable of the model. The goodness of fit of a regression model is mostly affected by the estimates values of the parameters. Similarly, the estimated parameters may be considered significant as they satisfied the t test. For the India (total) PNMR difference between estimated and presented PNMR for India (total), the parameter A, B<sub>1</sub> and B<sub>2</sub> to be considered. Significant as the t test

= 9.58 between estimated and presented PNMR for India (total) which has p<.001 highly statistically significant. This is also find for the constant parameter in all two different situation as Urban and Rural prediction of PNMR. The calculated F ratio is statistically significant only in prediction of India (total). Finally we can say the regression model for PNMR is best model for prediction of PNMR in India (total).

The presence of autocorrelation is a serious problem and therefore, D-W test is computed for detection of autocorrelation. The results of D-W test clearly show absence of autocorrelation in the residuals because the first order autocorrelation coefficient is very small and the condition : du < d < 4- du is well satisfied for total of India.

**Table 2:** Representing current & Estimated PNMR (Perinatal Mortality Rate) for Total, Urban and Rural for India

Years	Y (IMR) Total	Est. IMR (total)	Y (IMR) Rural	Est. IMR (Rural)	Y (IMR) Urban	Est. IMR (U)
2004	39	36	39	39	23	24
2005	40	37	40	41	24	24
2006	41	36	41	40	24	24
2007	41	36	41	40	24	24
2008	39	36	39	39	22	22
2009	39	35	39	39	23	23



**Fig. 1:** Comparison of Presented IMR (Total) and Estimated IMR (Total) according to Years

This figure 1 shows comparisons between Estimated PNMR (Total) and Presented PNMR (total) data of India with respect to year wise. It shows that current Perinatal Mortality Rates line is gradually increased in year 2009. Over all current PNMR data are high than estimated PNMR data with respect to years. What will behind the reason will be discuss in discussion.

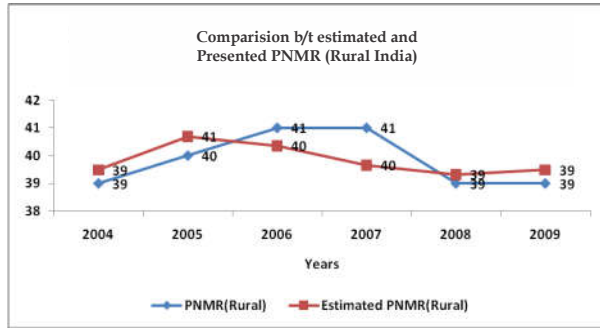


Fig. 2: Comparison between Estimated PNMR and Presented PNMR for Rural of India according to Years

This figure 2 shows comparisons between Estimated PNMR (Rural) and Presented PNMR (Rural) data with year wise. It shows that overall presented PNMR line is gradually decreasing and overlap in year 2008. Before that from 2004 to 2007 it has increased. But finally recent scene in year 2009 both line estimated PNMR and Presented PNMR for Rural are collapsed or touch to each other.

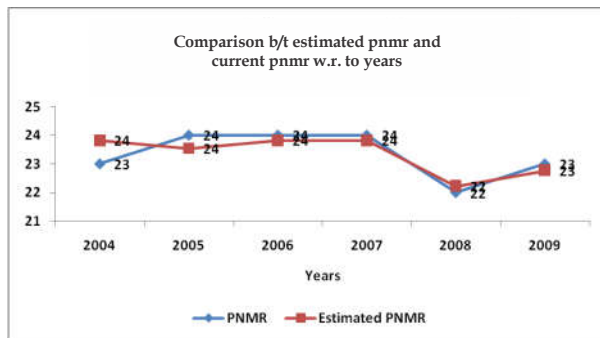


Fig. 3: Comparison between Estimated PNMR and Presented PNMR for Urban of India according to Years

This figure 3 shows comparisons between Estimated PNMR (Urban) and Presented PNMR (Urban) data with year wise. It shows that both line is gradually decreasing over all and overlap in year 2009. There is no big gap presented data of PNMR than Estimated PNMR Data which was good sign at that time. But in recent scenario year 2009 line of Presented IMR for Urban are touch to each other.

