

## AN EPIDEMIOLOGICAL STUDY OF TUBERCULOSIS IN FOOTHILLS OF UTTARAKHAND.

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**ABSTRACT: INTRODUCTION:** The international tuberculosis situation is complicated by the growing impression that tuberculosis is no longer a major public health problem'. Zaki MH in 1968 had short listed the following factors: chronicity, ability of bacilli to stay alive in body for years, increase in life expectancy, high level of endemicity in ethnic groups even in the midst of affluence in the western world, the frequent occurrences of isolated epidemics in certain parts of the world and the emergence of MDRTB. The 1990 World Health Organization (WHO) report on the Global Burden of Disease ranked TB as the seventh most morbidity-causing disease in the world and expected it to continue in the same position up to 2020 [2]. **MATERIAL & METHODS:** The present study was conducted among all the families registered with the Rural & Urban Health Training Centers (RHTC & UHTC) under the jurisdiction of Field practice areas of the Department of Community Medicine, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand. It was Community based survey, Cross-sectional (Observational) study. Entire study population (10 years & above) with 100% enumeration (census) of households. House to house survey was conducted on all the families registered with the Rural & Urban Health Training Centers (RHTC & UHTC) under the jurisdiction of Field practice areas of the Department of Community Medicine, Himalayan Institute of Medical Sciences, and socio-demographic profile of each house-hold was recorded. **RESULTS:** It can be observed from the table that a total of 399(1.68%) symptomatic were screened out of a total study population of 23,618 from 10 different peri-urban field practice locations; 73(0.30%) symptomatics turned out to be cases of Tuberculosis confirmed either as sputum positive cases by Microscopy or by other criteria. It is evident that overall (mean) prevalence of the disease was 3.09 per 1000 study population; notably, the prevalence was as high as 16.17/1000 population at Khatta & Dorbassi followed by 13.04/1000 population at Doiwala. Age-wise distribution of Pulmonary Tuberculosis and statistical association of its prevalence with age. It can be observed from the above table that prevalence of Pulmonary Tuberculosis was found to be directly proportional to client's advancing age. Highest prevalence i.e 14.79/ 1000 was in 70 years & above age group, followed by 9.52/1000 in the age group of 60-70 years, 5.92/1000 in the age group of 40-50 years and 5.82/1000 in the age group of 50-60 years; the least prevalence i.e 1.48 / 1000 was found in the age group of 10- 20 years. This difference in prevalence of pulmonary tuberculosis

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in terms of age group was statistically significant. **CONCLUSION:** We conclude that present day epidemiology of tuberculosis in India have not yet been fully elucidated, a considerable amount of information, of varying degrees of reliability and accuracy, has accumulated during the course of the last 30 or 40 years enabling us to see at least the outlines of the problem and furnishing the basis for future action.

**KEYWORDS:** Pulmonary Tuberculosis, prevalence, Uttarakhand, sociodemography.

**INTRODUCTION:** The international tuberculosis situation is complicated by the growing impression that tuberculosis is no longer a major public health problem'. Zaki MH in 1968 had short listed the following factors: chronicity, ability of bacilli to stay alive in body for years, increase in life expectancy, high level of endemicity in ethnic groups even in the midst of affluence in the western world, the frequent occurrences of isolated epidemics in certain parts of the world and the emergence of MDRTB. The 1990 World Health Organization (WHO) report on the Global Burden of Disease ranked TB as the seventh most morbidity-causing disease in the world and expected it to continue in the same position up to 2020 [2]. That the Tuberculosis situation in an area, community or country is the product of the 'Disease Triangle' comprising bacillus, host and environment is universally accepted. It is equally well established that these factors vary considerably from one country to another and from area to area in a country [10]. Unlike western countries, where a more or less efficient notification system has existed for a long time, India has been lacking in even approximate data about the prevalence and incidence of tuberculosis infection and disease as well as mortality rates. Although the relevant facts regarding the present day epidemiology of tuberculosis in India have not yet been fully elucidated a considerable amount of information, of varying degrees of reliability and accuracy, has accumulated during the course of the last 30 or 40 years enabling us to see at least the outlines of the problem and furnishing the basis for future action [11]. India is classified along with the sub-Saharan African countries to be among those with a high burden and the least prospects of a favorable time trend of the disease. The average prevalence of all forms of tuberculosis in India is estimated to be 5.05 per thousand, prevalence of smear positive cases 2.27 per thousand and average annual incidence of smear positive cases at 84 per 100,000 annually [9]. The available circumstantial evidence in India points towards a long history of many tuberculosis epidemics; tuberculosis was, is and may remain a dilemma in the future [12]. The national ARTI was estimated at 1.5% i.e. 75 new smear positive pulmonary TB cases are expected per 100,000 population annually [13]. Significantly, with atypical parameters like geotopographical / disadvantaged population living in periurban habitat/slums having varying socio-epidemiological predictors, the study of epidemiology of pulmonary tuberculosis is most likely to provide new insight. In view of rapidly changing and evolving evidence base in terms of epidemiological parameters and determinants of Pulmonary Tuberculosis in various settings, the present study has been designed to elicit and validate presumed epidemiological correlates and variables affecting Pulmonary Tuberculosis among field practice areas population of HIMS.

