DIS-5

Main Identity

From: <claudio@hcmc.netnam.vn>
To: <pha-exchange@lists.kabissa.org>
Sent: Tuesday, November 01, 2005 11:46 PM
Subject: PHA-Exchange> [afro-nets] The Patients' Charter Tuberculosis (4)

from Erika Blair <voices@tbtv.org> -----

The Patients' Charter of the Tuberculosis Community (4)

In response to the posted question from George Kent <kent@hawaii.edu> "why should there be a distinct charter for any particular disease?":

We are a group of people who are living with, and hopefully surviving, tuberculosis. A highly contagious (airborne) disease that killed some 2 million people last year. Two million the year before, and the year before that, etc. TB has been mass killing for hundreds if not thousands of years. Some sixty years ago they said that the cure had been found, which in reality has meant that those with resources live, and the poor die. Once the rich were protected, they seem to have forgotten about the others, illustrated by the fact that no new anti-TB drugs have been developed in fifty years. Probably some 100 million deaths ago.

As TB is a disease which affects the most vulnerable and disenfranchised populations, our rights have never been important and our voices never heard. Today, two deadly factors are beginning to raise the stakes: HIV/AIDS and MDR. TB is the biggest killer of those living with HIV, and the co-infection TB-HIV is now pandemic in Africa and large parts of Asia; multi drug resistance (MDR-TB) means that the old drugs do not work and the person dies slowly, painfully, and often in isolation. Most health systems don't even try to treat MDR patients - they're considered write-offs. There are some 700,000 to a million people with MDR today, increasing each year, who have no hope, no voice, and no rights. (Nor any media, rockstar or hollywood friends).

To TN →
For information and reply if any →

RM
3/11/05

Learning from the HIV experience, we are now trying to build 'community' as a step towards organising ourselves to demand better treatment, new drugs, diagnostics and vaccines that work. We also demand some dignity, and some basic human rights in the face of stigma and discrimination arising from our long marginalisation. A good part of this stigma has historically been passed down through the traditional medical establishment, who has too often seen the TB patient as a burden and a problem for public health (and not profitable to treat).

The Charter is one of our first tools to address the silence in

which we suffer. Tuberculosis is the killer loose in our communities, and we seek ways to stop the death toll and devastation. By drafting a document that outlines our basic Rights and Responsibilities, and that is endorsed and distributed globally through the WHO and its partners, we are beginning to build some of the foundations for change to occur.

In response to "Why have a separate charter for any particular ailment?": The many people who are helping to draft the next version write not for an "ailment", but for the human rights and responsibilities that are specific to their needs. The Patients' Charter of the Tuberculosis Community is the synthesis of values, principles, and aspirations that are widely shared by people infected or affected by TB, TB-HIV, and MDR-TB in all regions of the world. It is the standard of the Rights and Responsibilities, for and by those living with the diseases, which builds community amongst those most affected. People, not ailment, centered. Finally, I think that the Denver Principles of 1983 also serve as a response to the question.

So, we welcome your comments and input. It helps us all towards empowerment.

Cheers,
Erika Blair
TBTV.ORG
mailto:blair@tbtv.org)
http://www.tbtv.org/texts/newsflash/patients_charter_draft1.html

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Dr.G.Visweswaraiah
Hon.Secretary, KSTBA.

Karnataka State Tuberculosis Association, Bangalore.

Understanding the Nature and magnitude of TB in India and Karnataka

Tuberculosis in India happened to be the major public health problem. The National sample survey was conducted in India in 1955 - 1958, as per the report of NSS prevalence of Tuberculosis was 20 / 1000 and incidence of Bacillary Tuberculosis Cases was 4 / 1000. Men are more suffering than women, old age than young age. The distribution of Tuberculosis is almost equal in urban and rural areas. However since 4 times the population lived in the villages than the urban areas. The burden of Tuberculosis in the rural areas could be 80% as compare to that of about 20% in urban areas. This means that the resources for the control programme has to be reallocated proportionately.

40% of Indian population are infected, by TB in the community . Among the infected 10% of them may get TB at any time during their life time, if their natural resistance to the disease is reduced.

14 million Tuberculosis patients are there in India. Out of this 3.5 million are actually coughing out TB Bacilli in their sputum for the spread of Tuberculosis in the community. .5million (5 lakhs) deaths are caused by tuberculosis. One TB patient can spread the disease to 10 - 15 healthy persons in a year. Thus there are 10 lakhs of new TB patients added every year . One person in India die of TB every minute.

Tuberculosis is killer number one in the community. Of every 100 death due to all causes in the community 10 are estimated to be due to infectious forms of pulmonary tuberculosis. There could be many more deaths due to TB in children. Tuberculosis causes more deaths in women in child bearing age and even among the men in the productive age group of 15 - 49 years
(productive age group).

- Proportion of Tuberculosis cases remains same year to year
- Every year 1 / 3 of existing cases either die or cure . But the same number join the existing cases maintaining the same number in the community.

National Tuberculosis programme (NTP) was started in the year 1962 in India to meet the felt need of patients in community. It could not achieve its objectives as there was 30% treatment completion and 70% were dropouts and with other technical, administrative and inadequate budgetary outlet, It was reviewed by a committee of National and International experts in 1992 as a failure programme. The WHO declared tuberculosis as the global emergency in the year 1993 and formulated the Revised National TB Control Programme (RNTCP) providing all feasible requirement to run the RNTCP in India in a phased manner in the states, through District TB Centres, to be delivered through the primary health care infrastructure, to achieve 85% cure rate and to detect atleast 70% estimated smear positive Pulmonary TB Cases.

In Karnataka the RNTCP was launched in 10 districts including Bangalore Mahanagara Palike in the first phase covering 218 lakhs population. The 12 districts were taken in the second phase covering 257 lakhs population. The remaining 54 lakhs population has been covered in the third phase having 5 districts in the state by the end of 2003.

The Role of the Private Sector in TB
Community Health Cell, June - August 2000

Notes on the Study : **Non Governmental Organizations in Tuberculosis Control: A study in Western India** (by Sheela Rangan, Aditi Iyer, Sushma Jhaveri)

Objective :

To investigate the role of the Private Sector in Tuberculosis control. This includes launching an organized effort aimed to understand the nature and role of the private sector in health care in the arena of Tuberculosis control. (TB control has three main parts : case finding, treatment, and case holding. The private sector would be defined as including non governmental organizations (NGO's) , including voluntary organizations, for-profit establishments, grant-in-aid funded projects and finally a range of private physicians who practice anything from tribal to allopathic medicine.

Importance of Understanding this Project :

Although the National Tuberculosis Program (NTP) has been in existence for more than 30 years, many health care providers and patients are unaware of the benefits and reaches of the program, thereby encouraging the notion that the programs must be re-vamped and revitalized. The focus of the revitalized programs is the detections of at least 70% of the incident cases and ensuring cure of 85% of the detected cases. (This is what is projected to favorably alter the course of TB worldwide) In addition, plans are underway to involve the non governmental sector (NGO's), voluntary and non-profit sectors that all constitute the private sector. NGO participation in the social sector ranges from assistance to policy making to actual field based service delivery.

With the onset of HIV, TB has renewed global interest, and a large percentage of cases occur in India. However, despite the urgency of prudent action, a lack of interest has rendered NTP programs ineffective. Furthermore, although the Private Sector takes care of most TB programs nationwide, they have not been involved in the NTP programs. However if their input is taken, information could be provided that would improve the performance of the NTP as well as the quality of TB care available to patients nationwide.

Stages in the study:

Compile complete lists of the NGO's working in TB from lists of NGO's in the health field. This was then narrowed down to include those that had a significant TB component to their agenda.

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- A survey undertaken using a mailed questionnaire to understand the number of and nature of private sector health care providers as well as approaches to TB control. (obtains a directory of NGOs in the area with their profiles)

- Case studies of a few selected NGO's to document the effectiveness and implementation of TB control programs. (from this, a detailed report can be prepared identifying the strengths and weaknesses)

Here, it is important to document the follwing categories :

- *Exact response rates* (% replied, etc)

- *Location / Geographical Distribution* (Rural/Urban … etc)
  Source of Funding for NGO's (including individual donors, state govt. and municipal govt., international funding agencies, other NGOs, central govt., public/private corporation, etc)
- *Nature of Support Received from the Government* (including supply of drugs, grants, supply of stationary, deputation of workers, etc)
- *Nature of TB Work* (including only providing assistance, only case finding , only follow-up, case finding and treatment, treatment and follow-up, only health education, case finding, treatment and follow up)
- *Case Load and Number of New Patients registered in Previous year, and Case Detection.*
- *Diagnosis, Treatment and other Facilities* (including X-rays or Sputum examinations conducted by organization, referred to private laboratories, or referred to government facilities.
- *Treatment Methods of TB Patients* (Regimens, Medicines, etc)
- *Case Holding and Methods to Improve Regularity and Treatment Adherence*
- *Comparative Performance of NGOs and State TB Programs*
- *Nature of Assistance Provided to Patients*

Problems in Conducting Cohort Analysis :

- Poor Record Keeping contributed to the majority of problems in the study
  - Treatment Outcome was not usually recorded . This leads to inaccuracies in completing optimum period of treatment (COPT) numeric values.
  - Cohort analysis was not restricted to sputum positive patients and so it's all bunched up.
  - No continuity in collecting sputum samples. Hard to get patients to comply when treatment starts to work As a result, the cure rates could not be accurately assessed in all cases.

Important as a factor in the NGOs that deal with TB include the case load that they handle (usually from a third to a half of all state cases), the amount of reach that they have the urban and rural areas, as well as their infrastructure and ability to handle massive loads of cases. Many NGO's have more of a clinical approach rather than a public health approach : in these cases, there is not much concept of case holding nor treatment completion rates. The emphasis is placed on case detection.

Not many of the NGOs deal only with TB cases -- here, TB is usually only a component of the overall health activities. Some of the NGO approaches to tackling TB included :

- Institution/Hospital/Clinic Based Programs : outreach programs from clinics, hospitalization facilities and ambulatory treatment,
- Use of Community Based Workers in well integrated programs : incentives were given to workers for case finding and treatment completion. This was found to be fairly successful provided that there was adequate monitoring and supervision.

- Using Public Health Services and dependence on governmental services. (i.e. diagnostic and treatment facilities), but taking care of the drug dispersion. This lead to higher treatment completion rates.
- Involving Private Doctors : trying to including this sector in the TB program by setting up a proper referral system.

There is a hesitation in relying on sputum examinations for the diagnosis of TB, and patients prefer the chest X-Ray.

DIS-5.

Stop TB Fight poverty : An Indian Perspective

Introduction:

Stop TB, fight poverty is the theme for World TB day 2002. TB imposes a considerable economic toll on patients and their families. Because more than three-quarters of people with active TB are in the economically active age group (15 to 54), the economic and social costs to them and society are huge. They are income providers of the family. They are the parents of young children who need their economic and emotional support in order to thrive. They have elderly parents and relatives who depend on them. They are the citizens whose productivity and talents are essential to their countries' development. The result of TB is that access to opportunities and choices- a key principle of human development –is blocked.

Ill health, malnutrition and high fertility are three main reasons why households become or remain poor. They cause poverty through diminishing productivity, reducing household income and increasing health expenditure. A more complete view of poverty includes deprivation not only from money income, but also human development, financial and physical security, expanding opportunities and especially participation in key aspects of social life.

Poor families have no buffer against loss of income-no savings and very limited access to borrowing. The way they cope with this economic adversity may provide short-term benefits –that is cash-but in long term makes them and their children destitute. The sale of assets such as land is a common response to large medical expenses.

Income poverty leads to ill health and ill health contributes to income poverty. A more complete view of poverty includes deprivations from not only money income; but also human development, financial and physical security. Poverty is also seen as a lack of basic human development indicated by poor health, malnutrition and educational development. Gender is in particular an important variable affecting both health and poverty.

TB and Poverty Links

The global experience with TB control has been able to define certain clear-cut linkages between TB and poverty:

- TB is more prevalent among low-income groups than among high-

income groups.

- The cost of TB care, if borne by families alone can be unaffordable.
- TB is a chronic ill ness and requires care over a relatively long period during which productivity is reduced, leading to interruption of education and work.
- Household income is severely reduced, family dysfunction increases, particularly if mothers are ill and poverty increases.
- Lower productivity and more poverty impede social and economic development and increase inequalities in society.
- Lower income people are higher risk-as TB spreads in crowded places-households, school, workplace, marketplace and commuting between them.

The real stakeholders in TB control

- A. **The people: -** the low-income groups are the most vulnerable people with limited resources to over come poverty-related TB risks viz:
  - Barriers in access to primary health acre ans appropriate diagnosis and treatment for TB
  - Emerging HIV/AIDS –TB co-infection
  - Lack of knowledge about the disease
  - Overcrowded living and transport conditions
  - Urban congestion/pollution
  - Poor nutrition

- **B.Society: -** as represented by politicians and policymakers, with power to reduce risks.

Poverty in India

Statistics as provided Government of India show that about 240 million people live below the poverty line. (The poverty line is really the line of destitution. At this line, people just enough money to provide them with food, converting to 2,200 calories and with nothing else. No roof, no clothes, no security, no minimal comforts, let alone schools, medicines and any fruits of industrial revolution.)

Poverty alleviation remains pronounced challenge before the Government. Though there ahs been a steady decline in poverty over the last two decades, the total number of poor people has remained more or less constant due to growth in population. The inter-regional disparities in poverty levels are quite alarming. According to National Sample Survey Organization (NSSO) the poverty situation ins several states in India is appalling: Orissa 47.15%, Bihar 42.6 %, Madhya Pardesh 37.4%, Sikkim 36.55% and Tripura 34.44%. In terms of numbers Uttar Pardesh has 53 million, Bihar 43 million, Madhya Pardesh 30 million, Maharashtra 22 million, West Bengal 21 million, Orissa 17 million and Andhra Pardesh 12 million people below the poverty line. (Economic Survey 200-2001)

Poverty alleviation programmes are still ineffective because they have not reached the poor.

Surveys by the NCAER (National Council of Applied Economic Research) reveal that almost 59% of all households, accounting for 526 million people, have an annual income of less than Rs. 12500. This means a monthly household income of Rs.1000 or about Rs. 200 per head. This by any yardstick is abysmally low income.

Households with incomes between Rs.12500 and Rs.40, 000 per year account for 331 million people.

Only 4.1 percent, accounting for 37 million have an income of over Rs 40,000 a year.

(Life above poverty line: Rs 264 per month is all you need –Mohan Guruswamy, Courtesy www.tehelka.com)

Tuberculosis in India: (1)

General facts

- India carries a third of global TB burden. An estimated one in two of the adult population are infected with TB bacterium.
- The estimated incidence of all cases of TB is whopping 185 cases per 10,000 population.
- The TB epidemic continues to grow, every year, two million people develop active tuberculosis (more than any other country in the world).
- More people now die from tuberculosis than ever before -nearly 4,50000 every year. More than 1000 persons die of the disease each day.
- Only one in four people with tuberculosis is treated with DOTS. The current rate of DOTS expansion is still far too slow to reach the global targets by 2005. Failure to reach these targets will condemn millions of people to disease and death.
- Tuberculosis is inflicting enormous socio-economic costs. In India the estimated economic cost of TB is US $ 3 billion per year.
- India's DOTS programme is mainly financed through a US$ 142 million low interest loan from World Bank with increasing costs already being met by national and state governments.
- The quantum of human cost of TB in the country is 4.56 - 6.28 Disability-Adjusted Life Years (DALYS). (The DALY combines a measurement of premature mortality and morbidity and reflects the 'burden of disease' in a population)
- The cost to the patient for successful treatment of TB averages US$ 100 to US$150, more than half of the annual income of a daily wage labourer. The estimated cost of MDR-TB to an Indian patient is approximately Rs 6500 a month (US$135).
- Research shows that 20% of rural patients and 40% of urban patients borrow money to pay for expenses due to TB.

Tuberculosis in India: (2)

Tuberculosis and Women's Health

Jackie Jackson Joint UK Coordinator of Institute for Indian mother and Child (UK), in an article entitled Multiple disadvantages: India, women's health and tuberculosis, enlists the factors that make Indian women more susceptible to TB. Poverty whom she describes as the main cause of TB, affects 70% of women worldwide compared to 30% of men. Poverty predisposes women to poor living conditions and nutrition and renders them vulnerable to disease and infection. Research has shown that in their reproductive years (15 –49 years), women are at greater risk of developing the disease after infection than men at the same age. They may also be exposed more to TB than their men folk due to their particular duties and tasks. Besides these physical consideration the shame and stigma of disease affects women more-to the point where women commonly keep their diseased state a secret and unmarried girls fear that it will affect their marriage chances.

As regards the pattern of early marriage in both the major communities of the country, young brides are encouraged to begin a family early on. It reduces women's financial independence-which she would be able to use to good effect were she to develop the disease.

Clearly tackling TB in India raises many questions about the socio-economic and political structures within society. Can TB be tackled in India without tackling behaviors in the society, such as the low status of female, she asks? Certainly a husband or a father with TB puts an enormous strain on the family whenever it threatens his wage earning powers, however she warns that social cost to the family is much higher when the disease affects mother. Her need to attend treatment programmes takes her away from the children, the cost of treatment cuts into family budget and a child is at a 3-10 times greater risk of dying within two years if he/she loses their mother than those with both parents alive. She suggests that TB programmes in future shall not use the medical model instead tackle all factors operating on women with respect to disease side by side. The multiple disadvantages for women in India that operate through gender and associated factors will only be addressed by first understanding their role in both infection, disease and treatment stages and then formulating successful strategies to reduce their influence. Therefore solutions that apply to both women and men should be implemented.

Tuberculosis in India: (3)

TB and HIV

The Prime Minister of India in his speech at a meeting on National Program for prevention and Control of HIV/AIDS on December 12th 1998, said," the health ministry puts the figure of HIV infections in the country as of now at three million to four million. In some states, the infection rate is one percent of the populations. Since we have these three to four million infections today from a base of just a few infections in 1986, imagine what the scene will be in another twelve years from the base now of three to four million. I shudder even to contemplate the numbers."

As per National AIDS Control Organisation estimates, the total number of HIV infections in the country at the end of year 2000 stood at 3.86 million.

A document on Revised National TB Control Program (RNTCP) published on the official web site of the National TB Control Program sums up the situation rather crudely: "while the size of the HIV epidemic in India is presently not known, it is clear that HIV will worsen the TB epidemic". The document makes no further reference to the problem

The Draft National AIDS Control Policy has only to say this much for the dual HIV-TB epidemic "with about 14 million TB cases existing in India, HIV/AIDS also poses a twin challenge of HIV/TB co-infection. Nearly 60% of the AIDS cases are reported to be opportunistic TB infection cases. Treatment of TB among the HIV-infected persons is a new challenge to the National TB Control Programme, which has now adopted DOTS strategy for control of TB infection. At the same time looking for HIV among TB infected persons will also cause the problem of scaring away of a large number of TB infected cases in the country from seeking treatment under the DOTS strategy. There is no risk of any TB patient getting infected with HIV unless he or she practices high risk behavior or gets infected from transfusion of HIV-infected blood." The draft policy document makes no further reference to meeting of two programs (National AIDS Control Program and Revised National TB Control Program) to meet the twin challenge.