Table 3: Representing all statistical Analysis which are done by SPSS 21.0 Version

Test for Model Adequacy	Results
1. Tests for Goodness of Fit:	For
1. Based on Coefficient of determination Adjusted R2 (%), n=6	Total=14.1%,Urban=47.7%, Rural=13.3%
2. Test of Significance	$t_{total}$ (for PNMR)=-9.55 (p<0.01 highly significant),
1. Based on t test	$t_{rural}$ =-0.542 (p>.05 not significant),

2. Based on ANOVA and F ratio	$t_{urban}$ =-1.00 (p>0.05 not significant)
3. P value	
4. D-W test for Autocorrelation	$F_{total}$ = 4.819 (p<0.01 highly significant),
D statistic	$R_{rural}$ =3.442 (p>0.05 not significant),
*for Total, **for Rural, ***for Urban	$F_{urban}$ =8.495 (p>0.05 not significant)
	D***= 1.621, D**= 0.821. D*= 0.743

### Discussion

The perinatal mortality rate in the present study is 50.77% and is comparable to the statistics presented by other studies conducted in India [5,6,7]. The current perinatal mortality rate (PMR) of India (2013) is 26 per 1000 births [3]. It ranges from 16 per 1000 births in urban areas to 28 per 1000 births in rural areas. As with NMR, the PMR is not uniform across the country – the PMR of Kerala is only 9 per 1000 births, whereas that of Odisha is 35 per 1000 births [3]. The stillbirth rate (SBR) is estimated at four per 1000 births [3]. The estimated values of both SBR and PMR are likely to be underestimates, as stillbirths are extremely difficult to capture and may be misclassified [3,7]. This may explain the higher mortality rates encountered in our study as compared to national statistics. These figures reflect a need to upgrade the socio-economic conditions, literacy, healthcare awareness and primary health facilities in the country. Higher perinatal mortality in teenage and elderly group corresponds to higher incidence of anemia, malnutrition, cephalopelvic disproportion in younger mothers and more chances of toxemia in the elderly group. Perinatal mortality was higher in unregistered pregnancies and preterm births. Maternal anemia was the most common and preventable disorder complicating pregnancy and leading to adverse consequences, whereas birth asphyxia and RDS were the most common risks amongst the fetuses. Out of the 62 babies undergoing autopsy, 27 (43.54%) were analyzed with intracranial hemorrhage followed next by Meconium aspiration. (n=17, 27.41%). Major global causes of perinatal mortality are asphyxia at birth, low birth weight, and prematurity. Low-cost interventions, including training in neonatal resuscitation [8] and kangaroo-(skin-to-skin) care, [9] may effectively reduce deaths from these causes; it has been estimated that introducing these interventions as a package might decrease perinatal deaths by 50% or more [10,11]. It is important to note that perinatal deaths had some preventable

factor, emphasizing the need for universal and early ANC registration, follow up and better health care provision to pregnant and laboring mothers.

### Conclusion

The advantages of the indirect techniques in mortality estimates cannot be Overemphasized in developing country India. The proposed model is very simple and easy to apply; does not need census or survey data and model life tables for estimation of PNMR; and gives approximately reliable estimates of India. The results is indicates that the model is fit in total it means that we can predict or best estimation of PNMR in India (total) with respect to SBR & ENMR in previous 06 years. The model seems to provide comparatively better estimates for more recent periods than for the distant past. However, the model seems to be affected by accuracy of data and age structure of the population under study. Conclusively, the model may be considered suitable for estimating PNMR for India residence wise in from year 2010 up to 2019 .

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## Tuberculosis Trends Over A Five-Year Period at A Tertiary Care Hospital in Mangaluru, Karnataka

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### Abstract

**Background:** Tuberculosis is a major global public health problem. In 2017, 10 million people fell ill with TB, while 1.6 million died from the disease which included 0.3 million people with HIV and 230 000 children. India is the country with the highest burden and accounted for 27 per cent of the total cases. Although tuberculosis mainly affects the lungs, it may also involve many other sites i.e. lymph nodes, pleura, bones etc. called as extra-pulmonary tuberculosis (EPTB); and its prevalence in developing countries like India, ranges from 15- 20%; which goes further high if the patient is co-infected with HIV or has other co-morbidities like diabetes mellitus, malnutrition etc. **Objective:** To determine the prevalence of PTB and EPTB among admitted cases, study their clinical and demographic profiles and determine various risk factors associated with EPTB. **Methods:** A record-based observational study was undertaken to determine the demographic and clinical profile and associated risk factors, of all TB cases who were admitted to a tertiary care hospital, over a period of five years, and included all cases of EPTB and PTB. **Results:** The study comprised of 651 cases, which included 479 (73.6%) males and 173 (26.4%) females. Majority (26.6%) of cases belonged to the age group of > 60 yrs. Rural patients accounted for 55.5% of the cases. Out of 651 cases, 372 (57.1%) had PTB, while 279 (42.8%) had EPTB. Pleura was the commonest site involved (58.7%), followed by lymph node (37.9%) and abdominal cavity (6.8%). Further, 12.5% patients had COPD, 9.5% had Diabetes mellitus, 2.4% had HIV, and 3.9% had MDR TB. **Conclusion:** Extra-pulmonary TB accounts for a significant proportion of TB cases, though, due to its variable clinical picture and low index of suspicion on part of clinicians, it's often under-diagnosed. Therefore studies are required to determine the actual burden of pulmonary and extra pulmonary cases of tuberculosis in the community .