**AIMS AND OBJECTIVES:** To find out the prevalence of pulmonary tuberculosis among population aged 10 years and above. To determine the various socio-epidemiological correlates of pulmonary tuberculosis.

**MATERIAL & METHODS:** Study Population: All persons 10 years of age & above (17,952 ) belonging to the families registered with the Rural & Urban Health Training Centres under the

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jurisdiction of Field Practice areas of the Department of Community Medicine, HIMS, Dehradun were included as study population.

**TYPE OF STUDY:** Community based survey, Cross-sectional (Observational) study.

**STUDY AREA:** Universe of the Study comprised all the families registered with the Rural & Urban Health Training Centers under the jurisdiction of Field practice areas of the Department of Community Medicine, Himalayan Institute of Medical Sciences, and HIHT. Out of a total population of 23,618, population from across the catchments of Rural Health Training Centre (RHTC) i.e Rajeev Nagar, Teliwala, Khatta & Dor Bassi, Dharmuchak, Kurkawala, Keshavpuri, Gesharpuri & Doiwala was 12,588. Rest of the universe of the study was made up by a population of 11,030 from the catchments of Urban Health Training Centre (UHTC) i.e Chandreshwar Nagar and Shisamjhari, Rishikesh

**DURATION OF STUDY:** The period of the study was one (01) Year beginning from 19.05.2008 to 20.05.2009

**SAMPLE SIZE:** Entire study population (10 years & above) with 100% enumeration (census) of households.

**METHODOLOGY:** House to house survey was conducted on all the families registered with the Rural & Urban Health Training Centers (RHTC & UHTC) under the jurisdiction of Field practice areas of the Department of Community Medicine, Himalayan Institute of Medical Sciences, HIHT and socio-demographic profile of each house-hold was recorded.

All members 10 years of age and above from the surveyed house-holds having either history and or presenting complaints of cough for three weeks or more in duration and those already diagnosed cases of Pulmonary Tuberculosis included either as 'defaults', 'relapsed' 'failure', 'not completed treatment' or 'chronic' cases and undergoing treatment either from any Category of DOTS or non-DOTS regimen, were interviewed by administering a pre-designed, pre-tested and structured instrument.

Clients having cough for duration of 3 weeks or more and or having associated symptoms suggestive of pulmonary Tuberculosis and also those already diagnosed as cases of Pulmonary Tuberculosis undergoing treatment were identified as study subjects.

All data related to socio-demography, key practices / behaviors, environment, disease / morbidity profile including family history of the disease under study and history of present / past treatment of the study subjects were elicited and recorded.

A detailed clinical assessment of the study subjects was then carried out including general and systemic examination with particular reference to Respiratory system.

All newly detected symptomatics were subjected to sputum microscopy as per standard RNTCP Protocol.

Sputum was collected at RHTC & UHTC and sputum specimen sent to Department of Microbiology, HIMS for Direct Microscopy for AFB.

**INCLUSION CRITERIA:** All persons from among those 10 years of age and above, belonging to the families registered with the Rural & Urban Health Training Centers, under the jurisdiction of Field Practice areas of the Department of Community Medicine, HIMS, Dehradun

Having history and or presenting complaints of cough for three weeks or more in duration and

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Already diagnosed cases of Pulmonary Tuberculosis included either as 'defaults', 'relapsed' 'failure', 'not completed treatment' or 'chronic' cases and undergoing treatment either from any Category of DOTS or non-DOTS regimen, comprised the study subjects.

**EXCLUSION CRITERIA:** Those patients who were cured or had already completed their treatment regimen with negative smears at the end of the treatment by either DOTS or non-DOTS regimen were excluded from the study.

**A CASE OF PULMONARY TUBERCULOSIS:** For the study purpose a case of pulmonary tuberculosis was defined as one who had at least two initial sputum smear examinations (direct smear microscopy) positive for AFB or a person with one sputum smear examination positive for AFB and radiographic abnormalities consistent with active pulmonary T.B. as determined by treating Medical Officer(MO) or TB in a patients with one sputum smear specimen positive for AFB and culture positive for M. tuberculosis or TB in a patient with symptoms suggestive of TB with at least three sputum smear examinations negative for AFB and radiographic abnormalities consistent with active pulmonary TB as determined by the treating MO followed by a decision to treat the patient with a full course of anti-tuberculosis therapy or diagnosis based on positive culture but negative AFB sputum smear examination [13].