There is no reliable data available to determine how the HIV prevalence has affected the TB epidemic in India. There are only apprehensions and estimates. Even the NACO or RNTCP have not come out with any studies to document the linkage. The extent of collaboration (or lack of it) between the two programmes is reflected in the documents of two programmes available on their web sites.

On surface they appear to be two divergent lines, emanating from a common point but distancing from each other as they travel to states, districts and community health centers.

Why tackle Tuberculosis ?

Potential economic benefits for India

Effective TB control can help break the cycle of poverty and disease. It cures people and returns them to active, productive life, which in turn benefits their children and contributes to the economic and social development of their country. As more people are cured, the cycle of transmission is broken and fewer people are infected. Ultimately this leads to fewer cases of active TB.

TB control is rated by the World Bank as one of the most cost-effective health intervention because of its potential to avert a large percentage of the global disease, its low cost for each year of healthy life saved, the low cost per capita, and the potential impact on socially excluded and poor people.

Ravindra Dholakia, Professor of Economics from Indian Institute of Management, Ahmedabad in an article, Potential Benefits of DOTS Strategy

against TB in India, divides these into two broad categories:

- Pure social welfare increasing effects of DOTS, which do not generate direct tangible economic benefits. These include reduced suffering of TB patients, quicker and surer cure from the disease, lives saved and disability reduced for dependents and non-workers suffering from TB, poverty alleviation etc.
- Direct tangible economic benefits of DOTS which include: reduction in prevalence of TB due to DOTS which improves the efficiency and productivity of workers, TB deaths averted among current and future workers and release of hospital beds currently occupied by TB patients.

He postulates that that even if the Indian government spends about US $0.74 billion per year to ensure the success of DOTS strategy the investment would fetch a return of 16% p.a. in real terms.

Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year, the article notes.

Conclusion

India carries a third of global TB burden. Every year two million people develop active TB. TB accounts for nearly 4,50000 deaths every year and more than 1000 persons die of the disease every day. TB is inflicting enormous economic and social costs on the country. The estimated economic cost of TB is US $ 3 billion per year.

In India 240 million people live below the poverty line. Poverty alleviation remains a pronounced challenge before the government. Surveys reveal that almost 59% of households accounting for 526 million people have an annual abysmally low income of less than Rs 12500 (US $260)

Income poverty leads to ill health and ill health contributes to income poverty. The cost to the Indian patient for successful treatment of TB averages US $ 100 to US $150. Research shows that 20% of rural and 40% urban patients borrow money to pay for expenses due to TB.

Indian women have to pay much higher social and personal costs if suffering from TB. Besides poverty the shame and stigma associated with the disease, early marriage and social pressures to start a family early on and limited access to treatment facilities makes them more vulnerable to disease more so during the reproductive age group of 15 – 45 years.

The nation has not risen adequately to meet the twin challenge of TB and HIV/AIDS. The number of HIV positive persons has risen above 3.86 million. Nearly 60% of AIDS cases are reported to be opportunistic TB infection. This is going to add to the national load of 14 million TB cases.

Effective TB control can help break the cycle of poverty and disease. It cures

people and to turn them to productive, prosperous life, which in turn benefits their children and contributes to the economic and social development of their country. A cost effective health intervention exists for TB control and treatment: DOTS. Increasing public awareness about proven, effective interventions like DOTS and providing greater access and benefit to treatment for those with TB, will help put billions back into the economy. Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year. The expenditure on health has declined in last decade and stood at 1.11% of GDP in 1998-99. Indian government will have to increase its expenditure on TB control.

The three aims associated with World TB Day 2002 theme viz DOTS expansion, efforts to raise awareness among political leaders, decision makers and opinion leaders and mobilization of TB sufferers for demanding greater access to treatment are more relevant to India than any other country in the world.

Suggested further reading

Ministerial Conference : Tubeculosis and Sustainable Development
Web Site : http://w3.whosea.org/cds/pdf/16march00.pdf

Potential Economic Benefitys of the DOTS Strategy in India
Web Site: http://www.who.int/gtb/publications/pebdots/

Tuberculosis and Poverty: A PPT Presentation
Web Site : http://www.wpro.who.int/themes_focuses/theme1/focus3/POWERPOINTSTB/IMPO-TB-Poverty-Aviva%20Ron.ppt

Tuberculosis in India : A Critical Analysis
Web Site :
http://apha.confex.com/apha/129am/techprogram/paper_27954.htm

Life above Poverty Line : Rupees 640 per month is all that you need
Web Site : http://www.tehelka.com/channels/currentaffairs/2001/oct/30/ca103001lib1.htm

Multiple drug resistance : India, Women's Health and Tuberculosis
Web Site: http://www.fons.org/tb3.htm

Article Compiled by

Dr. Dinesh Kumar
Director Health and Development Initiative India
email: dinesh_kumar@vsnl.com ,
dinesh@healthinitiative.org

Dr. Jatinder Singh

Executive Editor, Health and Development Initiative India
mailto:dinesh@healthinitiative.org,
jatinder@healthinitiative.org

Article Designed by

VS Christopher
Webmaster Health and Development Initiative India
email : job340@hotmail.com ,
webmaster@healthinitiative.org

56 Pink Plaza, Hall Bazar, Amritsar, Punjab, INDIA, Postal Code 143001
Phone : +91-183-554467, Cellular (Director) +91-98140-50065 , Executive Editor +91-98141-21605

http://www.healthinitiative.org/
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DIS-5.

A·C·T·I·O·N

Advocacy to Control TB Internationally

Summary of Proceedings of the India TB Stakeholders meeting held on the 2nd of March 2005 at the India Habitat Center, New Delhi

Session 1: Introduction / RNTCP and Civil Society Partnership

Chair: Mr John Mathai, Country Director, ACTION India
Address delivered by Dr. V. S. Salhotra on behalf of Dr. L.S. Chauhan DDG-TB
Presentation by Dr. P. P. Mandal of CTD on the RNTCP and its current status
Partnering the RNTCP: Dr. Bobby John, Massive Effort Campaign

Main points from the presentations and the discussion following:

- Fastest growing DOTS programme in the world - by May 2005, it will cover the entire country
- Biggest public health success - possibly the biggest public health programme - TB is getting into the political agenda
- Significant administrative resources: Departments and ministries - Ports, ESI, Steel, Coal, Shipping, Railways
- Excellent data reporting systems
- Current focus on sustaining and maintaining the 85% benchmark, improving core services, facilitate involvement of NGOs, medical colleges and enhancing PPM
- Some successful PPM model - greater role for advocacy and PPP

Challenges for scaling up and maintaining current success rate- 1

- Sustain quality of interventions and financial support at the state level
- Strengthening state level program for decentralized management
- Frequent transfers of trained staff / unfilled vacancies
- Inter-sectoral collaborations: Program and the civil society, the armed forces, industry
- Addressing issues for urban areas, pediatric TB cases, marginalized populations
- Quality monitoring of the microscopy: STLS cadre performance needs to be monitored.
- Mobilizing community participation: Limited success in engaging the civil society partners to enhance case detection

A project by American Thoracic Society, Massive Effort Campaign, PATH, RESULTS Educational Fund, STOP TB Partnership Secretariat and WHO

Chennai: Grace Building, 4th Floor, No. 25 McNichols Road, Chetpet, Chennai 600 031, India
t: 0445 526 7284 *m:* 0938 234 2427 *e:* johnmathai@tbaction.org

Delhi: B-406, Mansara Apts., Vasundhara Enclave, Delhi 110096, India
t/f: 0112 262 3170 *m:* 0935 017 1914 *e:* pranay@tbaction.org

Hyderabad: 157/6, Staff Road, Gunrock Enclave, Secunderabad 500009, India
t: 0402 784 8457, 0402 784 1610 *f:* 0402 781 1982 *m:* 0934 662 7079 *e:* mateen@tbaction.org

Challenges for scaling up and maintaining current success rate- 2

Concerns

- More funds and political will needed in the government to fight TB
- Important to mainstream TB with the public health system
- No forecasts available to stakeholders on what scenarios hold in the future for the program: Administrative and financial
- No blueprint available for integrating different stakeholders: Is it an issue for the next phase of the World Bank funded RNTCP?
- Gaps between centre directive and state delivery
- Apprehension between DOTS and non-DOTS based treatment still persists in medical practitioners
- What is the deployed capacity of the NGO sector working on TB issues? Are they distributed across the country? Needs a mapping.

Session 2: HIV/TB challenge

Chair: Dr. Dora Warren, Director, CDC GAP, India
Mr. Christopher Skill, Freedom Foundation / Challenges of addressing TB in an HIV setting

Issues raised / Challenges

1. HIV epidemic will fuel the TB epidemic. There are an estimated 2 million co-infection cases in India at the present time.
2. Stigma and discrimination for seeking DOTS in community: Lack of confidentiality / sensitivity regarding HIV status at the DOTS center
3. Poor transfer in and transfer out records for patients from one DOTS center to another, especially those being initiated on HIV care at a place different from their regular place of residence. This also applies to non-HIV patients.
4. Lack of clarity with regards to DOTS zone distance is a deterrent for patients living at a distance away from the DOTS center they are attached to.

Recommendations

1. Improve understanding of DOTS providers of the linkages between TB and HIV
2. Recognition of HIV care centre diagnosis of TB for initiating patient on DOTS
3. Better understanding needed for use of DOTS with ART (especially the use of rifampicin with nevarapine)
4. Sensitivity to patient concerns on confidentiality
5. Recognize and provide for HIV-TB co-infection within the setting of the DOTS services

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Chennai: Grace Building, 4th Floor, No. 25 McNichols Road, Chetpet, Chennai 600 031, India
t: 0445 526 7284 *m*: 0938 234 2427 *e*: johnmathai@tbaction.org

Delhi: B-406, Mansara Apts., Vasundhara Enclave, Delhi 110096, India
t/f: 0112 262 3170 *m*: 0935 017 1914 *e*: pranay@tbaction.org

Hyderabad: 157/6, Staff Road, Gunrock Enclave, Secunderabad 500009, India
t: 0402 784 8457, 0402 784 1610 *f*: 0402 781 1982 *m*: 0934 662 7079 *e*: mateen@tbaction.org

Session 3: Civil Society participation

Chair: Dr. Tushar Ray, Program Advisor, DANTB
Ms Sarla, Sahasee: TB is curable
Dr. Ramnik Ahuja, CII: Reponse from the Corporate Sector
Dr. Santhosh Mathew, Emmanuel Hospital Association: NGO partnerships
Dr. Sanjana Mohan, Sewa Mandir: Participation at the community level

A. Industry / Corporate Sector

1. TB is being taken up as an issue of corporate social responsibility for Industry
2. Need for all corporate hospital / health care facilities to include Microscopy and DOTS provision facilities.

B. Challenges for NGOs

1. Apprehension among NGOs about government programmes (attitudes in partnering)
2. Resource constraints for civil society to promote DOTS/ RNTCP goals
3. Long delay in official recognition and clearances of NGOS for becoming DOTS delivery partners
4. Lack of clear directives/ guidelines and little formal feedback for civil society participation

C. Community level issues

1. Large awareness gaps in the community
   A. That DOTS is available free in government hospitals leading to delay in treatment (from months to a year).
   B. Poor communication of the duration of treatment and follow up by DOTS providers (therefore large numbers of defaulters)
   C. Is the communications strategy an effective one?
2. Limited support to certain high-risk categories of patients: Migrants, MDR TB patients
3. Need to understand the disease from the patient and community perspective, improve outreach and services
4. Community mobilization needs to be done through NGOs to create demand for DOTS services, but if these are not fulfilled, it leads to tremendous apprehension and mistrust of the program itself.

A project by American Thoracic Society, Massive Effort Campaign, PATH, RESULTS Educational Fund, STOP TB Partnership Secretariat and WHO

Chennai: Grace Building, 4th Floor, No. 25 McNichols Road, Chetpet, Chennai 600 031, India
t: 0445 526 7284 *m:* 0938 234 2427 *e:* johnmathai@tbaction.org

Delhi: B-406, Mansara Apts., Vasundhara Enclave, Delhi 110096, India
t/f: 0112 262 3170 *m:* 0935 017 1914 *e:* pranay@tbaction.org

Hyderabad: 157/6, Staff Road, Gunrock Enclave, Secunderabad 500009, India
t: 0402 784 8457, 0402 784 1610 *f:* 0402 781 1982 *m:* 0934 662 7079 *e:* mateen@tbaction.org

Way forward

Discussion facilitated by Dr. Bobby John

- Challenge of maintaining continuity in the program needs to be addressed: It needs dialogue within the program and its stakeholders.
- Develop synergy and communications between different stakeholders: Initiate an electronic discussion and information dissemination mechanism.
- Rural Health Scheme to be introduced by the Government and will be managed under the Panchayati Raj Institutions -tremendous opportunity to mainstream public health issues like TB
- Harnessing local innovative diagnostic tools (like Tb Research Center use of PAS for sputum disinfection, and transport to Microscopy Centers): This needs to be pushed aggressively, especially as this is useful for transport of sputum samples to distant microscopy centers when patients themselves are too sick or unable to travel to the center. This will increase the rates for case detection.
- Non-utilization of funds (85%) for NGOs largely on IEC and advocacy: This needs to be utilized by getting more civil society partners to get into agreements with the Central TB Division.
- GFATM is an excellent tool to access resources for all stakeholders: Round 5 application process to be coordinated with the CCM, and with the Central TB Division
- Hold regional/state level stakeholders' consultations to be able to recognize local achievements, issues and concerns.

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t: 0445 526 7284 *m*: 0938 234 2427 *e*: johnmathai@tbaction.org

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t/f: 0112 262 3170 *m*: 0935 017 1914 *e*: pranay@tbaction.org

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t: 0402 784 8457, 0402 784 1610 *f*: 0402 781 1982 *m*: 0934 662 7079 *e*: mateen@tbaction.org

A·C·T·I·O·N

Advocacy to Control TB Internationally

Assessment of Feedback

National TB stakeholders' meeting,
India Habitat Centre, New Delhi
March 2, 2005

The Meeting was attended by forty seven participants to discuss diverse issues concerning programme and policy issues in the control of tuberculosis in India. Feedback forms were filled in by participants to share their views regarding the consultation.

The following table gives the nature of feedback in writing on the meeting:

Found the meeting	
Thought provoking	3
Point of good interaction and Discussion	3
Got more information	6
Got greater awareness from meeting	7
Suggest that	
Many such meetings need to be organized	6
Create forums for discussions	5
Improve networking among Stakeholders	2
Session needed to structured better	1
Greater involvement of WHO	1
Stress on advocacy	1
Political	4
Funds	2
Focus on medical research	1

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Multidrug-Resistant Tuberculosis (MDR-TB) in India: An Attempt to Link Biosocial Determinants

SACHIN R. ATRE and NERGES F. MISTRY*

ABSTRACT

Multidrug-resistant tuberculosis (MDR-TB) has emerged as a possible threat to global tuberculosis control efforts in recent years. It is a challenge not only from a public health point of view but also in the context of global economy, especially in the absence of treatment for MDR-TB at national-level programs in developing countries. Biological accounts are insufficient to understand the emergence and dynamics of drug resistance. This article focuses essentially on the need for a holistic perspective, linking biosocial determinants that would probably lead to better insights into MDR-TB control strategies.

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Keywords: drug resistance, medical, behavioral, socio-cultural, primary, acquired

INTRODUCTION

Tuberculosis (TB) has long been recognized as a serious global public health problem. It imposes a burden of nearly 8 million new cases and 1.8 million deaths annually (1). It cost about US$5 billion to treat new TB cases in 22 high-burden countries during the period 2001–2005 (2).

Observers have noted several trends in the occurrence of TB over the last two centuries. While some have linked TB's decline in the mid-twentieth century to general nutritional improvement and economic development, as in England and Wales (3), others emphasized specific measures that reduced overcrowded housing patterns, as in the case of Glasgow (4). In contrast to the decline, a significant increase in TB prevalence has been observed in countries

*Address for Correspondence: The Foundation for Research in Community Health, 3&4, Trimiti B Apts., 85, Anand Park, Aundh, Pune 411 007, Maharashtra, India. E-mail: frchpune@giaspn01.vsnl.net.in

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like Russia in the last two decades, with a striking increase in mortality (38%) reported between 1991 and 1994 (5). Even in England, notification rates among immigrants remained as high as 809 per 100,000 (6). Factors responsible for such contrasting trends need careful identification and definition.

The Directly Observed Treatment Short-course (DOTS) strategy of the World Health Organization (WHO) includes five elements: political commitment; case detection using sputum microscopy; standard short-course chemotherapy under proper case management; direct observation of treatment; and a standard recording and reporting system. The main contribution of this remarkable, large-scale effort in TB control (7) has been in the supply of quality drugs to TB patients. The multidrug-resistant TB (MDR-TB) that now threatens global TB control programs (8) is conventionally defined as resistance to at least isoniazid and rifampicin. The phenomenon of drug resistance was recognized as far back as the 1940s (9), and many outbreaks of MDR-TB were observed in the United States, Latin America and Eastern Europe during the last decade (8,10). In Russia, between 1997 and 1999, the prevalence of MDR-TB rose from 6% to 13% in all civilians with TB, whereas among chronic cases the prevalence of MDR-TB was over 60% (11).

The *Global Project on Anti-Tuberculosis Drug Resistance Surveillance, Report no. 2*, revealed that the median prevalence of MDR in strains isolated from new cases (primary drug resistance) was only 1% (range 0–14.1%), whereas the median prevalence in previously treated cases (acquired drug resistance) was 9.3% (range 0–48.2%) (12). *Report no. 3* indicates these levels at 1.1% (range 0–14.2) and 7.0% (range 0–58.3%), respectively (13). The wide range depicted in these reports suggests the need for a separate interpretation of the data on MDR-TB by region, particularly data from "hot zones" (10). This would provide a more complete picture of drug resistance and its consequences for TB control programs and public health. This paper attempts to address the problem of MDR-TB in India and compares it with observations in other countries.

Emerging anti-TB drug resistance in India deserves serious attention as India's rate is highest among 22 high-burden countries (2). We fear a growing threat to public health that will draw heavily on human and monetary resources. Surveillance data are lacking because there is currently no provision of diagnostic and treatment

facilities for MDR-TB under India's Revised National Tuberculosis Control Program (RNTCP). Nevertheless, studies undertaken in Tamilnadu state by the TB Research Center during the period 1997–1999 revealed a prevalence of MDR-TB of 3% (14); surveillance of anti-TB drug resistance in two districts of South India – North Arcot and Raichur – revealed levels of MDR-TB among new cases of 2.8% and 2.5%. Strikingly, among previously treated cases the levels were 69% and 100%, respectively (15). Studies carried out in a tertiary care center (16) and a hospital in Mumbai (17) revealed high levels of MDR-TB among previously treated and untreated cases, albeit with small sample sizes. These sporadic studies highlight the need for further research and data related to MDR-TB.

The fact that TB has remained a major cause of death for over 40 years despite TB control programs and chemotherapy cannot be overlooked. According to Farmer (18), "Disease emergence models need to be dynamic, systemic, and critical. Such models – which strive to incorporate change and complexity, and are global yet alive to local variation – are critical of facile claims of causality, particularly those that scant the pathogenic roles of social inequalities."