**Keywords:** PTB; EPTB; HIV; Diabetes; Tertiary Care Hospital; Pleura; Lymph Nodes.

### Introduction

Tuberculosis (TB) is one of the top 10 causes of death worldwide. In 2017, 10 million people fell ill with TB, while 1.6 million died from the disease which included 0.3 million people with HIV and 230 000 children [1]. There were cases in all countries and in all age groups, but overall 90% were adults (aged  $\geq$  15 years), and two thirds

were in eight countries: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). Further, there were 558 000 new cases with resistance to rifampicin - the most effective first-line drug, of which - 82% had MDR-TB. Funding for the provision of TB prevention, diagnostic and treatment services has more than doubled since 2006 but continues to fall short of what is needed [2]. The amount available each year has been in

the range US\$ 6–7 billion since 2014, but US\$ 10.4 billion is required, leaving a gap of US\$ 3.5 billion. Without an increase in funding, the annual gap will widen to US\$ 5.4 billion in 2020 and to at least US\$ 6.1 billion in 2022 [3].

India is the country with the highest burden of TB and accounted for 27 per cent of the 10 million people who developed tuberculosis in 2017, the highest among the top 30 high TB burden countries in the world [4]. What's worse for India is that it was home to almost half of the world's cases which were resistant to TB drugs at 24% followed by China 13% and Russia 10%. Further, India accounted for 32 per cent of global TB deaths among HIV-negative people, and for 27 per cent of the combined total TB deaths in HIV-negative and HIV-positive people.

Although tuberculosis primarily affects the lungs (Pulmonary Tuberculosis; PTB), it may involve many other sites i.e. Lymph nodes, pleura, bones, central nervous system, skin, gastrointestinal tract etc. and is called Extra-pulmonary tuberculosis (EPTB). EPTB is also a significant health problem all over the world and its prevalence in developed countries ranges from 12 to 28.5%, while in developing countries like India, it ranges from 15–20%; which goes further high if the patient is co-infected with HIV or has other co-morbidities like diabetes mellitus, malnutrition etc. [6]. This may perhaps be attributed to declining immunity status of host being a major risk factor of EPTB. Besides, there is extensive literature available on PTB, very limited studies have been undertaken to determine the relative contributions of extra-pulmonary disease to the total burden of TB in India.

In the backdrop of above, present study has been conceived to evaluate the incidence of EPTB cases among all tuberculosis patients admitted to a tertiary care hospital, assess their clinical and demographic profiles and determine various risk factors associated with PTB/ EPTB.

#### *Aims & Objective*

1. To determine the prevalence of PTB and EPTB cases among study subjects.
2. To study their clinical and demographic profiles and determine various risk factors associated with EPTB.

#### **Materials And Methods**

A record-based observational study was undertaken to determine the demographic and

clinical profile of all TB cases who were admitted from 01 January 2013 to 31 December 2017 to the teaching hospital of AJIMS & RC, Mangalore, Karnataka. The Study included microbiologically confirmed as well as clinically confirmed cases of EPTB and PTB, with or without other co-infections or co-morbidities and were on anti-tubercular drugs. Patients having other disorders such as lung abscess, COPD, bronchial asthma, lung carcinoma and intestinal lung disease etc. were excluded from the study. A total of 651 patients were included in the study. Details of the patient were retrieved from the medical records department (MRD) of the hospital and were subsequently analyzed. The study was carried out over a period of three month - from 01May to 31 July 2018.

#### *Statistical Analysis*

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Chi-square test was used as test of significance for qualitative data. p-value of < 0.05 was considered significant.

#### **Results**

A total of 651 cases were included in the study. Out of these 479 (73.6%) were males while remaining 173 (26.4%) were females. The age of the patients ranged from 5 to 70 years plus, with a mean age of 49.5 years. Majority (26.6%) of cases belonged to the age group of > 60 yrs, followed by 41-50 years (21.3%), 51-60 years (18.7%) while least number of cases were found in the age group of < 10 years. Rural patients accounted for 55.5% of the cases while remaining 44.5% were urban patients. Further, out of these 651 cases, 372 (57.1%) were having PTB, while 279 (42.8%) cases were of EPTB. (Table 1).