**RESULTS AND DISCUSSION:** Area wise population of the Universe of the Study which comprised the field practice areas of the department of community medicine, Himalayan Institute of Medical Sciences, HIHT.

Out of a total population of 23,618, population from across the catchments of Rural Health Training Centre (RHTC) i.e Rajeew Nagar, Teliwala, Khatta & Dor Bassi, Dharmuchak, Kurkawala, Keshavpuri, Gesharpuri & Doiwala was 12588 (53.30%). Rest of the universe of the study was made up by a population of 11,030(46.70%) from the catchments of Urban Health Training Centre (UHTC) i.e Chandreshwar Nagar and Shisamjhari, Rishikesh

It can be observed from the table that highest proportion of study subjects i.e. 183(45.88%) belonged to families with family size 3-5 followed by 137(34.33%) from families with size 6-8. Table 1.3 shows distribution of study subjects according to type of family they belonged. The families of most of the subjects and as many as 270(67.7%) were of unitary type followed by 129 (32.3%) joint families. The above table (1.4) also shows distribution of study subjects' families according to socio economic status as per modified B.G. Prasad's classification; most of the families with as many as 155(38.8%) belonged either to lower middle class or 139(34.8%) to upper lower class.

Table 2.1 gives distribution of the study subjects according to the local environment they live in. It can be seen from the table that study subjects' immediate vicinity had undesirable environmental contaminant/pollutant elements with 184 (46.1%) and 144(36.1%) of them living in a local environment of dust and smoke respectively. Table 2.2 shows distribution of study subjects by presence or absence of air pollution. Though any source of air pollution was not observed/reported by the most i.e. as many as 280(70.2%) of the subjects, 119(29.8%) of them nevertheless had a source of air pollution in the immediate environment. As regards distribution of study subjects' families by intensity of vehicular traffic as an environmental characteristic, most of the respondents i.e. 264 (62.2%) reported minimal vehicular traffic as against 133 (33.3%) reporting moderate vehicular traffic. Table 2.4 gives profile of study

subject's handling type of dust. Most of the respondents i.e. 244 (61.2%) reported handling house dust with insignificant proportions giving history of handling other kinds of dust. Distribution of respondents in terms of type of housing is presented at table 2.5. It can be observed that significant proportion of study subjects i.e. 233 (57.6%) lived in pucca houses followed by 123 (30.8%) living in semi pucca houses; only 46 (11.5%) respondents lived in Kutcha houses. Table 2.6 & 2.7 relate study subjects with overcrowding and ventilation. As many as 261 (65.4%) and 290 (72.7%) respondent subjects lived in overcrowded and inadequately ventilated houses respectively.

Table 3.1 shows profile of study subjects in terms of choice of type of diet. Significant proportion i.e. 270 (67.7%) of respondents were non-vegetarian as against 129(32.3%) vegetarians. As regards respondents' status of nutrition, it can be seen from table 3.2 that highest proportion of them i.e. 280(70.2%) were well-nourished. Table 3.3 shows distribution of respondent study subjects by behavior towards addiction particularly smoking habit. Significant proportion of the respondents i.e. 258(64.7%) were non-smokers as against 141(35.3%) smokers. Distribution of study subjects according to history of risk behaviors/ risk situations (table 3.4) reveals that a very insignificant proportion of respondents i.e 15(3.8%) had such history.

Table 4 shows area wise distribution of symptomatic and confirmed cases of Tuberculosis and its period prevalence. It can be observed from the table that a total of 399(1.68%) symptomatic were screened out of a total study population of 23,618 from 10 different peri-urban field practice locations; 73(0.30%) symptomatics turned out to be cases of Tuberculosis confirmed either as sputum positive cases by Microscopy or by other criteria. It is evident that overall (mean) prevalence of the disease was 3.09 per 1000 study population; notably, the prevalence was as high as 16.17/1000 population at Khatta & Dorbassi followed by 13.04/1000 population at Doiwala.

Table 5 reveals the number of confirmed cases of pulmonary tuberculosis among the symptomatic according to findings by sputum microscopy. It can be seen from the table that 52 (71.24%) were sputum smear positive cases as against 21(28.76%) of the cases being sputum negative.