In our opinion, this failure in TB control results from another failure: to interpret biomedical factors in the light of social inequalities. In order to delimit emerging infections, a holistic understanding of underlying biosocial complexity is essential. In subsequent paragraphs, we attempt to provide a brief overview of the different factors involved in the emergence and sustenance of MDR-TB.

DRUG RESISTANCE: A MULTIFACTORIAL PHENOMENON

As a basic concept of epidemiology, any disease condition results from a complex interplay among the pathogen, host, and environment. In the present context of MDR-TB, the "health care system" also plays a pivotal role. We hypothesize that there are several biomedical, socio-cultural, and behavioral determinants underlined by poverty and gender and their interaction results in MDR-TB (Figure 1).

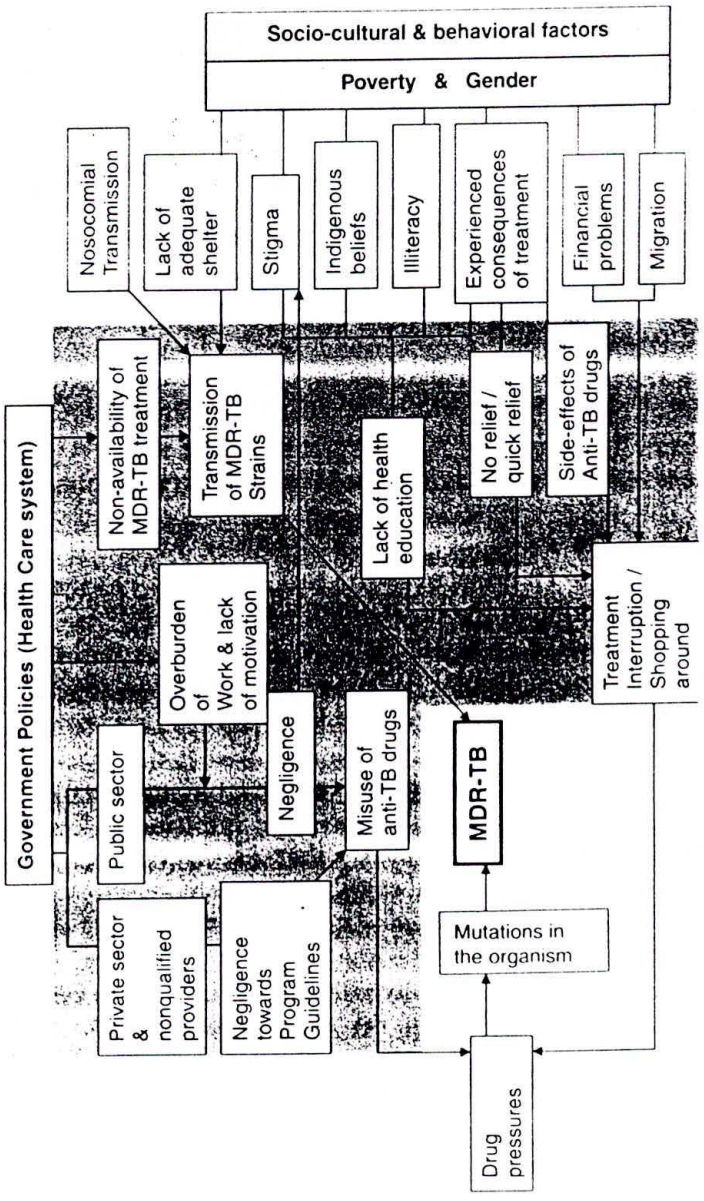

Figure 1
Biomedical, behavioral, and socio-cultural determinants of MDR-TB

Molecular Epidemiology Perspective

Both primary and acquired drug resistance can be considered to be the result of inadequate treatment, substandard drug use, use of inappropriate drug combination preparations, or "mono therapy". Natural biological processes favor the survival of microbes through the development of genetically transmissible resistance when exposed to antimicrobials or by physical expulsion of these drugs (19). Evidence suggests that both appropriate and inappropriate use of antimicrobials apply selective pressure on microbial populations (20). Thus, empirical short-course chemotherapy and inadequate treatment regimens amplify first-line drug resistance (10). Additionally, drug pressures during adequate therapy can also engender the generation of drug resistance. Organisms have been known to shift phenotypically from sensitive to resistant during ongoing therapy (21). The recording of high levels of acquired drug resistance to first-line regimens after completion of short-course chemotherapy (15) also supports the existence of drug pressures. With the intense application of anti-TB drugs over 40 years, sufficient drug pressures may now be ushering in the post-antibiotic era.

While some strains of MDR-TB have caused large outbreaks of tuberculosis, recent molecular epidemiological analyses suggest that resistant strains are, on average, less infectious than drug-susceptible organisms because they bear a physiological cost that undermines their fitness (22,23). However, the study by Billington *et al.* (23) suggests that some MDR strains are more infectious because the relative fitness of the strain exceeds that of the wild strain. The Beijing genotype and its subtypes, associated with MDR-TB epidemics, have spread worldwide (24) and are associated with the active transmission of drug-resistant TB in Germany, Russia, Estonia, South Africa, and Colombia. Elsewhere, these genotypes have not been associated with the spread of MDR-TB (25). In Vietnam, the Beijing genotype was associated with young patients; preliminary studies in Mumbai, India, reported a range of 5–33% of Beijing isolates with no evidence of an obvious epidemiological linkage to location of residence, occupation, or health center (25,26).

Although HIV/AIDS and MDR-TB linkage is uncommon (24,27), it has been observed in some outbreaks of MDR-TB (28). Strains

associated with HIV/AIDS form larger clusters (25) and represent actively transmitted strains. There is a likely explanation for the association between HIV/AIDS and MDR-TB: if in AIDS patients Mycobacterium tuberculosis continues replicating in the continuation phase, it will result in exposure of bacilli to rifampicin alone because isoniazid has a shorter half-life, as there are no other supporting drugs (22). The studies from Mumbai (25,26) also showed the presence of dominant clusters as well as unique strains. A single strain creating an MDR-TB epidemic, (e.g., the Beijing strain) is unlikely in this scenario because of an internal competition between the resistant strains.

Patients' Perspective

Drug resistance is often attributed to a patient's noncompliance with the therapeutic regimen. Noncompliance, however, has many causes, such as poverty, gender discrimination, homelessness, and side effects of the anti-TB drugs themselves, and how they affect individuals in different settings (29).

Poverty leads to undernutrition, which itself is affected by both scarcity of food and intrahousehold distribution. Large family size and resulting purchasing power plus a wide variety of food habits and certain taboos ingrained in culture also contribute to deprived nutritional status. Immune system function is closely associated with nutritional status. A poor nutritional status also affects drug absorption, resulting in sub-therapeutic serum drug levels, which may lead to non-response to drug therapy (30).

Gender issues are equally significant. A study in Russia reported "female gender" as a significant predictor of MDR-TB (11). In the Indian context, harassment by in-laws, difficulty in getting married, or dismissal from the work were reported as major barriers for women to get appropriate treatment (31). Because someone – usually the husband or brother – generally accompanies a woman when she visits the health center, costs exceed those for the patient alone, which already average Rs. 120–165 (~US$3) per month (32). Atre *et al.* (33) also found that women have less access to information about TB than men. For men, being the head of the family, loss of job and fear of social isolation were reported as major reasons for discontinuation of the treatment (34).

Social stigma, lack of scientific awareness about the disease, and social commitments are other stated reasons for interrupting and defaulting from the treatment (31). Morankar and Deshmukh (34) reported similar reasons for delays of 2–8 months in diagnosis and in seeking help among two-thirds of their patient study group. Although in India, decentralization of DOTS has been largely effected, problems affecting effectiveness remain in interior pockets of the country.

Other factors contribute to problems: early symptomatic relief or side effects of anti-TB drugs prompt patients to discontinue treatment or to take drugs irregularly. Perceiving no relief also affects the patient's psyche and makes him/her shop around for other treatments. Morankar and Deshmukh (34) reported that patients make on average one to nine visits to diverse health providers, before as well as after diagnosis. Such irregular and inadequate treatment contributes to the development of drug resistance.

These findings underscore the importance of understanding local needs and socio-cultural aspects of the community to implement any disease control program, such as for TB, effectively.

Health Care System Perspective

Apart from the factors mentioned above, it is essential to understand the role of health care providers and how health system function and personnel behavior influence patient help-seeking behavior. Despite DOTS policy, now in place in 119 countries, only an estimated 40% of TB cases are notified worldwide. This suggests that a large proportion of unreported TB cases are managed by the private sector (35). For many medical conditions, people in India prefer the private sector despite its reputation for being highly exploitative. In all, three-fourths of the patients prefer private care for treatment of major illnesses (36,37); perhaps it is convenience and or the confidentiality that offers protection against social stigma. Unfortunately, studies have shown that private providers do not necessarily follow standard therapeutic guidelines. They offer inappropriate and often expensive treatment (38). Consistently dismal use of public health facilities in India, as underlined in several utilization studies, results in all likelihood from the rude behavior of the public health staff towards patients (39,40). The socio-economic class, caste, and

education-based alienation of public health providers from their poor, illiterate clients suggests a definite need for an overall reorientation of public health personnel.

Re-administration of the same drugs to which the patient has not responded probably results in further development of drug resistance (29). We observed misuse of drugs during our field visits in rural and urban areas of Western Maharashtra, India. Some medical officers fail to take the history of prior anti-TB treatment; thus, the patient is misclassified. Patients who fail to mention their previous treatment bear some of the blame. More seriously, an early observational study by Kaul (39) and colleagues reported that one-third of the patients in the study group were turned away from DOTS centers because of homelessness or because of non-response to previous treatment. This may explain the reluctance of some patients to provide information about previous treatment.

Other factors affect the extent of effective TB control programs. Our recent field experiences reveal that RNTCP does not reach interior areas; thus, many patients are still not covered by RNTCP. Perhaps recognizing this fact, the Global Fund to fight AIDS, Malaria and TB (GFATM) has awarded funds to the Government of India (GOI) to develop Urban DOTS Projects (UDP) in four metropolitan cities in India to improve the quality and reach of RNTCP to slumdwellers and migrants (41).

The misuse of antimicrobials in the form of incorrect dosages – overprescribing, extravagant prescribing, underprescribing – is commonly reported in countries such as Tanzania (91%) and India (over 90%) (42,43). During our field visits, we found that where monitoring of treatment is not possible, patients are given dosages for 1 or 2 weeks. Owing to a lack of adequate information, patients consume tablets as per their will or sometimes doctors split the doses of individual drugs because they fear that the patient cannot tolerate them. As a result of an improper spacing of dosing intervals, efficacious serum drug levels are probably not achieved, leading to reduced drug efficiency and generation of resistance. Directly observed treatment does not work under these local circumstances.

Experiences in the developing world have revealed that traditional healers, who have no knowledge of pharmaceuticals, drug regulation, or side effects of modern drugs, still incorporate these drugs in

their traditional therapy (44). Such practices may lead to adverse drug interactions or may cause side effects, prompting the patient to shop around for treatment. This also promotes drug resistance.

Ambiguity may exist in interpreting laboratory results concerning treatment completion and cure (45). In a series of comparisons across six countries, an average of 47% of MDR-TB patients were reportedly cured with 6- or 8-month treatment regimens with four drugs, always including isoniazid and rifampicin. Reported cure rates varied from 6 to 59%, but may ultimately have been lower because of subsequent relapses (22). A report from Médecins Sans Frontières (MSF) states that sputum microscopy can at best detect 45–60% of people with active TB (46). Thus, the quality of the sputum sample as well as sputum microscopy are major concerns linked to decision making for categorization and treatment. In India, because of program integration, besides sputum smears, a laboratory technician must now also perform blood tests, urine tests, and look for malarial parasites. Such overburdening of public health personnel under the label of integration has resulted in a drop in quality.

In light of the above, overburdened public health facilities, consequent lack of motivation among the staff, and the absence of drug resistance surveillance facilities are major issues that need attention while formulating MDR-TB control strategies. Recognizing the imperative need for surveillance, the GOI has recently initiated the Integrated Disease Surveillance Project (IDSP) with training provided by the National Institute of Epidemiology, Chennai (47).

Role of Multinationals vis-à-vis Globalization

There has been a sharp increase in drug and vaccine prices in the post-TRIPS (Trade-Related Aspects of Intellectual Property Rights) era. Powerful multinational pharmaceutical companies control the global drug market, and surveys have shown that they enjoy a major share of drug sales 48.

The doctor in India is a focal point for drug company efforts to influence the choice of drugs. Doctors are unaware of the pharmaceutical market and are generally ignorant about the price variation between similar drugs manufactured by different companies and marketed under different brand names (49,50). A study by Bhargava (51) revealed tremendous variations in branded drug prices

in the Indian market for rifampicin (249%) to cycloserine (1488%), a drug widely used for treating drug-resistant TB. As patients cannot afford expensive drugs, MDR-TB cases are left untreated and may continue transmitting infection. As discussed in the section above, this provider ignorance about the pharmaceutical market is likely to aggravate the problem of drug resistance.

The development of a new drug spans around 20 years and costs US$802 million (52). So far, research and development departments of multinational pharmaceutical companies have shown little interest in new anti-TB drugs (53), perhaps because of the notion that tuberculosis is a poor man's disease, affecting only the developing world.

In 1998, WHO and several partners around the world jointly devised a strategy, still under continuous development, called DOTS-Plus and implemented through a body called the Green Light Committee. It provides second-line anti-TB drugs in the areas with high MDR-TB prevalence and well-implemented DOTS programs (54).

The cost of MDR-TB treatment in the open market has been as high as US$20,000 per person for 18–24 months treatment (55), a price that constitutes a death sentence for a large proportion of MDR-TB patients. These new efforts have reduced the price of second-line regimens by 95% and for individual second-line drugs by as much as 99% compared with prices in the open market (7,55), but these reduced prices have been available only to WHO-designated procurement agents and WHO-endorsed projects (55). There is still no implementation of DOTS-Plus strategy in many high-burden countries, including India. One reason is that long-term treatment (18–24 months) and severe side effects of second-line anti-TB drugs may require hospitalization. A study by Sterling *et al.* (56) claims that DOTS-Plus is less efficient and more expensive than DOTS and that DOTS-Plus, if not properly implemented, would reduce the efficiency of DOTS.

Currently, for patients who do not respond to DOTS, the program has no solution to offer. Such patients go to the private sector or different providers. In countries like India, where medico-pluralism is common, the situation is serious. Subsequently, the search for alternatives has begun. The Department of Biotechnology (GOI) in conjunction with Cadilla (57) has initiated trials adding immuno-therapy using the Mycobacterium W vaccine. This seven-center trial aims at studying the efficacy of a first-line regimen combined

with Mycobacterium W vaccine in fresh TB cases to improve rates of sputum conversions and cure.

Being ranked first among 22 high-burden countries, India is a huge market for the sale of anti-TB drugs. It has been estimated that rifampicin sales in India (alone and in combination) account for 50% of global sales, amounting annually to US$139 million (58). If MDR-TB spreads, then additional resources would need to be allocated for the second-line regimens in addition to the first-line regimens, further increasing the financial burden beyond today's nearly US$2.6 billion per year (59) – mostly in loans. The Commission on Macroeconomics of Health (CMH) recommended that the Global Fund (GFATM) should be spent on three scourges: AIDS, malaria, and TB but HIV/AIDS now accounts for half of the total expenditure (53). Spending on care also leads to neglect of poverty and related issues of drinking water, nutrition, housing, and so on – amelioration of which had a strong influence on TB decline in developed countries (5).

RETHINKING

One can predict that with a 70% case detection rate and 85% cure rate, prevalence of infectious cases and the number of infected contacts would drop by 40% (60). Similarly, there would be a decline of 6–7% in annual incidence (61). However, global trends do not reflect any major decrease in TB as a major cause of death (1,18). The Revised National Tuberculosis Control Program in India claims over 80% geographical coverage of DOTS, 69% case detection rate, and 86% cure rate among new sputum smear-positive cases (62). As India carries one-third of the global burden and ranks first among 22 high-burden countries with TB (2), these rates bear careful scrutiny. Our doubts here are solely about operational implementation of DOTS under local conditions and not the grand strategy. Mere geographical coverage and reported completion of targets will not suffice as far as public health is concerned. Ultimately, if the program ends up with a high burden of cases and perhaps with more drug-resistant strains (which need to be investigated), then it would siphon huge global resources and threaten the success of the program itself.

In response to the Amsterdam declaration and World Health Assembly (WHA) Resolution, TB program managers of 22 high-

burden countries and WHO global TB network developed a Global DOTS Expansion Plan (GDEP) at a meeting in Cairo in November 2000 (63). Well-conducted clinical trials in Thailand, South Africa, and Pakistan showed little or no advantage of direct observation over home-based self-treatment in relation to cure (64). Nevertheless, home-based treatment was not successful in some sites (65, 66). These observations suggest a need for careful implementation of DOTS and possible alternatives for its expansion. In a country like India, where one-third of the population remains illiterate, experimental strategies, such as involvement of self-help groups and community-based DOTS delivery, may prove more effective, and need to be worked out.

Using a mix of molecular epidemiology and other laboratory tools, it would be useful to learn why certain strains are dominant and actively transmitted. If social factors – for example, migration to earn a livelihood – are associated with active transmission of drug-resistant strains, then social analysis linked to molecular epidemiological analysis might help explain the worldwide epidemic of TB and guide effective control measures against it.

Manabe and Bishai (67) discussed the activation of latent M. tuberculosis. Active TB can be developed from an exogenous infection, but latency followed by endogenous reactivation also results in active TB. Two key questions need to be answered in the context of MDR-TB:

- whether there is any role of human behavior predisposing to reactivation of bacilli and subsequent development of drug resistance in them;
- what host-related factors favor an exogenous infection with drug-resistant strains.

This would help provide the basis for treatment of patients infected with primary MDR-TB strains. Also, the use of anti-TB therapy in HIV-positive patients needs to be re-examined because rifampicin is currently contraindicated with protease inhibitors (PIs) and non-nucleotide reverse transcriptase inhibitors (NNRTIs) of the triple therapy regimen, as it accelerates their metabolism and reduces their levels (68).

Treatment compliance depends upon the psychosocial behavior of the patient, which is deeply influenced by indigenous practices and beliefs ingrained in the culture in which the person is brought up, particularly so among the illiterate and/or elderly. Stigma arising

from both illiteracy and traditional beliefs must be an important consideration for health policy and clinical practice, as it contributes to the suffering from illness in various ways such as delaying appropriate help seeking, leading the patient to shop around for an alternative treatment, or an abrupt termination of the treatment (69). "Concordance", an agreement between the health care provider and the patient about how, when, and where to take treatment, could be an important step (70).

To create awareness among people, Indian health professionals, either from the government or the private sector, have an important role to play in conveying requisite information about the general health as well as communicable diseases. Patients should be informed about consequences of stopping the treatment prematurely. Communications media can be used for this purpose. However, no arrangement between the patient and provider is likely to succeed in the presence of disabling factors like socio-economic disparities, including unemployment and homelessness. Although responsible and supportive behavior on the part of the provider plays a signal role, we must not fail to explore whether treatment discontinuation is linked to social status and commitments, especially in the Indian context.