Figure 1 depicts an analysis of admission rate from the year 2013 to 2017 and it brings out a declining trend in the number of admissions with each successive year i.e. There were 302 (46.4%) admissions in 2013, followed by 182 (28.0%) admissions in 2014, 73 (11.2%) admissions in 2015 while there were only 47 (07.20%) admissions in 2016 and 2017 each.

Table 2 represents the common sites of EPTB among male and female patients, and brings out pleura as the commonest organ involved (58.7%), followed by lymph node (37.9%), abdominal cavity (6.8%) Genitourinary system (4.6%), and Central

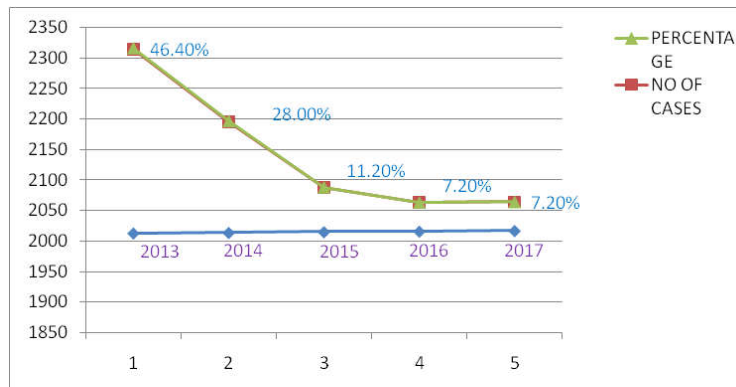
Nervous System (1.0 %). All the EPTB sites showed higher involvement among female patients. High prevalence of extra-pulmonary cases among study subjects could be attributed to irregular treatment compliance, poor nutrition, addictions and various co-infection and other systemic illnesses.

Table 3, brings out categories (I/II) of various cases under study and their association with co-morbidities. The study reveals that majority of

the patients i.e. 523 (80.3) belonged to category I (newcases), while remaining 128 (19.6%) cases belonged to category II. Further, 137 (21.0%) patients were also found to be having co-morbidities i.e. 82 (12.5%) had COPD, 62 (9.5%) had Diabetes mellitus, 16 (2.4 %) had HIV, 26 (3.9%) had MDR TB; while 46 (7.0%) patients had other co-morbidities. The prevalence of EPTB was also found to be significantly higher among smokers and alcoholics (p value - 0.0423 and 0.045 respectively).

**Table 1:** Prevalence of PTB & EPTB in accordance with demographic characteristics of study subjects (n=651)

Age	PTB (n=372)		EPTB (n=279)		p-value
	Frequency	Percentage	Frequency	Percentage	
<10yrs	3	0.80	1	0.35	0.847
10-20	19	05.10	12	4.30	
21-30	45	12.09	27	9.67	
31-40	61	16.39	46	16.48	
41-50	78	20.96	62	22.22	
51-60	69	18.54	55	19.71	
Above 61	97	20.07	76	27.24	
Gender					0.0518
Males	263	70.69	216	77.41	
Females	109	29.30	63	22.58	
Place of Residence					0.186
Rural	198	53.22	163	58.42	
Urban	174	46.77	116	41.57	



**Fig. 1:** Yearly trends of admission of TB cases (n=651)

**Table 2:** Common sites of extra-pulmonary tuberculosis (EPTB) among study subjects (n=279)

Site of EPTB*	Male (n=205)		Female (n=74)		Total (n=279)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Pleural	107	52.1	57	77.2	164	58.78
Lymph Nodes	73	35.6	33	44.5	106	37.99
Abdominal Cavity	11	5.3	8	10.8	19	6.8
Genito-Urinary system	06	2.9	7	9.4	13	4.6
CNS	02	0.9	1	1.3	3	1.0
Others	07	3.4	5	6.7	12	4.3

**Table 3:** Category of patients and associated co-morbidities (n =651)

Variable	EPTB (n=279)		PTB Total (n=372)		Total (n=651)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<b>Category of patient (n=651)</b>						
I	231	82.7	292	78.4	523	80.3
II	48	17.3	80	21.6	128	19.6
Majority of the patients belonged to category I, in both the groups i.e. PTB as well as EPTB.						
<b>Co-Morbidities*</b>						
Diabetes	37	13.2	25	6.7	62	9.5
HIV	11	3.9	5	1.3	16	2.4
MDR	19	6.8	7	1.8	26	3.9
COPD	19	6.8	63	9.9	82	12.5
Others	19	6.8	27	7.2	46	7.0
* Multiple responses						
<b>Addictions</b>						
Smokers #	127	45.5	119	31.9	246	37.7
Alcohol ##	103	36.9	88	23.6	191	29.3
# p value 0.0423## p value 0.045						

## Discussion

Although tuberculosis primarily affects the lungs (PTB), it may have various other manifestations and can affect many extra pulmonary sites in the body, such as pleura, lymph nodes, central nervous system, bones, and gastrointestinal tract etc. (EPTB). Present study was aimed at understanding the clinical as well as epidemiological characteristics of EPTB in comparison with PTB among admitted patients in a tertiary care hospital. The percentage of patients with EPTB in tertiary care centres in India was between 30% and 53%, while the percentage estimated by the national control program in India for HIV-negative adults is between 15% and 20% [6].