**CONCLUSION:** We conclude that present day epidemiology of tuberculosis in India have not yet been fully elucidated, a considerable amount of information, of varying degrees of reliability and accuracy, has accumulated during the course of the last 30 or 40 years enabling us to see at least the outlines of the problem and furnishing the basis for future action [11]. Significantly, with atypical parameters like geo-topographical /disadvantaged population living in rural or periurban habitat/slums having varying socio-epidemiological predictors, the study of epidemiology of pulmonary tuberculosis is most likely to provide new insight. In view of rapidly changing and evolving evidence base in terms of epidemiological parameters and determinants of Pulmonary Tuberculosis in various settings, the present study has been designed to elicit and validate presumed epidemiological correlates and variables affecting Pulmonary Tuberculosis among field practice areas of population of HIMS.

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**Table 1. Distribution of Study Subjects by Religion, Family size, Type of Family and Socio Economic Status (n=399)**

<b>Family Characteristics</b>	<b>No. of Families</b>	<b>Percentage</b>
<b>1.1 Religion</b>		
Hindu	270	67.7
Muslim	125	31.3
Christian	4	1
Sikh	0	0
<b>1.2 Family size</b>		
1-2	20	5.01
3-5	183	45.88
6-8	137	34.33
>8	59	14.78
<b>1.3 Type of Family</b>		
Unitary	270	67.7
Joint	129	32.3
<b>1.4 Socio Economic Status</b>		
Upper		
Upper Middle	5	1.3
Lower Middle	31	7.8
Upper Lower	155	38.8
Lower	139	34.8
	69	17.3

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**Table 2 Distribution of Study Subject by Family characteristics i.e. Local Environment, Source of Air Pollution, Vehicular Traffic, Type of Dust, Type of Housing, Overcrowding, Ventilation,**

Family Characteristics	No. of Families	Percentage
<b>2.1 Local Environment</b>		
Smoke		
Dust	144	36.1
Fumes	184	46.1
(Others)	17	4.3
	54	13.5
<b>2.2 Source of Air Pollution</b>		
Present		
Absent	119	29.8
	280	70.2
<b>2.3 Vehicular Traffic</b>		
Minimal	264	66.2
Moderate	133	33.3
Heavy	2	0.5
<b>2.4 Type of Dust</b>		
House Dust	244	61.1
Wheat Dust	44	11.0
Coal Dust	11	2.8
Cotton Dust	4	1.0
Dye / Chemical	21	5.3
Cattle	18	4.5
Others	57	14.3
<b>2.5 Type of Housing</b>		
Pucca	230	57.6
Kutchha	46	11.6
Semi Pucca	123	30.8
<b>2.6 Overcrowding</b>		
Present	261	65.4
Absent	138	34.6
<b>2.7 Ventilation</b>		
Adequate	109	27.3
Inadequate	290	72.7



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**Table 3 Distribution of Study Subjects by Type of Diet, Status of Nutrition, Addiction (Smoking Habit), Risk Behaviors / Risk Situations**

Respondent Characteristics	No. of Respondents	Percentage
<b>3.1 Type of Diet</b>		
Vegetarian	129	32.3
Non Vegetarian	270	67.7
<b>3.2 Status of Nutrition</b>		
Well Nourished	280	70.2
Under Nourished	109	27.3
Over Nourished	10	2.5
<b>3.3 Addiction (Smoking Habit)</b>		
Smokers	141	35.3
Non Smokers	258	64.7
<b>3.4 Risk Behaviors / Risk Situations</b>		
History Present	15	3.8
History Absent	384	96.2

**Table 4 Area wise Distribution of Symptomatic & Confirmed cases of Pulmonary Tuberculosis diagnosed by either microscopy or criteria other than microscopy (n = 399)**

S.N	Area	Population Screened	No. of Symptomatic	Confirmed Cases [Old & New]	Prevalence [Per 1000]
1	Chandreshwar Nagar	7000	68 (0.97)	14 (0.20)	2.00
2	Shisamjhari	4030	113 (2.8)	23 (0.57)	5.70
3	RajeevNagar	639	8 (1.25)	1 (0.15)	1.56
4	Teliwala	3500	78 (2.22)	12 (0.34)	3.42
5	Khatta&Dorbassi	680	46 (6.76)	11 (1.61)	16.17
6	Dharmuchak	1378	14 (1.01)	0 (0)	0

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7	Kurkawala	2810	17 (0.60)	0 (0)	0
8	Keshavpuri	2850	22 (0.77)	5 (0.17)	1.75
9	Gesharpari	271	1 (0.36)	1 (0.36)	3.69
10	Doiwala	460	32 (6.95)	6 (1.30)	13.04
	Total	23,618	399 (1.68)	73 (0.30)	3.09

**Table 5 Distribution of confirmed cases of Pulmonary Tuberculosis by Microscopy for Sputum Positivity for Acid Fast Bacilli (n =73)**

Diagnostic Status by Microscopy	Confirmed Cases	Percentage
Sputum smear positive Cases	52	71.24
Sputum Smear Negative Cases	21	28.76