Vertical programs are always target oriented and restricted. They focus on the therapeutic regimen and treatment completion, and rarely take into account the environment in which the patient is living and going to live even after treatment completion. Mere drug therapy can never be a solution for tackling the problem of drug resistance. In fact, its misuse will aggravate the problem. Thus, clear articulation of governmental policies and information from multinational companies are required to remedy the provider's negligence or lack of knowledge, especially when there is no treatment available for MDR-TB under the RNTCP.

The regulation of medical education is equally important. In India, admission to many medical colleges is decided on the basis of donations rather than merit. If the system produces such doctors, misuse of antibiotics is inevitable, irrespective of well-designed programs and sound strategies. Will going to private sector doctors become "habitual" for the people because of the inability of the public sector to fulfill their needs and subsequent loss of faith in it? The private sector, although largely unregulated, could be useful because of its close rapport with the community and its curative

function, as highlighted by Uplekar and Rangan (71). Their tendency to be unethical and exploitative, however, argues against their inclusion in the RNTCP. We believe that the program needs to focus far more on the training, leadership, and motivation of grass-roots level staff who deal directly with the patients and the drugs. The surveillance system, when in place, should include a referral pattern to assure use of appropriate technology from the peripheral health posts to the referral hospitals. The gray areas for undertaking intervention activities are highlighted in Figure 1.

Paul Farmer and his group, through their action-oriented philosophy, have shown a successful implementation of community-based treatment programs for MDR-TB and HIV/AIDS in the poorest sites such as rural Haiti and Peru (72), which can guide others. Nevertheless, these programs are dependent on external funds such as GFATM (73). To run similar programs without such funds would be a major challenge for many developing countries.

Through this paper, we have tried to address the multidimensional problem of MDR-TB in the context of a developing country like India where the highest burden of TB cases exists. Most cases are managed by a large unregulated private sector, funds are lacking, and one-third of the population is illiterate and strongly influenced by local cultural beliefs. We hope that these experiences may find suitable application in other areas and for other infectious conditions where the problem of drug resistance is increasing.

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TUBERCULOSIS PREVALENCE SURVEY IN TUMKUR DISTRICT

RAJ NARAIN[1], A. GESER[2], M. V. JAMBUNATHAN[3] AND M. SUBRAMANIAN[4]

Introduction

Tumkur District in Mysore State was selected for running pilot control programmes and for evolving standard procedures in the field as well as in the laboratory. A survey was carried out to provide data for planning and assessment of the Control Programmes. The Sample Survey of Tuberculosis in India, Indian Council of Medical Research (1959), referred to hereafter as NTSS, was the first national effort to estimate prevalence rates applicable to different cross sections of the country. This report (Page 54) also states, 'while the figures are able to give an overall idea of the conditions prevalent in each zone, they would not necessarily represent conditions prevalent in limited areas in each zone. Specific control measures for such areas would normally call for more detailed information than can be provided by this survey'. The present survey contributes its mite towards that end.

This survey was carried out during 1960-61 to collect baseline information on the prevalence of infection and radiological and bacteriological cases, in the form of age and sex specific prevalence rates. Further information necessary for a control programme are incidence rates of infection, and of various categories of disease among different groups of people. These could have been collected by a longitudinal survey, but would have entailed a much longer time and a much bigger organization than was available at the time.

2. Objectives

The objectives of the survey were to establish for rural and semi-urban areas of Tumkur district (excluding Tumkur town) the following:

1. Age and sex prevalence rates of tuberculous infection;
2. Age and sex prevalence rates of radiologically active tuberculous disease;
3. Age and sex prevalence rates of bacteriologically confirmed tuberculous disease;
4. Age and sex prevalence of symptoms suggestive of tuberculosis and
5. A correlation between various prevalence rates.

The findings in respect of objective 4 will be dealt with later in a separate paper.

3. Details of the survey

3.1 Study area and population

Tumkur district is situated in the centre of Mysore State, contiguous to Bangalore district. The district headquarter town, viz., Tumkur is on the national highway to Bombay and is 43 miles north-west of Bangalore, the capital of Mysore State. The district has 10 taluks, northernmost taluk Pavagada being completely separated from the rest of the district by parts of Andhra Pradesh. Besides Tumkur, there are 10 municipal towns and 2392 villages in the district. The area of the district is 4091 square miles with an average density of population of 334 persons per square mile (1961 Census). The average altitude is 2,700 ft. above sea-level, and the climate is salubrious throughout the year.

The 1960 population of the district was estimated on the basis of 25 per cent increase in towns and 12.5 per cent increase in the rural population over the corresponding 1951 census figures. The 1951 census figures, the estimated population for 1960 and the actual 1961 census

[1] Epidemiologist, National Tuberculosis Institute, till May 1962; at present, Director, National Tuberculosis Institute.

[2] WHO Epidemiologist, National Tuberculosis Institute, till July 1961; at present, on WHO assignment to Cyprus.

[3] Senior Statistical Officer, National Tuberculosis Institute, till July 1962; at present Professor of Statistics, Karnatak University, Dharwar, India.

[4] Statistical Assistant, National Tuberculosis Institute, till July 1962; at present with Health Statistics Unit, World Health Organisation, South East Asian Regional Offices, New Delhi.

figures (obtained subsequent to the survey) are as follows:

Population of	1951 Census	Estimate of population in 1960	1961 Census
District ...	1,151,694	...	1,366,722
Rural areas (2392 villages) ...	1,045,797	1,175,000	1,227,392
The 10 towns	69,812	88,000	91,893
Tumkur town	36,085	...	47,437

A sample of 30,000 persons was considered operationally convenient and within the facilities then available and was believed to be able to give sufficient accuracy for the purpose of planning control programmes and their assessment.

The 10 municipal towns and the 2392 villages were treated separately and approximately 3 per cent population in each was included in the sample. The district headquarter Tumkur was excluded.

The sample for the towns was selected in a three-stage sampling as four groups of 525 people each. Four towns were selected at random from amongst the 10 municipal towns without excluding the possibility of selecting the same town more than once. One of the administrative sections of the selected town was chosen at random giving weights to the different sections according to the size of the population. Using the household schedules of a recently conducted municipal census one household in the selected section was randomly chosen. With this household as starting point, the census was carried out following the numerical order of the households until 525 people were registered.

From the inhabited villages as given in the 1951 census handbook, 63 villages were selected as a simple random sample. Together with the four town blocks, there were 67 units in all, and these constitute the study population. Each one of these units was called a group. One village with a 1951 population of 9 was found depopulated and was excluded. Figure 1 is a map of the district showing the taluks and the location of various groups surveyed.

3.2 Methods

Co-operation of local officers of the district was secured by addressing one of their routine meetings under the presidentship of the Deputy Commissioner. The District Medical Officer and the staff of the National Tuberculosis Institute, explained in detail the necessity for and the requirements of the survey.

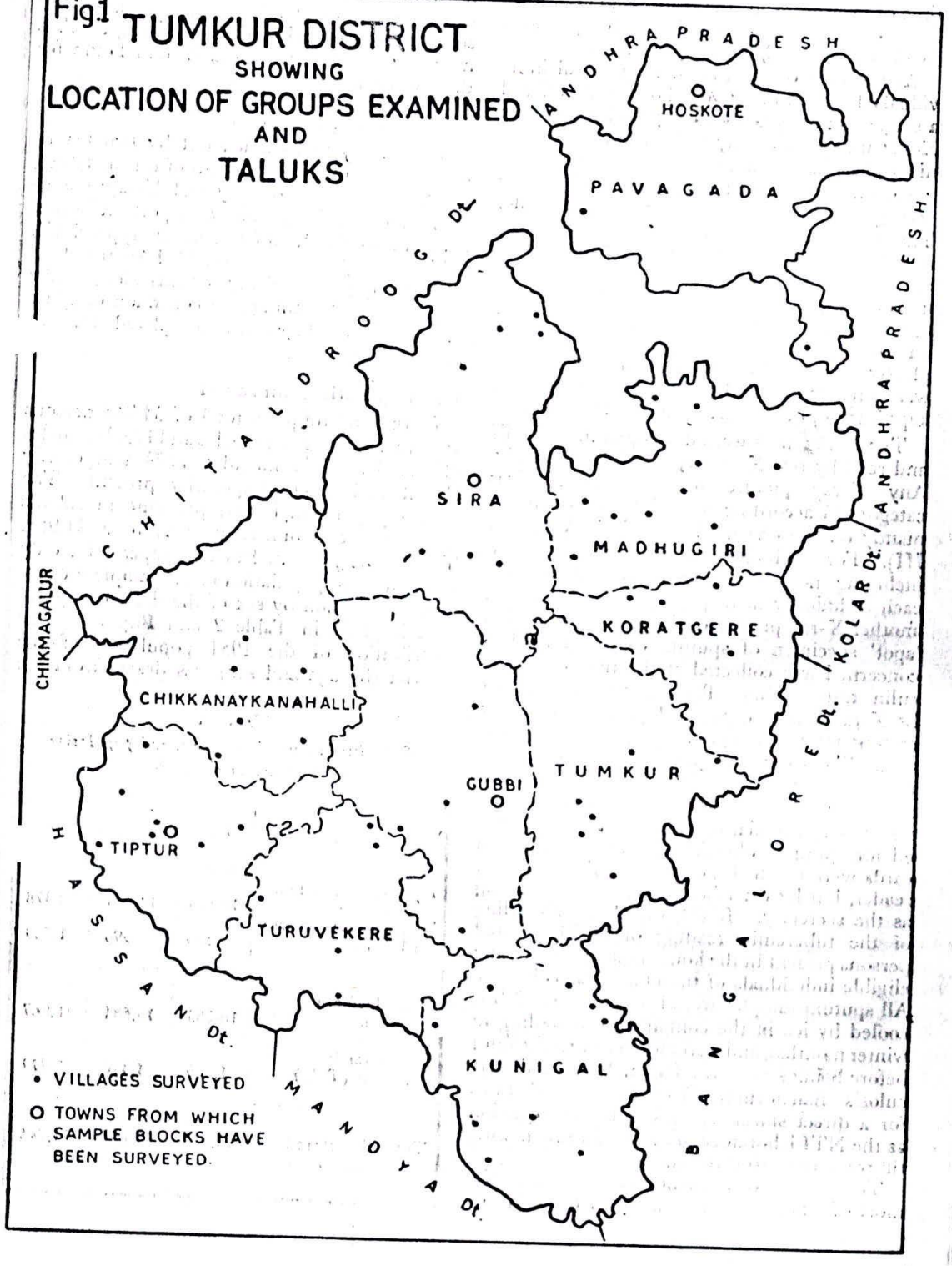
Before the actual commencement of the survey of any village, a preparatory visit was made by the Planner-Organiser, and/or the Medical Officer—Field Teams, accompanied by either of the two team leaders (see Appendix I). A meeting of the inhabitants was convened with the help of the village headman (Shanbhogue or Patel). The objectives and the procedure of the survey and the part to be played by the villagers were explained. The date and time of starting was settled in consultation with them.

In each of the 62 villages, every house was numbered. A map of the village showing the number and location of each house was prepared. A census of the total population of the village was taken by a house-to-house visit by the census takers of the field team. A similar procedure was adopted in each of the four town blocks. For each individual in the 66 groups a card was prepared giving information regarding group number, individual number, name, age, sex, father's name or husband's name, household number and relation to the head of the household. All the persons normally resident in the village (permanent residents), whether present at the time of registration or temporarily absent as well as visitors temporarily present in the village were included in the census and registered. Definitions of terms are given in Appendix II.

All the available individuals in the registered population were given a Mantoux test with 0.1 c.c. of 1 TU RT 23 with 0.05% tween 80 on the mid-volar surface of left forearm. Before giving the test, both deltoid regions were examined for the presence of a previous BCG scar, definite or doubtful, and the findings recorded on the individual cards. Three to four days after the test, the longitudinal diameter of induration of the tuberculin test was measured and recorded in millimetres.* At the

* Longitudinal diameter of induration was measured because of the considerably greater support provided by the length of the volar aspect of the forearm to the transparent scale which, when held by one hand, shakes much less than when similarly held along the breadth of the forearm.

Fig.1 TUMKUR DISTRICT
SHOWING
LOCATION OF GROUPS EXAMINED
AND
TALUKS



time of measurement, the reader had no knowledge of the presence or absence of previous BCG scar in the examinee (vide infra).

At the time of the tuberculin test, all individuals 10 years of age or above were offered a single 70 mm. photo-fluorogram by a mobile X-ray unit temporarily stationed at a convenient place in the village.

No village included in the random sample was given up because it was inaccessible. This was possible not only because of more mobile and lighter X-ray units than were available for the NTSS but also due to a daring use of vehicles for reaching the village sometimes through knee-deep water and sometimes on non-existent tracts. Some villages completely inaccessible during the monsoons were surveyed after the rains, the teams being kept busy in other villages in the meantime.

The X-ray films were developed in the NTI and read by two X-ray readers independently. Any X-ray picture found abnormal was categorised according to a classification based mainly on the one used in NTSS (Appendix III). For each picture read as abnormal, including non-tubercular pathology and for each technically inadequate picture, for which another X-ray picture could not be repeated, a 'spot' specimen of sputum of the individual concerned was collected at the time of tuberculin test reading. Persons who could not be X-rayed due to physical disability or other reasons were also eligible for sputum examination. To avoid any possible bias, care was taken to see that the tuberculin test reader did not know before the actual reading of the test, whether a particular individual had been marked for sputum collection or not. In fact, all cards were handled, not by the tuberculin test reader, but by the laboratory technician acting as the secretary. It was only after recording of the tuberculin reading of all the tested persons present in the house that sputum of any eligible individuals of the house was collected. All sputum samples were brought to the NTI, cooled by ice in the containers (no cooling in winter months), and were stored in a refrigerator before being sent to the Union Mission Tuberculosis Sanatorium, Arogyavaram (UMTS) for a direct smear and a culture examination as the NTI laboratory did not start functioning till some time after the survey.

To suit the convenience of the examinees, most of whom would be away in the fields or at work during the day, examinations were carried out mostly late in the evenings, but sometimes also early in the mornings. This naturally meant hard work at odd hours for the survey teams.

3.3 Staff and time taken

The survey was carried out by two teams, each with its own complement of census takers, testers, readers, laboratory and X-ray technicians, mobile X-ray unit, transport and other staff and working in different areas (Appendix I).

The survey was started on 23rd August 1960, with testing and X-ray examination, while tuberculin test reading and collection of sputa in the last village was completed on 6th February 1961.

3.4 Population surveyed

In the 66 groups, a total of 34,746 persons were registered, 17,652 males and 17,094 females (Table 1). This includes 2779 temporarily absent and 1589 temporarily present. The defacto population, i.e., the permanent residents and those temporarily present total 31,967. The results presented in this paper refer only to the defacto population in the sample groups. Age distribution by sex of the defacto population is given in Table 2 and Fig. 2. The distribution of the 1951 population of the district (by age and sex) was drawn from the

TABLE 1

Sex distribution of the registered population by various categories

	Males	Females	Total
Permanent residents (present)	15,684	14,694	30,378
Temporarily present (T.P.)	599	990	1,589
Total Defacto population	16,283	15,684	31,967
Temporarily absent (T.A.)	1,369	1,410	2,779
Total Registered population	17,652	17,094	34,746

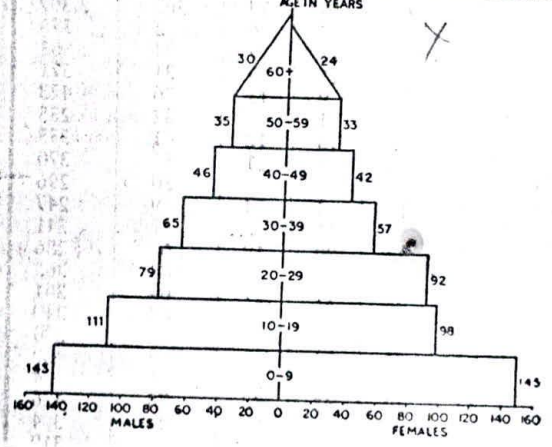
TABLE 2

Age-sex distribution of the defacto† population

Age	Defacto population		Distribution per 1,000 persons	
	Male	Female	Male	Female
0— 9	4584	4643	143	145
10—19	3562	3140	111	98
20—29	2512	2924	79	92
30—39	2071	1831	65	57
40—49	1463	1348	46	42
50—59	1123	1039	35	33
60+	959	756	30	24
Total	16274	15681	...	...

† Excludes 12 persons whose ages had not been mentioned. These persons could not be contacted; nor was any examination carried out for them.

FIG. 2. AGE PYRAMID OF DEFACTO POPULATION SURVEYED IN TUMKUR DISTRICT



figures in District Census Handbook (1951) and on comparison, no appreciable difference between these two distributions was noticeable.

3.5 Coverages

The coverages of the defacto population obtained in respect of the various stages of the survey are given in Table 3. Coverages vary from 92 per cent to 95 per cent of the eligibles.

TABLE 3

Coverages for various examinations

	No.	Percentage of defacto population	Percentage of eligible
Defacto population ...	31967	100.0	...
Tested ...	30431	95.2	95.2
Read ...	28994	90.7	95.3
Eligible for X-ray ...	22740	71.7	...
X-rayed ...	21021	65.8	92.4
Eligible for sputum examination ...	2441	7.6	...
Persons sputum examined	2333	7.3	95.5

3.6 Comparison with NTSS

The general procedures adopted in the present survey were more or less the same as in the NTSS except for the following differences:

1. A tuberculin test was offered to all in the sample.
2. Sampling technique was different. Villages and towns were selected at random from the entire district without any stratification according to size. The sampling ratio was 2.8 per cent as compared to about 0.2 per cent of the eligible population in the NTSS.
3. No village included in the random sample was given up because it was 'inaccessible'.
4. Towns or villages of the size 5,000-10,000 were excluded in the NTSS but not from the present survey. However, the headquarter town, Tumkur, was excluded.
5. As the present survey was for mainly control purposes, only persons 10 years of age and above were eligible for the X-ray examination. In the NTSS all persons 5 years of age and above were eligible for such an examination.
6. In the present survey a spot sample of sputum was examined by one direct smear for microscopy and a culture after homogenisation and centrifuging, while in the NTSS from each eligible person, two laryngeal swab cultures and if sputum was available

two direct smears for microscopy and two sputum swab cultures were obtained.