In present study majority (73.6%) of the patients were male and majority (26.6%) of them belonged to the age group of > 60 yrs. As observed in present study, there were more cases (55.5%) from rural areas as compared to urban area, but this difference did not bring out any significant association ( $p > 0.186$ ) between PTB and EPTB. The comparison of EPTB and PTB according to age was also analysed, but it was not found to be statistically significant ( $p > 0.847$ ). The study also brings out a higher prevalence of EPTB among males (77.4%) as compared to females (22.5%), but this difference too was not found to be statistically significant ( $p = 0.051$ ). Similar findings have been reported by Prakasha S.R., et al., (41.6%), Gaur PS, et al., (45.6%), Gaifer Z. (37%) and Abu Khattab, et al.,

(53.6%) in their studies from various tertiary care centres across India and abroad [6-9]. However a referral bias in such cases cannot be ruled out as many cases are referred to tertiary care centres for confirmation of diagnosis.

Present study brought out a declining trend in admissions of TB cases with every successive year i.e. from 302 admissions in 2013 to 47 admissions in 2017. Similar results have been reported by Varun Kumar, et al., in their study in Delhi who found a consistent decline from 89 cases to 50 cases over a period of six years from 2007 to 2012 [10]. The decline in admission rate from 2013 to 2017, may be attributed to improved care under DOTS component of RNTCP during the study period.

Studies have brought out that the sites of EPTB may vary according to population groups and geographical locations [11-14]. The most common site for EPTB in our study was found to be pleura (58.7%), followed by lymph node (37.9%). Similar findings have been brought out by Gaur P.S., et al., who reported pleural tuberculosis as the most common (54.7%) presentation of EPTB in their study followed by lymph nodes (34.9%), genitourinary, abdominal and CNS TB respectively [8]. Chander V., et al., in their study from Shimla also reported pleural TB as the most common site of EPTB (61.6%), followed by lymph node (23.2%) and abdominal TB (9.3%). [15]

Many other researchers have found pleura and lymph nodes as the commonest sites for EPTB. However, Prakash S.R., et al., in their study in south India reported involvement of lymph nodes



as the commonest manifestation among less than 14 years' age group (58.7%), while involvement of pleura was found to be more common among > 65 years' age group (45.1%) [16].

A relatively higher proportion of EPTB cases were observed among diabetics, accounting for 13.2% of the patients, followed by COPD (6.8%) and HIV (3.9%) cases. Similar findings have also been observed by Prakasha S.R., et al., in their study from Lucknow, who reported 16.7% diabetics and 8.0% HIV positive among EPTB Cases. 6 Houda Ben Ayed, et al., in their review article have cited HIV infection as the greatest risk factor for the development of EPTB in persons with latent TB, and the risk of TB progression has been estimated to be 10% higher who are not receiving treatment for HIV. 17 It has also been brought out that younger age, female sex and non-white race are at a higher risk for EPTB and several host genes- TLR 2 genotype and T597C have been found to be associated with TB meningitis and increased severity of neurologic symptoms [18-19].

#### Limitations

The present study had limitations which are inherent to any hospital record based studies. The study was restricted to only those patients who were hospitalised during the study period and included a large number of patients who were referred from private health care providers and other health delivery care centres, and represented only a small proportion patients with PTB/EPTB in the community. Therefore the results of our study, may not be generalized.

#### Conclusion

Despite the availability of a cure and knowledge on prevention of transmission, EPTB remains an important public health problem of the world. In developing countries like India EPTB is given lesser attention by the National TB Control Program (RNTCP) than PTB, though its identification is equally important for elimination of TB. The diagnosis of EPTB poses further challenges due to its diversity of symptoms, low level of suspicion on part of clinicians, and difficulty in obtaining an adequate sample for confirmation of disease. Needless to say, that identifying the EPTB determinants and the patients at higher risk of EPTB, is the need of the hour, if the goal of global TB eradication by 2050 is to be achieved.

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*Conflict of interest:* None

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### Corporate (collective) author

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