4. Results of tuberculin tests

4.1 Tuberculin reactions

Distributions of tuberculin reactions by millimetre size in eleven age groups, separately for males and females, among those without any previous BCG scars are given in Tables 4, 5. The frequency of bigger reactions as also of intermediate reactions increases in each succeeding age group. Histograms for tuberculin reactions in different age groups for the two sexes among those with no evidence of previous vaccination are shown in Fig. 3. The five year age groups in this figure do not show a clear line of demarcation between what may be called positive and negative reactors. In Fig. 4 distributions of reactions for each of the age groups 0-9 and 0-14 are shown. The distributions are what is usually called 'bimodal' with one mode near 0 mm. and the other between 22-24 mm. In age group 0-9 the 'line' of separation into unimodal distributions

TABLE 4

Distribution of persons without previous BCG scars by each millimetre of tuberculin induration in various age groups

MALES

Size of Tuberculin induration	Age Group 0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50+	Total
0	1,394	718	324	124	108	99	72	69	58	74	267	3,307
1	313	158	63	14	8	5	4	2	3	6	2	578
2	235	278	166	55	32	27	20	8	13	7	24	865
3	90	151	114	60	36	29	21	19	11	9	31	571
4	30	90	92	42	51	32	27	11	9	13	26	423
5	4	38	43	39	29	29	11	7	11	12	32	255
6	12	42	54	41	41	52	24	23	13	12	41	355
7	5	27	48	43	38	48	44	23	16	21	57	370
8	4	14	35	35	34	41	23	25	19	16	50	296
9	2	3	18	30	38	33	27	19	4	24	49	247
10	3	5	14	27	33	31	27	28	11	15	47	241
11	2	3	18	25	30	36	34	32	20	19	67	286
12	2	11	15	23	40	47	44	41	22	30	88	363
13	1	8	16	19	28	40	42	39	17	27	64	301
14	2	9	17	24	33	47	42	35	22	27	82	340
15	1	7	15	16	43	63	55	35	33	40	72	380
16	3	11	24	19	37	70	57	57	34	39	99	450
17	6	7	13	22	39	53	57	56	35	35	91	414
18	5	12	29	25	46	46	43	49	45	48	78	426
19	5	13	18	29	35	37	35	32	26	27	47	304
20	6	21	19	26	34	36	39	31	23	25	59	319
21	5	11	34	27	37	36	41	34	23	33	80	361
22	5	29	34	20	22	23	28	24	23	22	63	293
23	5	15	30	18	23	17	14	25	8	18	39	212
24	4	22	31	10	14	23	24	23	20	14	39	224
25	—	13	18	16	8	11	12	12	11	12	25	138
26	2	17	17	9	9	9	7	11	9	5	46	141
27	1	8	18	13	7	2	5	8	6	3	16	87
28	1	7	15	5	1	5	5	3	7	—	15	64
29	1	3	5	7	3	5	1	2	2	2	12	43
30+	—	3	14	—	2	5	5	5	3	4	17	58
Total	2,149	1,754	1,371	863	939	1,037	890	788	557	639	1,725	12,712

* 16 persons for whom the presence or absence of a BCG scar was not stated have been excluded from Tables 4, 5, 10 and 11.

TABLE 5

Distribution of persons without previous BCG scars by each millimetre of tuberculin induration in various age groups

FEMALES

Size of tuberculin induration	Age Group 0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Total
0	1,413	799	354	184	221	210	155	114	92	113	377	4032
1	284	190	64	35	33	13	14	7	4	8	13	665
2	244	304	179	87	113	78	41	28	20	27	52	1173
3	83	161	135	83	95	82	41	40	31	22	42	815
4	29	79	94	68	76	75	39	32	28	16	40	576
5	6	35	56	53	52	52	25	16	19	15	29	358
6	5	31	60	41	66	52	30	29	24	20	45	403
7	6	28	45	33	46	39	34	34	18	12	56	351
8	1	11	26	22	40	33	24	21	16	14	37	245
9	2	5	24	9	32	35	20	21	11	13	31	203
10	4	9	11	8	21	25	18	14	12	15	31	168
11	...	5	8	11	22	23	13	20	15	15	40	172
12	1	9	11	20	29	21	30	12	17	16	43	209
13	...	4	16	13	19	25	15	14	18	12	35	171
14	4	12	11	4	17	22	23	14	14	18	44	183
15	...	8	9	14	25	27	16	25	15	12	45	196
16	6	17	11	14	41	49	31	21	29	18	46	283
17	8	13	14	19	26	39	28	22	20	24	54	267
18	5	19	15	16	29	36	32	27	18	26	51	274
19	4	15	15	17	26	28	27	25	18	10	45	230
20	3	19	21	16	35	23	19	26	10	22	34	228
21	5	14	36	21	40	34	34	33	35	18	56	326
22	3	21	36	29	42	42	30	22	26	14	54	319
23	4	21	30	21	32	32	29	24	27	32	58	310
24	2	17	37	18	35	38	31	23	21	24	40	286
25	2	13	28	12	30	32	25	16	16	10	35	219
26	2	14	23	22	27	21	14	22	16	14	35	210
27	...	11	22	8	12	17	13	11	3	9	15	121
28	...	7	11	8	11	10	7	14	12	9	26	115
29	2	7	11	6	4	10	8	2	5	6	13	74
30+	...	12	21	6	10	22	17	14	14	10	42	168
Total ...	2128	1910	1434	918	1307	1245	883	743	624	594	1564	13350

* 16 persons for whom the presence or absence of a BCG scar was not stated have been excluded from Tables 4, 5, 10 and 11.

could be anywhere between 8 and 16 mm. In age group 0-14, this line of separation could be between 10-16 mm. Thus these histograms do not give a clear or definite line of separation between positive and negative reactors. This difficulty of defining any clear line of demarcation between a negative and a positive reaction in some communities is well recognised. Perhaps no sharp line of demarcation exists for these communities.

4.2 Definition of a positive reaction

In an attempt to define a positive reaction, the following hypothesis was propounded. If a sharp line of demarcation between 'positive' and 'negative' reactors exists, the positive reactors at this level would possibly show the best correlation with the prevalence of radiological and bacillary disease in the several age groups. To examine this hypothesis correlation co-efficients between infection rates at various levels with the radiological and bacteriological case rates in village groups were calculated. Further, so that non-specific allergy, waning of allergy or some similar factor(s) may not reduce the magnitude of these correlations, especially if infection rates in the older age groups were included, co-efficients of correlation were calculated separately between infection rates in each of the four age groups 0-4, 0-9, 0-14 and all ages at various levels of tuberculin reactions and X-ray and bacillary

FIG. 3. HISTOGRAMS SHOWING THE DISTRIBUTION OF TUBERCULIN REACTIONS BY AGE AND SEX AMONG PERSONS WITHOUT PREVIOUS BCG SCAR

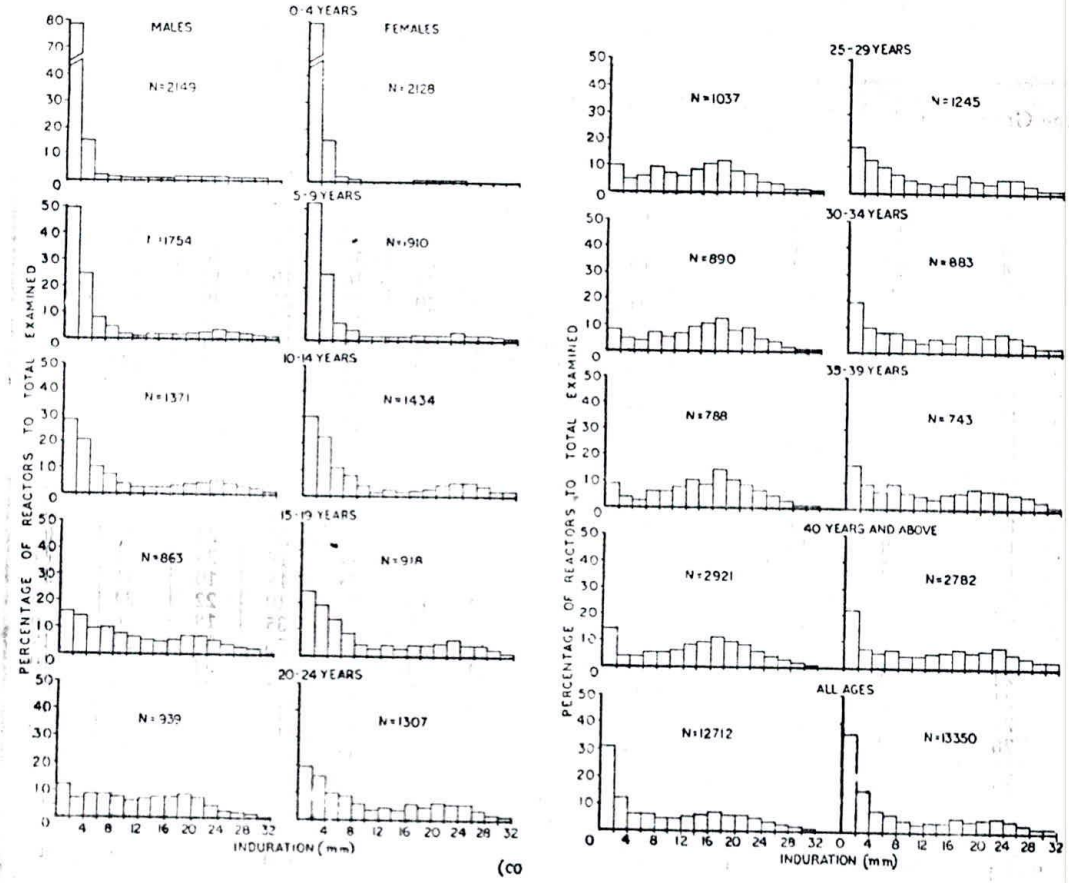


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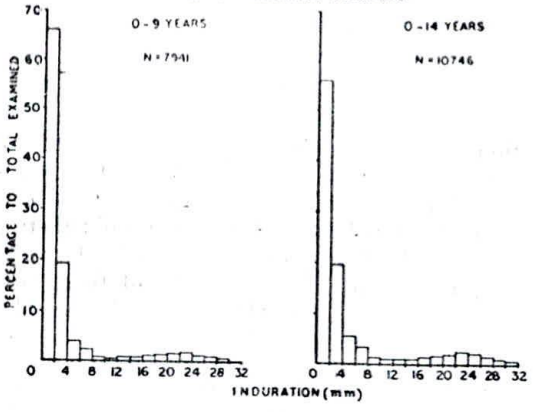
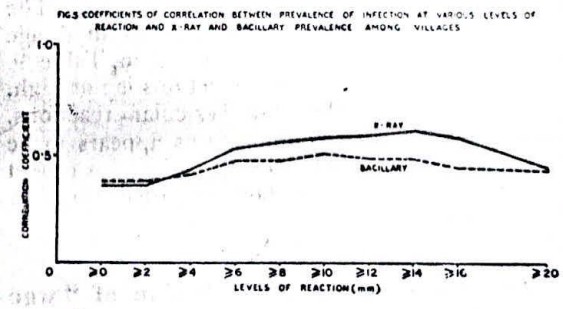
FIG 4 DISTRIBUTION OF PERSONS WITH NO BCG SCAR ACCORDING TO THE SIZE OF TUBERCULIN REACTIONS



case rates as found in age groups 10 years and above. Infection in the younger age groups could be expected to be a better index of the present or recent pool of infection in the community. But infection rates in lower age groups did not give a higher co-efficient of correlation with X-ray and bacillary case rates. The co-efficients of correlation were highest for infection rates in all age groups. These co-efficients of correlation in respect of infection rates for all ages for the 62 villages are shown in Fig. 5. The co-efficients of correlation are not significantly different at any level, and therefore do not seem to be very helpful in defining a line of demarcation between positive and negative reactions. However, for calculating infection rates in the community an induration of 10 mm. has been chosen as the reasonable minimum for a positive reaction on the basis of the histograms, the co-efficients of correlation and, it must be admitted, somewhat arbitrarily.



4.3 Infection rates

With this definition of a positive reaction for the infected, 38.3 per cent of the population examined were found infected, the figures for the two sexes separately being 42.8 per cent males and 33.9 per cent females (Table 6). For persons 10 years and above (not shown in the table) infection rate for males is 58.5 per cent and for females 45.2 per cent. Table 6 also shows the number and percentage of persons infected in other specified age groups for each sex. The percentage of infected persons rises with age reaching a maximum at about 40 years. Thereafter this percentage is rather steady. For age group 10-19 years and above, infection rates are consistently higher among males than among females, the difference being most marked between 20 and 60 years of age, the peak being at 30-39 years. Difference in the infection rates in the two sexes has also been reported by Benjamin (1951).

4.4 Infection in village and town groups

Table 7 gives the number and percentage of infected persons in the 62 villages and the four town groups. The number of persons test-read in the four town blocks is only 1603 and may not be adequate for drawing a definite conclusion. For this reason the four town groups have been excluded from some of the tables.

Distribution of 62 villages by prevalence of infection is given in Table 8. In one of the rural groups, the defacto population was 5.

TABLE 6

Sex and age specific prevalence of infection

Age group	No. Test Read			No. infected (Reactors ≥10 mm.)		
	Male	Female	Total	Male	Female	Total
0–4	2,149	2,128	4,277	60 (2.8)	55 (2.6)	115 (2.7)
5–9	1,754	1,910	3,664	235 (13.4)	267 (14.0)	502 (13.7)
10–19	2,234	2,352	4,586	794 (35.5)	700 (29.8)	1,494 (32.6)
20–29	1,976	2,552	4,528	1,166 (59.0)	1,109 (43.5)	2,275 (50.2)
30–39	1,678	1,626	3,304	1,199 (71.5)	861 (53.0)	2,060 (62.3)
40–49	1,196	1,218	2,414	845 (70.7)	695 (57.1)	1,540 (63.8)
50–59	945	905	1,850	671 (71.0)	493 (54.5)	1,164 (62.9)
60+	780	659	1,439	475 (60.9)	349 (53.0)	824 (57.3)
Over-all	12,712	13,350	26,062	5,445 (42.8)	4,529 (33.9)	9,974 (38.3)

(Figures in brackets represent per cent infected)

TABLE 7

Sex specific prevalence of infection in rural and semi-urban groups

	Male		Female		Total		
	Tested and Read	Reactors >10 mm	Tested and Read	Reactors >10 mm	Tested and Read	Reactors >10 mm	Prevalence
Rural ...	11,942	5,074	12,521	4,196	24,463	9,270	37.9
Semi-Urban ...	773	371	830	333	1,603	704	43.9
Total ...	12,715	5,445	13.351	4,529	26,066	9,974	38.3

TABLE 8

Distribution of the villages by prevalence of infection

Infection Rate	Number of villages according to defacto population size				Total
	<250	250-499	500-749	750+	
0-4	1	...	...	...	1
5-9	...	...	...	...	...
10-14	...	...	...	...	...
15-19	...	1	...	...	1
20-24	2	2	1	1	6
25-29	7	4	3	2	16
30-34	3	5	3	1	12
35-39	3	3	3	...	9
40-44	3	1	1	1	6
45-49	...	3	...	3	6
50-54	1	...	...	1	2
55-59	...	...	...	1	1
60-64	1	...	...	1	2
Total ...	21	19	11	11	62

Of these four were tested and one found positive. In 37 of the remaining 61 villages, percentage of positive reactors varied from 25 to 39.

4.5 Complications of tuberculin reactions

Oedema, necrosis, vesicles or bullae were recorded, if present, for each tuberculin reaction that was read. Sometimes more than one complication was present. The distribution of these complications in 4 age groups in the two sexes is given in Table 9. The incidence of bullous reactions is not high. These include the few vesicular reactions. The incidence of complications appears to be higher in the females for all age groups except 0-4. Necrosis was not recorded in any reaction.

4.6 Sex reversal of proportion of 'large reactors'

Age specific curves taking 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and 24 millimetre induration as the minimum levels for 'positive' reactions were drawn for the two sexes. It was seen that although the percentage of reactors at all levels below 14 mm. was greater among males than among females, the percentage of reactors at levels 20 mm. and above was higher among females for all age groups above 15 years. This has been illustrated in Fig. 6 by age specific curves for reactors with indurations equal to or larger than 6, 14 and 20 mm. for the two sexes separately. The percentage of reactors at the 18 mm. level was more or less equal in the two sexes (Fig. 7). This greater frequency of bigger tuberculin reactions in the female has also been noticed in another study carried out by the NTI (1960).* The significance of this phenomenon of 'Sex-reversal of proportion of large reactors' which does not seem to have

TABLE 9

Distribution of complications of tuberculin test with 1 TU RT 23 by age and sex

Age Group	Males					Females					Overall rate per 1,000
	Oedema	Bulla	Both	Total	Rate per 1,000	Oedema	Bulla	Both	Total	Rate per 1,000	
0-4 ...	15	2	9	26	12.1	9	3	11	23	10.8	11.4
5-9 ...	65	2	12	79	45.0	86	3	29	118	56.5	51.0
10-20 ...	181	5	20	206	92.2	206	4	27	237	100.7	96.6
>20 ...	242	13	22	277	42.1	394	15	69	478	68.7	55.8
Overall ...	503	22	63	588	46.2	695	25	136	856	64.1	55.4

* Dodballapur Training Survey (1960)—Unpublished data.

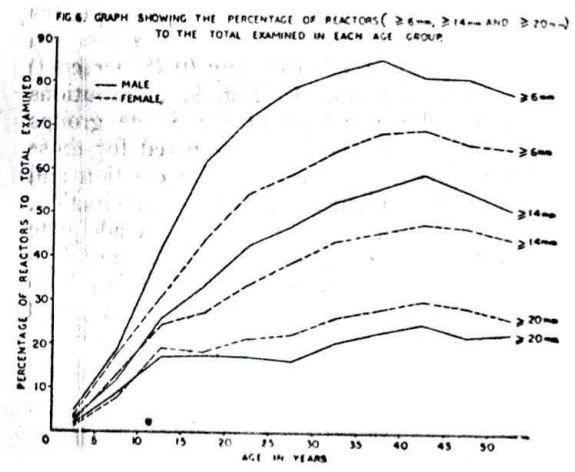


FIG 6. GRAPH SHOWING THE PERCENTAGE OF REACTORS TO THE TOTAL EXAMINED IN EACH AGE GROUP

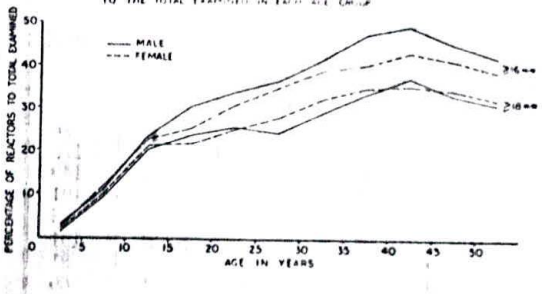


FIG 7. GRAPH SHOWING THE PERCENTAGE OF REACTORS TO THE TOTAL EXAMINED IN EACH AGE GROUP

been noticed before, is not clear. But this observation appears to be in line with the earlier observation of higher incidence of complications of tuberculin reaction in the female although the total number of reactors among them is lower.

4.7 Tuberculin reactions among patients

Figure 8 shows the tuberculin reactions among X-ray and bacillary cases. There were in all 392 X-ray cases of whom tuberculin reactions were available in 379. There were 86 bacillary cases in all, among whom tuberculin reactions were available in 85. Of the X-ray cases 291 or 77 per cent were positive tuberculin reactors. Of the bacillary cases 73 or 86 per cent were tuberculin reactors. Similar findings with 1.0 mgm. of standard old tuberculin were reported by Gass and his co-workers (McDougall, 1949) 'Among subjects regarding whom on the basis of an X-ray picture 4 independent specialists agreed that there were definite tuberculosis lesions, 24.7

FIG 8. DISTRIBUTION OF RADIOLOGICALLY ACTIVE AND BACILLARY CASES BY SIZE OF TUBERCULIN INDURATION

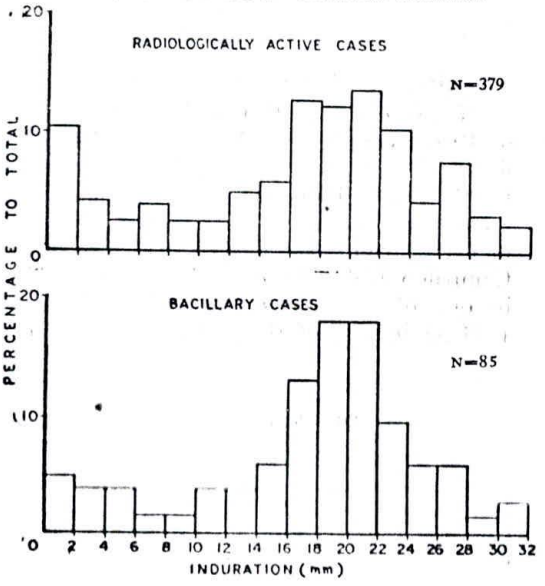
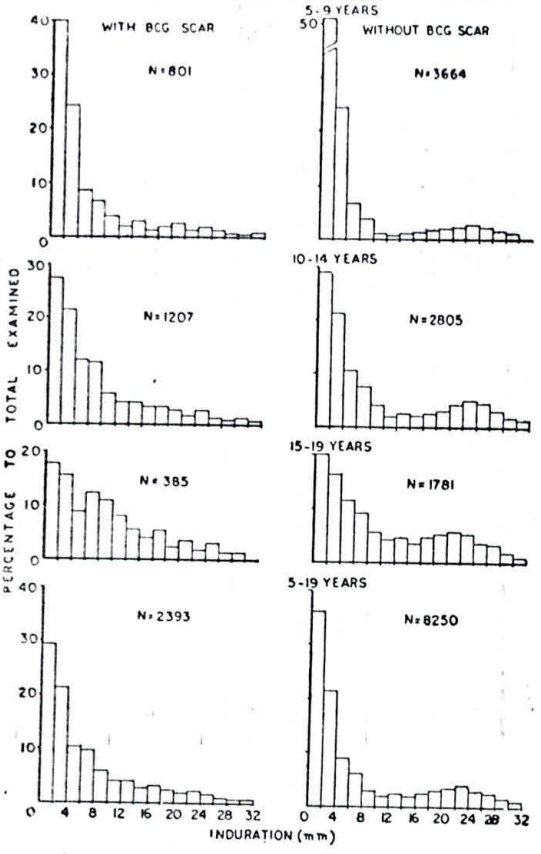


FIG 9. DISTRIBUTION OF TUBERCULIN REACTIONS AMONG PERSONS WITH AND WITHOUT BCG SCAR IN DIFFERENT AGE GROUPS



per cent showed completely negative tuberculin reactions'. Limitations of an index for infection rates have to be kept in mind.

4.8 Retests of persons with BCG scars

Of the total 28,994 tested and read, 2,916 or 10 per cent showed BCG scars, definite or doubtful. Distributions of tuberculin reactions for these by millimetres size in 11 age groups separately for males and females are given in Table 10 and 11. A Mass BCG Vaccination Campaign had been carried out during 1952 in one of the taluks (Kunigal) and during 1954-55 in rest of the district. 30 per cent of the children in the age group 10-14 years and 18 per cent in each of the two age groups 5-9 and 15-19 years showed such scars. In the age group 0-4 hardly any (0.75 per cent) showed such scars. In Fig. 9, distributions of tuberculin reactions in the 3 age groups 5-9, 10-14 and 15-19 are compared for those with no evidence of previous vaccination and those with evidence of previous vaccination. The 3 age groups do not show an adequate level of post-vaccination allergy. From tables 10 and 11 it can be calculated that for both sexes among the vaccinated 61.4 per cent of the persons in age group 5-19 years show in-

TABLE 10

Distribution of persons with previous BCG scars by each millimetre of tuberculin induration among various age groups

MALES

Size of tuberculin induration	Age group 0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Total
0	11	140	175	35	8	12	3	5	1	1	3	392
1	...	34	34	7	1	...	...	...	...	...	...	76
2	5	61	82	20	4	1	1	...	...	1	...	175
3	...	49	67	14	9	6	3	1	...	...	...	149
4	...	31	53	11	2	1	2	1	...	...	...	101
5	...	11	28	10	1	2	...	1	...	...	2	55
6	1	18	57	14	4	2	3	2	...	...	...	101
7	...	12	35	17	3	5	4	4	1	...	...	81
8	...	10	28	14	3	1	3	...	...	...	1	60
9	...	4	21	16	4	2	1	...	...	1	...	49
10	...	6	12	13	2	1	2	4	...	...	1	41
11	..	3	16	10	2	3	2	1	1	..	...	38
12	...	7	18	13	3	2	1	1	3	1	...	49
13	...	6	15	6	2	3	1	2	...	1	1	37
14	...	1	13	5	3	5	1	...	1	1	...	30
15	...	3	12	9	5	1	1	...	2	...	...	33
16	...	4	11	6	3	1	2	1	...	1	2	31
17	...	5	17	5	1	...	2	...	...	...	1	31
18	...	6	15	4	4	2	1	1	1	1	...	35
19	...	4	6	...	3	3	...	1	...	...	...	17
20	...	3	4	7	2	2	...	1	...	...	1	20
21	...	2	7	3	1	1	...	1	2	1	...	18
22	...	2	9	3	2	...	...	...	1	...	...	17
23	...	5	7	2	2	..	1	...	...	...	...	17
24	...	3	6	1	1	2	...	...	...	...	1	14
25	...	1	3	2	...	...	1	...	...	...	...	7
26	...	2	2	1	...	...	...	...	...	...	1	6
27	...	1	5	1	1	...	...	...	...	1	...	9
28	...	...	2	...	...	...	...	...	...	...	...	2
29	...	1	4	3	...	...	...	1	...	...	...	9
30+	...	3	3	...	...	1	...	...	..	...	...	7
Total ...	17	438	767	250	76	59	35	28	13	10	14	1,707

* 16 persons for whom the presence or absence of a BCG scar was not stated have been excluded from Tables 4, 5, 10 and 11.

duration of 5 mm. or lower and 23.9 per cent '0' mm induration. The post-vaccination allergy as elicited by 1 TU RT 23 with tween is by no means high. Either the vaccine was weak or the allergy produced had waned, or perhaps 1 TU RT 23 is not a good dose for eliciting post-vaccination allergy or being somewhat softer, post-vaccination reactions are possibily more difficult to read.

4.9 Incidence of infection

From the age specific infection rates among those with no evidence of previous vaccination, an attempt has been made to estimate, on the basis of certain assumptions, the annual incidence of infection (see Appendix IV). For the several age groups upto 35 years, the incidence of infection is shown in Table 12 and Fig. 10 (left half). The annual incidence of infection rises upto 15 years of age. After this age differences in incidence rates among the remaining age groups are not marked. There is a decline in the incidence rates in later years. The right half of figure 10 shows the incidence of infection when figures have been adjusted for the BCG vaccinated people among the population (Appendix IV). After this adjustment the incidence of infection seems to rise

TABLE 11

Distribution of persons with previous BCG scars by each millimetre of tuberculin induration among various age groups

FEMALES

Size of tuberculin induration	Age group 0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Total
0	6	116	89	25	14	9	6	4	4	3	7	283
1	...	25	30	3	5	1	...	1	...	...	...	65
2	1	47	57	12	8	7	1	1	...	...	...	134
3	1	40	51	14	7	4	3	1	...	1	...	122
4	2	15	37	5	4	5	3	...	...	1	...	72
5	1	14	27	9	2	3	...	1	...	...	...	57
6	...	9	22	6	5	6	4	1	4	1	..	58
7	1	15	19	10	6	1	3	...	...	1	1	57
8	...	10	10	6	2	1	1	1	1	...	...	32
9	...	7	10	6	2	2	...	2	...	1	...	30
10	...	3	11	3	3	1	1	2	...	...	...	24
11	1	4	9	5	3	1	2	...	...	...	...	25
12	...	3	8	1	3	1	2	2	2	...	...	22
13	...	7	5	1	1	2	3	1	...	...	...	20
14	1	3	4	...	3	...	...	...	...	...	...	11
15	...	4	9	1	1	3	...	...	...	...	...	18
16	...	4	4	8	1	1	2	...	...	1	...	21
17	1	3	5	1	1	...	...	2	...	...	...	13
18	...	4	5	3	1	2	...	...	1	...	...	16
19	...	6	4	1	2	2	...	1	1	...	1	18
20	...	4	3	3	...	...	...	1	1	...	1	13
21	...	2	3	...	2	2	2	...	2	1	...	14
22	...	5	7	...	...	...	...	1	...	1	...	14
23	...	3	4	1	4	1	1	...	1	...	...	15
24	...	4	1	6	1	...	1	1	...	1	...	15
25	...	2	2	2	2	...	3	...	...	...	...	11
26	...	1	2	1	...	...	...	...	...	...	...	4
27	...	1	1	1	...	...	1	...	...	...	...	4
28	...	...	2	...	...	...	...	...	...	...	...	2
29	...	1	3	1	1	...	1	...	...	...	...	7
30+	...	4	4	1	...	...	1	1	...	...	1	12
Total ...	15	366	448	136	84	55	41	24	17	12	11	1,209

• 16 persons for whom the presence or absence of a BCG scar was not stated have been excluded from Tables 4, 5, 10 and 11.

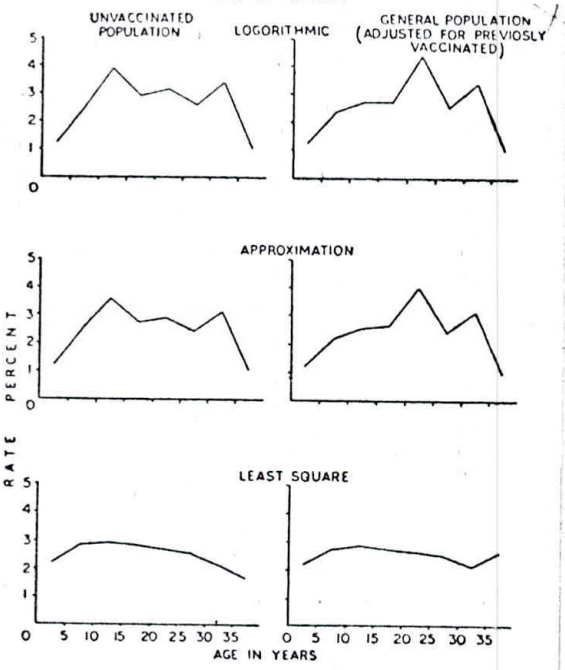
TABLE 12

Estimates of incidence of infection (> 10 mm) in the unvaccinated and general population (See Appendix IV)

Age group	Prevalence among unvaccinated	Incidence rate of infection among Unvaccinated population by the method of			Incidence of infection among general population by the method of		
		Log	Approx.	Least squares	Log	Approx.	Least squares
1	2	3	4	5	6	7	8
0–4	2.7	1.09	1.08	2.18	1.09	1.08	2.11
5-9	13.7	2.38	2.26	2.78	2.29	2.16	2.69
10–14	28.9	3.81	3.52	2.81	2.69	2.49	2.72
15–19	38.3	2.80	2.64	2.79	2.65	2.58	2.70
20–24	47.1	3.04	2.85	2.69	4.39	4.02	2.61
25–29	53.4	2.51	2.38	2.48	2.51	2.38	2.43
30–34	60.7	3.35	3.13	2.12	3.35	3.13	2.11
35+	62.4	0.89	0.87	1.60	0.89	0.87	2.65

upto age group 20-24. Thereafter there is a decline in the incidence of infection. The reason (s) for this decline in incidence rates is (are) not understood. It is not due to the number of uninfected persons who are still at risk being insufficient after 20-24 years. Could it be due to waning of allergy perhaps due to desensitization by repeated small infections with specific or non-specific agents or perhaps due to some other factor which may be specific to these higher age groups? Further investigations may be necessary to explain this decline.

FIG. 10. ESTIMATED ANNUAL INCIDENCE OF INFECTION BY VARIOUS AGE GROUPS FOR THE UNVACCINATED AND GENERAL POPULATION ADJUSTED FOR PREVIOSLY VACCINATED BY THE LOGORITHMIC, APPROXIMATION AND LEAST SQUARE METHOD.



5. Results of X-ray examination

5.1 General considerations

The aim of X-ray examination in surveys is to find out an estimate of the prevalence of disease. Difficulties in X-ray interpretation are well known. To reduce the extent of under-reading it is considered necessary to have two independent readers. Many of the cases missed by one reader are picked up by the other under this procedure, but at the same time the number of over-readings increases. A correlation of the readings of the

TABLE 13 (3)

Correlation between the radiological findings of the two readers

MALES

Reader II

		Normal	Unsatisfactory films	Calcification only	A	B	C	D	Total
Reader I	Normal	8,835	15	195	77	301	32	...	9,455
	Unsatisfactory films	45	148	...	2	...	1	...	196
	Calcification only	203	...	259	6	44	3	...	515
	A	41	...	3	38	24	18	6	130
	B	119	...	11	24	65	26	1	246
	C	16	...	1	13	38	86	28	182
	D	...	...	...	1	...	11	69	81
Total	...	9,259	163	469	161	472	177	104	10,805

TABLE 14 (4)

Correlation between the radiological findings by the two readers

FEMALES

Reader II

		Normal	Unsatisfactory films	Calcification only	A	B	C	D	Total
Reader I	Normal	8,504	21	194	170	214	30	1	9,134
	Unsatisfactory films	49	140	2	1	2	1	...	195
	Calcification only	101	...	275	14	25	3	...	418
	A	92	...	8	80	20	11	4	215
	B	66	...	5	23	35	19	...	148
	C	11	...	...	15	14	36	11	87
	D	...	...	...	...	1	4	14	19
Total	...	8,823	161	484	303	311	104	30	10,216

two readers in the present material according to classification shown in Appendix III is presented in Table 13 and Table 14 for males and females separately. Percentage agreement between the two readers for each category of X-ray reading has been calculated by taking the total read by at least one of the two readers as the denominator and the total read by both readers as the numerator. Thus in Table 13 (for males) and category of reading D we find that Reader I read 81 films as D and Reader II read 104 as D while both of them read only 69 as D, thus showing an agreement in 59 per cent amongst the total 116 cases read as D in males by either reader. The percentages of agreement for some categories of X-ray cases are as follows:

	Males %	Females %	For both %
'D'	59	40	55
'C' or 'D'	55	37	49
'C'	32	23	29

In general, there is greater agreement between the readers in respect of the films of males. The greatest agreement is seen in the category of reading D, viz., 59 per cent for males and 40 per cent for females. The agreement for the category C or D is only slightly lower, but the coverage of bacillary cases is considerably higher as shown by the following results.

(There were in all 84 bacillary cases among those x-rayed).

Category of X-ray reading	No. of cases	Bacillary cases	% Bacillary
D by both	83	42	50.6
D by either	151	54	35.8
C or D by both	259	60	23.2
C or D by either	525	71	13.5

One may use bacillary findings for choosing a suitable index of radiologically active disease. D by either or both does not give a satisfactory coverage of the bacillary cases. C or D by 'either' reader gives the greatest coverage of bacillary disease while C or D by 'both' reader yields a larger percentage of bacillary cases. These two latter indices could be used as a lower and an upper limit for the true prevalence of disease. If agreement between the two readers become closer, the difference between the lower and upper limits would be smaller. In the present study the agreement between the two readers for C or D cases was 49 per cent.

5.2 Umpire reading

Following Yerushalmy (1956) the 266 disagreed films i.e., read as C or D by only one of the two readers, were submitted to umpire reading. A list of the 266 films was prepared. The readings of the two readers were arranged. In two columns with the more 'serious' of the two readings in the right hand column. The umpire thus knew the readings of the two readers but not the identity of the reader for any reading. He recorded his readings in a separate column on the list. Tables 15 and 16 show correlation between the readings of the umpire and I and II readers respectively. Out of the 110 disagreed cases read by reader I only 31 (or 30 per cent) was confirmed. Out of 156 cases by reader II, 102 (or 65 per cent) were confirmed. It is seen that 133 (i.e., one half of the disagreed cases) were confirmed in the umpire reading. These included 10 out of the 11 bacillary cases among 266 disagreed films. Thus the coverage of bacillary cases was better when the method of umpire reading was used.

5.3 Choice of an index for prevalence of radiological disease

One may use any of the above indices or readings by any one reader as a means to denote disease in the community. In search for the 'best' index, correlations of the various indices with prevalence of infection and bacillary case rates were calculated. These along with bacillary findings and prevalence rate of X-ray cases according to each index are shown

TABLE 15

Correlation between the readings of reader I and those of umpire reader

READER I

UMPIRE	Normal	Unsatisfactory films	Calcification only	A	B	C	D	Total
Normal	10	...	...	...	...	13	...	23
Unsatisfactory films	...	...	...	...	...	1	...	1
Calcification only	...	...	1	...	...	...	...	1
A	6	...	...	4	1	27	...	38
B	13	...	1	2	16	38	...	70
C	33	1	4	26	28	28	1	121
D	1	1	...	7	1	1	1	12
Total	63	2	6	39	46	108	2	266

TABLE 16

Correlation between the readings of reader II and those of umpire reader

		READER II							
		Normal	Unsatisfactory films	Calcification only	A	B	C	D	Total
UMPIRE	Normal	13	...	...	...	...	10	...	23
	Unsatisfactory films	1	...	...	...	...	...	...	1
	Calcification only	...	...	...	...	...	1	...	1
	A	5	...	...	18	4	9	2	38
	B	5	...	2	5	26	30	2	70
	C	2	1	...	4	22	92	...	121
	D	...	...	...	2	...	2	8	12
	Total	26	1	2	29	52	144	12	266

TABLE 17

Comparison of various indices of prevalence of X-ray cases

Category of X-ray Cases	No. of cases in given X-ray category	Bacillary cases in given X-ray category		% of reactors to 1 TU (≥ 10 mm)	% of total bacillary cases missed	*Correlation co-efficient with prevalence of		Prevalence rate %
		No.	%			reactors	Bacillary cases	
C or D by I Reader	369	63	17.1	73.2	25.0	0.59	0.41	1.76
C or D by II Reader	415	68	16.4	78.4	19.0	0.61	0.38	1.97
C or D agreed by both readers ...	259	60	23.2	80.6	28.6	0.63	0.49	1.23
C or D by either reader ...	525	71	13.5	73.6	15.5	0.58	0.32	2.50
C or D agreed by both readers + C or D by umpire	392	70	17.8	77.0	16.7	0.58	0.41	1.86

Sputum positive cases among the X-rayed = 84 (excluding two bacillary cases not X-rayed).

* Correlation co-efficient calculated on the basis of 62 villages only.

in Table 17. C or D cases by 'both' readers gives the highest co-efficient of correlation (though not significantly different) with bacillary cases (0.49) and with tuberculin reactors (0.63). But this index as shown earlier misses 24 i.e., 29 per cent out of the total 84 bacillary cases and may not thus be the best representative of X-ray disease in the survey area.

Among the 62 villages, as shown later in Table 24, as many as 30 did not have a single bacillary case. Co-efficients of correlation

TABLE 18

Co-efficients of correlation (c.c.) of disease prevalence, according to different categories of diagnosis, with prevalence of (1) bacillary cases and (2) infected, among different types of villages

Category of diagnosis	Type of village				
	All villages		Villages with Bacillary case		Villages without Bacillary case
	c.c. with Bac. cases	c.c. with infected	c.c. with Bac. cases	c.c. with infected	c.c. with infected
C or D by Reader I	0.41	0.59	0.61	0.70	0.46
C or D by Reader II	0.38	0.61	0.54	0.67	0.56
C or D agreed by both readers	0.49	0.63	0.67	0.66	0.53
C or D by either reader	0.32	0.58	0.51	0.71	0.50
C or D agreed by both readers + C or D by umpire	0.41	0.58	0.65	0.65	0.52
Bacillary cases	...	0.51	...	0.42	...

calculated separately for the villages with and without bacillary cases are shown in Table 18. Co-efficients of correlation for both infection and bacillary disease with various categories of X-ray cases are invariably higher (though not significantly different) for villages with bacillary cases.

A consideration of all the data presented above does not make the choice of a suitable index (of the 'best' index) for X-ray disease in the community easier or definite. There may not be much to choose between different indices, but keeping in view the bacillary cases covered, agreement with the umpire and various co-efficients of correlation, two indices appeared suitable, namely, C or D by both plus those confirmed by the umpire from the disagreed films between the two readers and C or D by reader II only. Co-efficients of correlation for these two indices with infection rates in the total population at four different levels for a positive tuberculin test were as follows:

	at 8 mm	at 10 mm	at 12 mm	at 14 mm
C or D by both plus those confirmed by the umpire ...	0.56	0.58	0.59	0.61
C or D by II reader only ...	0.56	0.61	0.63	0.63

The differences are not significant and choice between indices remains indefinite. On general considerations it may not be desirable to prefer the readings of a single reader because the results would not be easily comparable. It was, therefore, decided to prefer a 'method' rather than an individual reading and C or D by both plus those confirmed by the umpire was selected as the suitable index to represent amount of radiologically active disease in the area surveyed. This had also given a better coverage for bacillary cases, i.e., 70 or 83 per cent out of the total 84 bacillary cases discovered among those X-rayed. Unless otherwise stated this index only has been used as indicative of Radiologically Active Disease in this paper.

5.4 Prevalence rates for radiologically active disease

According to this index prevalence of radiologically active tuberculosis for all persons X-rayed by age and sex groups is shown in Table 19. The overall prevalence rate is 1.9 per cent, respective figures for males and females being 2.5 per cent and 1.2 per cent. About 66 per cent of the total X-ray disease was in the age group 40 years and above. Prevalence rates are higher among males than among females for all age groups except 10-19 years. This greater prevalence among males is especially well marked after the age of 30 years and increases with rise in age. The higher prevalence of disease in the female in the age group 10-19 years was also seen in the NTSS.

Table 20 shows the distribution of villages by X-ray disease rate and size of village. Eight villages with a population of over 900

TABLE 19

Sex and age prevalence of radiologically active disease

Age group	No. X-rayed			Radiologically active disease					
				Male		Female		Total	
	Male	Female	Total	No.	%	No.	%	No.	%
10-19 ...	3,402	2,991	6,393	9	0.3	17	0.6	26	0.4
20-29 ...	2,304	2,708	5,012	18	0.8	17	0.6	35	0.7
30-39 ...	1,892	1,716	3,608	53	2.8	18	1.0	71	2.0
40-49 ...	1,347	1,261	2,608	46	3.4	26	2.1	72	2.8
50-59 ...	1,019	948	1,967	67	6.6	26	2.7	93	4.7
60+ ...	841	592	1,433	78	9.3	17	2.9	95	6.6
Overall ...	10,805	10,216	21,021	271	2.5	121	1.2	392	1.9

TABLE 20

Distribution of villages by radiologically active disease

X-ray rate per 100 X-rayed	Number of villages according to defacto population size				Total
	<250	250-499	500-749	750+	
0	7	1	...	...	8
0- (excl. '0')	2	6	2	2	12
1-	4	5	7	4	20
2-	2	5	2	3	12
3-	2	2	...	2	6
4-	3	...	...	...	3
5-	...	...	...	...	...
6-	...	...	...	...	...
7-	1	...	...	...	1
Total	21	19	11	11	62

did not show a single X-ray active case. Half of the villages showed a prevalence rate from 1 to 3 per cent. One village with a population of 152 X-rayed had 7 X-ray cases, 4 of which were bacteriologically positive.

5.5 Other radiological findings

In addition to reading X-ray pathology as active, other findings on the X-ray films as in Appendix III were also recorded, and are presented in Table 21 by each reader and by the umpire for the C or D cases read by each of them. Bacillary cases have been shown in brackets. Reader I read in all 74 cavitary cases, definite or doubtful, among the 369 active cases read by him. Reader II read 56 cavitary cases among the 415 active cases read by him. Of the 74 cavitary cases read by reader I, 32 were bacillary. Of the 56 cavitary cases read by reader II, also 32 were positive bacteriologically. Reader I read in the total, 3 active cases due to pleurisy with effusion and 1 due to hilar adenitis. Reader II read 13 cases in each of the two categories. None of the cases in either of these two categories by either reader was positive on sputum examination. Readings of the umpire for the 133 C or D cases from among the disagreed cases by the two readers are also shown.

6. Results of bacteriological examination

6.1 Bacillary cases

Table 22 shows the number and percentage of bacillary cases in the several age and sex groups as found by examination of a single 'spot' sample of sputum. The percentage of bacillary cases especially among the males rises with age as has been seen for radiologically active cases and infected persons. The percentage of bacillary cases also is higher among

TABLE 21

Pathology and aetiology of C and D cases of each reader separately
(See Appendix III)

Reader	Aetiology	Pathology					Total
		a	b	c	d	e	
First	C	1	4	260 (19)	3	1	269
	D	45 (24)	24 (8)	30 (12)	1	...	100
Second	C	...	...	259 (16)	10	12	281
	D	34 (22)	22 (10)	74 (20)	3	1	134
Umpire	C	...	6	109 (7)	3	3	121
	D	4 (2)	2	3 (1)	2	1	12

Figures in brackets show bacillary cases

TABLE 22

Age and sex specific prevalences of bacillary cases in the defacto population examined

Age group	No. X-rayed			No. of sputa positive by either method		
	Male	Female	Total	Male	Female	Total
10–19	3,402	2,991	6,393	2 (0.06)	4 (0.13)	6 (0.09)
20–29	2,304	2,708	5,012	9 (0.39)	6 (0.22)	15 (0.30)
30–39	1,892	1,716	3,608	15 (0.79)	7 (0.41)	22 (0.61)
40–49	1,347	1,261	2,608	12 (0.89)	3 (0.24)	15 (0.58)
50–59	1,019	948	1,967	12 (1.18)	2 (0.21)	14 (0.71)
60+	841	592	1,433	10 (1.19)	4 (0.68)	14 (0.98)
Overall	10,805	10,216	21,021	60 (0.56)	26 (0.25)	86 (0.41)

Figures in brackets represent percentages

males in all age groups except 10-19 years. The bacillary cases found in the different age groups are however small. 0.41 per cent of the total X-rayed population (0.56 per cent males and 0.25 per cent females) have been found to excrete tubercle bacilli. It can be calculated from the table that 50 per cent of the bacillary cases were found in age group 40 years and above. The X-ray findings of the two readers for the bacillary cases have been correlated in Table 23. One bacillary case, was read normal by both readers. Sputum examination had

TABLE 23

Correlation between the radiological findings of the two readers among bacillary cases

Reader I	Reader II: Normal	Unsatisfactory films	Calcification only	A	B	C	D	Not X-rayed	Total
Normal ...	1	...	...	2	4	2	...	...	9
Unsatisfactory films ...	...	1	...	...	...	1	...	...	2
Calcification only ...	...	...	...	...	...	...	...	...	...
A ...	1	...	1	1	1	1	2	...	5
B ...	...	...	...	...	1	2	...	...	5
C ...	...	...	...	2	1	8	8	...	19
D ...	...	...	...	...	...	2	42	...	44
Not X-rayed ...	...	...	...	...	...	...	...	2	2
Total ...	2	1	1	5	7	16	52	2	86

been requested by one of the readers with the remark that there was 'hair shadow' on the right apex. 4 further cases had been read as normal or non-tubercular pathology by both the readers. One reader had read in all as many as 9 bacillary cases as normal radiologically.

Distribution of the 86 bacillary cases as found positive by different techniques was:

Positive by direct smear	59
Positive by culture	66
Positive by culture and direct smear	39
Positive by direct smear, culture contaminated	4

It may be seen that 27 or 46 per cent bacillary cases were added by culture to those positive by direct smear.

Distribution of villages by bacillary case rates is given in Table 24. It will be seen that in as many as 30 villages, comprising 5,367 persons X-rayed, not a single bacillary case was found. These 30 villages represent about 25 per cent of the population X-rayed. On the other hand one village with an X-rayed population of 152 showed as many as 4 bacillary cases.

Number and percentage of bacillary cases among the X-ray cases in different age groups is presented in Table 25 separately for males and females. Except in the age group 10-19, the percentage of bacillary cases with advance of age among the X-ray cases drops steadily. This greater frequency of abacillary lesions with advance in age could be due to either

TABLE 24

Distribution of villages by the bacillary case rates according to the size of population

Bact. prevalence rate	Number villages of according to defacto population size				Total
	<250	250-499	500-749	750+	
0	16	9	4	1	30
1	...	...	...	2	2
2	...	...	2	1	3
3	...	5	1	1	7
4	...	2	1	1	4
5	...	...	1	1	2
6	1	...	...	1	2
7	...	1	...	2	3
8	...	...	1	1	2
9	...	...	1	...	1
10	...	...	...	...	...
11	...	1	...	...	1
12	...	...	...	...	...
13	...	1	...	...	1
14	1	...	...	...	1
15	...	...	...	...	...
16	...	...	...	...	...
17	1	...	...	...	1
18	...	...	...	...	...
19	...	...	...	...	...
20+	2	...	...	...	2
Total	21	19	11	11	62

accumulation of old abacillary lesions with advance in age or due to new lesions in older age groups being more often abacillary, or judgement regarding activity of a lesion being

TABLE 25

Number and percentage of bacillary cases among X-ray cases in different sex and age groups

Age group	X-ray cases		Bacillary cases		Percentage	
	Male	Female	Male	Female	Male	Female
10–19	9	17	2	3	22.2	17.6
20–29	18	17	8	4	44.4	23.5
30–39	53	18	14	5	26.4	27.8
40–49	46	26	11	2	23.9	7.7
50–59	67	26	11	1	16.4	3.8
60+	78	17	8	1	10.3	5.9
Overall	271	121	54	16	19.9	13.2

probably less reliable from a single picture in older people.

6.2 Contamination rates

The maximum distance from the field to the NTI was over a hundred miles and from the NTI to the UMTS Laboratory, 75 miles. It took one to thirteen days for the sputum samples to be delivered at UMTS. Among the 2333 samples of sputa cultured, both tubes were contaminated in 395 (i.e., 17 per cent of the samples) and one tube was contaminated in another 536 samples (23 per cent). Among the contaminated, 616 cultures were repeated from the material left over from the first cultures and preserved in a refrigerator. A total of 2 from both tube contaminations and 12 from one tube contaminations were found positive in these repeat cultures.

The unusually high contamination rate of 40 per cent was considered to merit further study. The influence of the following characteristics on contamination was analysed.

(*i*) X-ray category of the examinee
(*ii*) Age of the examinee
(*iii*) The interval between collection of the sputum sample and its inoculation in the culture medium
(*iv*) Seasonal variation as shown by a study of weekly fluctuations in contaminations

None of these factors could be held responsible for the high contamination rate.

6.3 Absentees for examination

Sputum could not be collected from 108 persons out of 2,441 persons eligible (Table 3). These included 13 X-ray cases read as C or D by both the readers.

The number of bacillary cases found in this study should be taken as a minimum, because the collection of a single 'spot' sample of sputum and the presumption that all the absentees at sputum examination had negative sputa and the high contamination rate. all-tend to reduce the number of bacillary cases detected.

7. Other results

7.1 Standardised rates

In order to make figures comparable, it is usual to compute standardised rates which take into account differences in the sex and age composition of the population examined and the actual population. The age and sex distribution of the population in the district as in 1960 being not known, this standardisation is not feasible. Since the absentee rates have been found to vary in the different age and sex groups, it was considered desirable to make due allowance for this and calculate standardised rates assuming that the prevalence rate among the absentees was the same as among those examined in each age and sex group. These standardised rates worked out to be 38.3 per cent for infection, 1.86 for X-ray cases and 0.41 per cent for bacillary cases, the latter two for ages 10 years and above only. These standardised rates are not different from the prevalence rates for the population examined due to high coverages obtained during the survey.

7.2 Estimates for the district

The population of Tumkur district excluding the headquarter town of Tumkur was estimated to be 12.2 lakhs during November, 1960, the middle point of the Baseline Survey period. Appendix V gives details of findings for each group in the survey.

Standard error and co-efficient of variation for three prevalence rates are given in Table 26 (Appendix VI). It may be seen that a co-efficient of variation of 5 per cent for infection rate, 8 per cent for radiologically active disease

TABLE 26

Estimates of prevalence for various epidemiological characteristics in Tumkur District

Category	Prevalence rate %	Standard error %	Co-efficient of variation %	95% confidence limits of prevalence	
				Lower %	Upper %
Infection ⩾ 10 mm	38.3	1.8	4.8	34.6	41.9
X-ray (by both plus umpire)	1.86	0.15	8.10	1.56	2.16
Bacillary	0.41	0.05	11.5	.31	.51

Note: Prevalence of infection relates to persons test read, and for the other two categories to persons X-rayed.

rate and 12 per cent for the bacillary case rate has been achieved. In the NTSS (Page 92) the co-efficient of variation for X-ray disease rate in villages varied from 5.7 per cent to 10.2 per cent in various zones.

With a confidence of 19 in 20 it can be asserted that the number of radiological cases aged 10 years and above in the said population lies between 11.8 thousand and 18.8 thousand, and is likely to be round about 16.2 thousand.

Similarly with a confidence of 19 in 20 it may be asserted that the number of bacteriological cases aged 10 years and over in the above population may lie anywhere between 28 hundred and 44 hundred and is likely to be about 36 hundred.

7.3 Variation within the district

The villages surveyed were a random sample from the entire district. Therefore, estimates for smaller units like the taluks are not valid. But the differences between the southern-half consisting of 6 taluks (Tumkur, Chiknayakanahalli, Tiptur, Gubbi, Kunigal and Turuvekere) and the northern-half consisting of 4 taluks (Pavagada, Sira, Madhugiri and Koratagere) have been strikingly large. The findings in the two halves are presented in Table 27. It will be seen that although the population in the two halves is nearly the same, the prevalence of infection in the northern-half is 46 per cent compared with 30 per cent in the southern-half while the prevalence of active disease is 2.3 per cent in the north and 1.4 per cent in the south. The bacillary rates are 0.58 per cent and 0.24 per cent respectively. The reason or reasons for these differences are not known, but these have not been found due to any differences in the coverages by age and sex or due to size of village in the two zones.

A further difference observed may also be recorded. Although only 25 out of 86 bacillary cases are in the southern-half, the sex ratio of these cases in this half is different from that in the northern-half. In the southern-half there are 11 male and 14 female bacillary cases, while in the northern-half there are 49 male and 12 female cases. Among X-ray cases in the northern-half this preponderence in the number of males is not seen. The prevalence rates in the 10 taluks range from 1.6 per cent to 3.7 per cent. Results of significance tests for the differences mentioned above have not been presented in this paper, because even though such tests showed significant differences these are not necessarily valid as the sample has not been stratified by taluks.

TABLE 27

Prevalence of infection and diseased in the Southern and Northern Zones

	No. of groups (incl. towns)	Defacto popln.	No. tested and read	Infected		No. X-rayed	Radiologically act. cases		Bacillary cases	
				No.	%		No.	%	No.	%
Southern Zone ...	40	15,911	12,895	3,907	30.3	10,514	150	1.43	25	0.24
Northern Zone ...	26	16,056	13,171	60,67	46.1	10,507	242	2.30	61	0.58

TABLE 28

Prevalence of infection, X-ray and bacillary cases, by size of village

Size of village (defacto population)	No. of villages	Test-read	Infected ≥ 10 mm	X-rayed	Radiologically active cases	Bac. cases
< 250	21	2,300	775 (33.70)	1,792	34 (1.90)	8 (0.45)
250–499	19	6,081	2,045 (33.63)	4,722	76 (1.61)	15 (0.32)
500–749	11	5,398	1,752 (32.46)	4,329	62 (1.43)	14 (0.32)
≥ 750	11	10,684	4,698 (43.97)	8,892	185 (2.08)	40 (0.45)
Overall	62	24,463	9,270 (37.89)	19,735	357 (1.81)	77 (0.39)

Figures in brackets represent percentages

7.4 Variations with size of village

In Table 28 the prevalence rates for infection and radiological and bacillary disease have been given for villages of different size. The total X-rayed was only 1792 in the 'smallest' villages and the high radiological and bacillary disease rates may not necessarily be reliable for such villages. Thus all the three prevalence rates appear to be highest for 'large' villages with population of 750 or more. For reasons given in the preceding paragraph the results of significance tests for the differences observed are not given.

7.5 Accessible and inaccessible villages

The difference in the prevalence rate in the accessible and in the inaccessible villages is of considerable importance. NTSS was confined to accessible villages only and all surveys in developing countries will of necessity have to be confined only to accessible villages. NTSS (Page 75) also states, 'preliminary results indicate that there is no significant difference regarding the tuberculosis prevalence in the 'accessible' and 'inaccessible' rural areas now surveyed'. 46 out of the 62 villages of the present survey were considered accessible. Findings in the two sets of villages are presented in Table 29. The percentage of tuberculin reactors and radiologically active cases is higher in the inaccessible villages while percentage of bacillary cases is higher in the accessible villages. However, the differences for X-ray and bacillary cases are not statistically significant but the sample was not stratified for this characteristic.

8. Some remarks

The Baseline Survey in Tumkur district confirms, in general, the findings of NTSS that there is a considerable amount of tuberculosis in the villages. There is an appreciable variation in the prevalence rates of infection, radiological and bacteriological cases among different taluks, among villages of different sizes and in the northern and southern halves of the district. As the sample surveyed was drawn from the entire district, these differences may not necessarily be valid. All the same if such differences are there these can seriously interfere with the assessment of different control programmes applied to different parts of the district. If the original sample had been stratified for the taluks or for the size of villages, differences found would have been more reliable. The conclusion may be drawn that stratification according to the factors mentioned should be considered necessary in drawing a sample for a survey, especially so, if the results are to be used for assessment of different control programmes in different areas of the district. At any rate there can be no serious disadvantage in stratification.

Co-efficients of correlation between infection and various categories of disease on the one hand and between X-ray and bacillary disease on the other, have been shown earlier. The

TABLE 29

Prevalence of Infection, radiological and bacillary cases in accessible, inaccessible and urban areas covered by the Survey

Areas	Defacto population	No. tested and read	No. of reactors > 10 mm		No. X-rayed	Radiologically act. cases		Sputum + ve by either method	
			No.	%		No.	%	No.	%
1	2	3	4	5	6	7	8	9	10
Accessible (46 villages) ...	22,671	18,731	6,961	37.2	15,125	266	1.76	63	0.42
Inaccessible (16 villages) ...	7,142	5,732	2,309	40.3	4,606	91	1.98	14	0.30
Urban (4 blocks) ...	2,149	1,603	704	43.9	1,290	35	2.71	9	0.70
Total (66 groups) ...	31,962	26,066	9,974	38.3	21,021	392	1.86	86	0.41

value of some of these co-efficients is not as high as to be useful in utilising the comparatively simple tuberculin test for judging the amount of radiological and bacillary disease in a group or a community. It is possible that some of these values have not been high enough due to the relative crudeness of the methods that are available for surveys. Limitations due to reader error in tuberculin tests and X-ray readings are well known. Limitations of a single spot sample of sputum for juding the number of bacillary cases have been reported earlier Raj Narain (1962). There are many other limitations of the methods available for surveys which may account for the low values of the many co-efficients of correlation in this report. The value of these co-efficients of correlation will be judged better, it is hoped, by further surveys.

Some methods for defining more accurately a positive reaction and an index for X-ray disease have been used. The results may not appear commensurate with the labour put in. However, a basis for further work has been, it is hoped, defined. Another survey with a sampling ratio of 20 per cent with more intensive sputum examination is nearing completion. Correlation of the findings by the different techniques used may help in judging their value better and may make their application more precise.

Summary

A Tuberculosis Prevalence Survey was carried out in Tumkur District, Mysore State, India, to provide basic information regarding age-sex specific prevalence rates for infection, radiologically active disease and bacillary cases. The survey was confined to 66 groups—62 rural and 4 semi-urban selected at random. Coverages were about 92 to 95 per cent. The results of the survey showed (and confirmed) the limitations of these examinations in providing clear indices for prevalence. Attempt has been made to find the best possibe indices for prevalence of infection, radiologically active disease and bacillary cases by correlating the findings of one with the other two and making use of all types of data available. A clear cut choice of the best possible indices was still not available, but a basis for further work has been defined. Some interesting variations in prevalence, which have been observed in this survey, indicated the desirability of stratified samples for such surveys.

The main findings of the survey, in the defacto population examined are:

1. 38.3 per cent were infected; 42.8 per cent among males and 33.9 per cent among females.
2. The percentage of infected persons rises with age, reaching a maximum at about 40 years.
3. For age group 10-19 years and above, infection rates are consistently higher among males than among females.
4. Complications to tuberculin test were observed in about 5 per cent of the tests read and consisted mostly of oedema; incidence of complications was significantly more among females.
5. Large reactions of 20 mm. or more were observed among a larger proportion of females than males.
6. Incidence of infection rises with age at first, but drops in later years.
7. 1.9 per cent had radiologically active disease; 2.5 per cent among males and 1.2 per cent among females.
8. 66.3 per cent of the radiologically active cases were persons aged 40 years or more.
9. Prevalence rate for radiologically active disease increases steadily with age; the increase being particularly marked among males.
10. 0.41 per cent were bacillary cases among persons of age 10 or more; 0.56 per cent among males and 0.25 per cent among females.
11. Prevalence of bacillary cases steadily increases with age among males.
12. 50 per cent of the bacillary cases were persons aged 40 years or more.

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APPENDIX I

Composition of a field team

1. Team Leader
2. Two census takers
3. One tuberculin tester
4. One card controller
5. One X-ray technician
6. One tuberculin test reader
7. One laboratory technician
8. Two scouts
9. Two drivers for X-ray units
10. Two drivers for staff cars of testing and reading teams.

Drivers help in positioning persons for X-ray examination, for scouting and in various other ways.

APPENDIX II

Definitions of some terms used

(*a*) *Household*

A household is defined as a group, whose members live together and have their main meals prepared in the same kitchen.

If the group consists of persons who live and sleep under the same roof but take meals in different places, they are still to be regarded as forming a household.

Ex. (*i*) Students or others occupying a house or a room in common and messing elsewhere should be registered at their common residence.

(*ii*) Servant who sleeps in his own household in the village but takes his meals in the master's house will be registered in his own household.

(*b*) *Homeless persons*

Persons who have slept in the village the previous night but who do not belong to any household in the village are treated as homeless persons eligible for registration.

(*c*) *Permanent residents* (*P.R.*)

Permanent residents of the village are those who belong to households in the village as also homeless persons who live in the village. In the case of homeless persons, the answers given by them as to whether they belong to the village or not, may be taken as the basis of the classification.

(*d*) *Temporarily present* (*T.P.*)

A person is classified as temporarily present if he does not belong to the village but has slept in the village the previous night.

A person who has stayed in the village for more than one year shall be regarded not as a TP but as permanent resident of the village.

Similarly, a person who has been staying in the village for a period of less than one year and does not intend to leave the village within a year from now, shall be regarded not as a TP but as a permanent resident.

(*e*) *Temporarily absent* (*T.A.*)

A person is classified as temporarily absent if he belongs to the village, but was absent from the village the previous night. If the person was absent from the village for more than one year, he should be regarded as a permanent absentee and shall not be registered. If the person is absent for less than a year and has no intention of returning to the village within one year from now, he should be regarded as a permanent absentee and shall not be registered.

APPENDIX III

READING OF X-RAY FILMS

All readings of X-ray films will be recorded on a separate form. Each form will clearly indicate the Group Number, Group Name, Film Roll No., Date of X-ray exposure, the date of X-ray reading and the name of the reader. This is done to ensure complete independence of the two readings. Individual cards are not available to the readers at the time of reading.

X-ray code

The X-ray code is based mainly on the code followed in NTSS. In all cases where pathology is present readings are recorded under the following four headings.

I. *Extent of disease*

Each lung (R=right; L=left) is considered to consist of three zones:

1. Upper zone—area of the lung above a horizontal line drawn along the lower margin of the anterior end of the 2nd rib.
2. Middle zone—area of lung lying between the upper and lower zones.
3. Lower zone—area of the lung below a horizontal line drawn along the lower margin of the anterior end of the 4th rib.

The zones involved are recorded as R_1, R_2, R_3, etc.

II. *The physical appearance of the lesion*

Only one of the following is recorded in all cases where a pathology is present.

(*a*) Infiltrate with cavity
(*b*) Infiltrate with doubtful cavity
(*c*) Infiltrate without cavity
(*d*) Pleural effusion
(*e*) Hilar Adenitis. Only dense shadows with distinct contours in the hilar regions are to be considered abnormal. Particular care should be taken *not* to react on confluenting vascular and bronchial shadows which are normally present in the hilar region.
(*f*) Pulmonary scar—Fibrotic strands or bands in the lung fields.

(*g*) Pleural scar—Thickening of pleura or obliteration of the castophrenic angle.

(*h*) Pneumothorax or Pneumoperitoneum.

(*i*) Cardio-vascular pathology—marked alterations of the shape and size of heart or large blood vessels.

(*j*) Thorocoplasty or Rib Resection.

(*k*) Other pathology of the chest—any pathology of the chest which cannot be listed from a—j.

If more than one of the lesions listed above are found, only the main lesion from the point of view of tuberculosis is recorded.

III. *Presence of calcification*

Calcifications wherever present are recorded independent of any other pathology. End-on blood vessels and foreign bodies are, as far as possible, excluded.

IV. *Impressions regarding aetiology*

For all abnormalities (except for calcifications only) the reader gives a judgment regarding the aetiology of the lesion. The probability of finding tubercle bacilli in the sputum of the examinee serves as a guide. In making this judgment the nature of the lesion is taken into account (presence of cavity, location of lesion, etc.) and also the extent (size of areas involved; uni-or bilateral distribution). The radiological appearance of the lesion is also taken into account. If the reader, in recording a lesion, feels some doubt whether an abnormality really exists or not, the degree of doubt and the probability of isolating tubercle bacilli guide the ultimate judgment.

The following aetiological classification is used:

A. Probably non-tuberculous

All lesions which are considered of non-tuberculous origin. The probability of finding tubercle bacilli judged to be near 0.

B. Probably tuberculous but inactive

All scars and other healed lesions except calcifications; some doubtful shadows, if they are recorded at all may be classified as inactive. Probability of finding tubercle bacilli is judged to be small.

C. Probably tuberculous, possibly active Lesions appearing to be of tuberculous nature but without a definite cavity and not extensive. Tubercle bacilli may be detected even with a single collection of sputum.

D. Probably tuberculous and active

The lesion appears to be of tuberculous nature, may be extensive, may be bilateral, or a definite cavity is present. The probability of finding tubercle bacilli by a single collection is judged to be high.

The last two categories namely C and D are grouped together as Radiologically Active Tuberculosis.

(For choice of index of disease used in this paper, see text).

APPENDIX IV

Statistical note on the calculation of incidence rates

The incidence rates of infection can be estimated from the prevalence rates of infection in various age groups with certain assumptions viz:

1. Mantoux reaction of over 9 mm. is synonymous with infection with Myco. Bact. Tuberculosis and hence the infection rates calculated on this basis reflect the true position.
2. The onset of infection within each age group is similar in the two sexes.
3. Mortality rate is the same for both infected and uninfected.
4. The phase in the epidemiology of tuberculosis through which the community has passed has no influence on the annual attack rate.
5. The incidence of infection is uniform within the several age groups specified.

With these assumptions age specific annual incidence rates can be worked out directly for those without BCG scars. But in order to estimate the incidence of natural infection in a community some adjustment has to be made to account for the exclusion of those with BCG scars. A method of making this adjustment, using the incidence rates among those without BCG scar, is also given in this appendix.

Estimation of annual incidence among those without BCG scar:

The following three methods may be adopted:

(1) *Logarithm method*

Let P_t be the proportion of infected in the age 't'

Let P_{t+i} be the proportion of infected in the age '$t+i$'

Let r_t be the annual infection rate in the age group 't' to '$t+i$'

Then non-infected people in the age $t+i$

= (non-infected in the age t) — (infected in the interval t, $t+i$)

$\therefore (1-p_{t+i}) = (1-p_t)(1-r_t)^i$

$\therefore (1-r_t)^i = \dfrac{(1-p_{t+i})}{(1-p_t)}$

$r_t \equiv 1-\text{antilog}\left\{\dfrac{1}{i}\log\dfrac{1-p_{t+i}}{1-p_t}\right\}$

(2) *Approximation (Binomial) method*

The annual incidence of infection being of the order of 2 per cent, if i is also small we have

$(1-r_t)^i = 1-ir_t \quad (0 < r_t < 1)$ approximately

$\therefore 1-ir_t = (1-p_{t+i})/(1-p_t)$

$\therefore ir_t = \dfrac{P_{t+i}-P_t}{1-p_t}$ or

$r_t = \dfrac{1}{i}\left\{\dfrac{P_{t+i}-p_t}{1-p_t}\right\} = \dfrac{1}{i}\dfrac{\triangle i P_t}{1-p_t}$

Where $\triangle$ is the symbol of differencing and i the interval of differencing.

Incidence of infection at age t $\Big\}$ = (Newly infected in the interval) / (Interval × Uninfected at the beginning of the interval)

(3) *Least square method*

This method uses the best mathematical fit to the age specific infection curve.

Let $y = ax^2 + bx + c$ be the curve of best fit to the data relating to the age specific prevalence rates of infection where y is the prevalence of infection in the specified age x.

Since it may be reasonably supposed that all are uninfected at birth, the pevalence of infection at birth (i.e. at age zero) should be zero and the constant term in the above equation vanishes. Thus the equation to be fitted reduces to the type

$$y = ax^2 + bx$$

Using the method of least square, we note that $\mu = \Sigma (ax^2 + bx - y)^2$ should be minimum;

i.e. $\dfrac{d\mu}{da} = 0$ and $\dfrac{d\mu}{db} = 0$ with appropriate conditions on the value of the second derivatives

Let $X = \dfrac{x}{5} \quad \therefore x = 5X$

Then $\mu = \Sigma (25\,a\,X^2 + 5b\,X - y)^2$ should be minimum

i.e. $\mu = \Sigma (AX^2 + BX - y)^2$ should be minimum where $A = 25a$ and $B = 5b$.

Then $\dfrac{d\mu}{dA} = 2\,\Sigma\,(AX^2 + BX - y)\,X^2 = 0$

i.e. $\Sigma (AX^2 + BX - y)\,X^2 = 0$

$A\,\Sigma X^4 + B\,\Sigma X^3 = \Sigma X^2 y \ldots (1)$

Similarly, $\dfrac{d\mu}{dB} = 2\,\Sigma\,(AX^2 + BX - y)\,X = 0$

i.e. $\Sigma (AX^2 + BX - y)\,X = 0$

$A\,\Sigma X^3 + B\,\Sigma X^2 = \Sigma XY \ldots (2)$

The normal equations then are given by (1) and (2). By solving these equations we can find out the constants A and B and hence the equation of best fit.

By substituting $x = 1, 2, \ldots n$ in the equation of best fit we estimate the values of y (i.e. P_t) at different ages.

By using the formula

$$r_t = \frac{1}{i}\frac{P_{t+i} - p_t}{1-p_t}$$

the incidence of infection at each age is calculated. Adjustment for exclusion of those with BCG Scar:

Most of the villages in the survey were covered by Mass BCG Campaign during 1954-55. Some of those who were vaccinated at that time would have become naturally infected but for vaccination. Thus the prevalence of natural infection in the community would have been different from that observed among those without BCG scars. The prevalence rates for natural infection have, therefore, to be estimated for the population including persons with BCG or doubtful scar before incidence rates (for natural infection) could be derived from them. For this purpose, we assume that the annual infection rate among the BCG or doubtful scar group is the same as among those without any scar.

By applying the above rates to the number tested and read among those with BCG scar (after making due allowance for the fact that they were vaccinated in 1954-55) the number among them that would have been found infected at the time of the survey has been estimated. The prevalence rate was then re-calculated by including this to the number actually found to be infected among those without BCG scar. From these prevalence rates, incidence rates were worked out by the three alternate methods explained earlier. But this value is a tentative value because the estimated number of persons that would have become infected in the BCG vaccinated but for the vaccination are calculated on the basis of an incidence rate which is only approximate. In order to arrive at a stable figure this process should be repeated 3 or 4 times till we get at a rate that does not undergo further revision, i.e., becomes stable. This may be taken as the true incidence rate.

APPENDIX V

Details of findings for each group in the survey

Group No.	Total registered	Total Test read	Infection rate ⩾ 10 mm %	Total X-rayed	Radiologically active disease		Bacillary cases	
					No.	Rate %	No.	Rate %
1	2	3	4	5	6	7	8	9
501	456	387	49.9	303	10	3.3	4	1.32
502	966	799	47.2	630	13	2.1	3	0.48
503	273	251	48.2	176	3	1.7	2	1.14
504	220	185	61.1	152	7	4.6	4	2.63
505	103	97	30.9	69	2	2.9	1	1.45
506	874	738	47.8	581	19	3.3	5	0.86
507	377	295	34.2	200	2	1.0	...	...
508	1,427	1,196	41.6	961	15	1.6	6	0.62
509	93	75	37.3	64	...	...	...	...
510	351	331	36.6	239	2	0.8	...	...
511	3,021	2,276	51.0	1,906	53	2.8	6	0.31
512*	560	423	51.8	345	12	3.5	4	1.16
513	897	723	61.0	637	24	3.8	5	0.78
514	480	409	40.8	338	9	2.7	1	0.3
515	1,056	888	55.5	714	16	2.2	5	0.7
516	769	593	26.3	488	4	0.8	1	0.2
517	266	217	35.9	160	4	2.5	...	...
518	347	314	19.4	218	2	0.9	...	...
519	242	186	28.5	147	1	0.7	...	...
520	306	272	32.4	212	5	2.4	...	...
521	113	85	35.3	73	3	4.1	...	...
522	347	265	21.9	220	1	0.5	1	...
523	140	129	41.1	87	3	3.4	...	...
524	630	553	35.1	453	5	1.1	...	...
525	491	402	46.0	328	4	1.2	1	0.3
526	428	401	32.7	295	9	3.1	1	0.34
527	568	509	41.8	373	6	1.6	2	0.54
528	1,803	1,479	45.4	1,279	23	1.8	7	0.55
529	467	401	29.4	271	2	0.7	...	...
530	625	563	35.9	440	12	2.7	4	0.91
531	49	39	25.6	32	...	...	...	...
532*	512	404	41.8	285	4	1.4	1	0.35
533	501	410	25.1	352	4	1.1	...	...
534	897	665	22.0	606	3	0.5	...	...
535	447	383	25.6	320	3	0.9	1	0.31
536	836	677	34.4	543	8	1.5	1	0.18
537	510	432	34.3	339	9	2.7	3	0.88
538*	540	407	56.6	318	9	2.8	2	0.63
539	239	200	27.0	177	...	...	...	...
540	516	437	33.2	350	4	1.1	1	0.29
541	117	99	29.3	81	...	...	...	...
542	321	252	34.5	228	3	1.3	1	0.44
543	145	118	28.0	90	1	1.1	...	...
544	442	341	32.0	284	6	2.1	...	...
545	84	59	40.7	48	1	2.1	1	2.08
546	205	182	20.3	112	2	1.8	...	...
547	227	194	22.2	157	2	1.3	1	0.64
548	102	83	50.6	69	5	7.2	...	...
549	336	282	37.6	196	2	1.0	...	...
550	506	430	26.7	312	4	1.3	...	...
551*	537	369	38.9	342	10	2.9	2	0.58

* Town blocks

Group No.	Total registered	Total Test read	Infection rate ≥ 10 mm %	Total X-rayed	Radiologically active disease		Bacillary cases	
					No.	Rate %	No.	Rate %
1	2	3	4	5	6	7	8	9
552	59	51	33.3	45	2	4.4	...	...
553	740	650	33.1	498	8	1.6	1	0.2
554	713	590	36.1	499	6	1.2	2	0.4
555	183	148	43.9	110	1	0.9	...	...
556	17	17	29.4	13	...	...	...	...
557	132	106	33.0	93	...	...	...	...
558	5	4	...	...	...	...	...	...
559	592	471	22.7	385	3	0.8	...	...
560	446	332	21.4	289	2	0.7	1	0.35
561	181	150	36.6	115	2	1.7	...	...
562	271	194	27.8	171	...	...	...	...
563	506	347	27.4	328	1	0.3	1	0.3
564	429	352	27.8	274	7	2.6	2	0.73
565	821	650	26.0	547	7	1.3	1	0.18
566	102	93	36.6	58	2	3.4	1	1.72

APPENDIX VI

Statistical note on the calculation of the co-efficient of variation for the various prevalences

The villages or town blocks were selected randomly in the manner described in the test and the entire population of the selected villages and the town blocks were included in the survey. It may, therefore, be noted that the sampling plan was that of cluster sampling, each cluster being a village or a town block and not a random sample of persons constituting the rural population of the district. The parameter to be estimated in the population is the prevalence rate, which may be denoted by p. If the number examined and the number of cases in any village of the district be denoted by x_i and y_i respectively then

$P = \Sigma y_i / \Sigma x_i$ where the summation extends over all the villages of the district.

Let $\bar{x}$ and σx^2 be the mean and the variance of x_i $\bar{y}$ and σy^2 the mean and the variance of y_i and let σxy be the covariance between x_i and y_i over all the villages in the district.

The estimate of the population parameter P is given by $\hat{P}$ where

$$\hat{P} = \Sigma y_a / \Sigma x_a$$

where y_a is the number of radiologically active cases diagnosed among x_a persons x-rayed in cluster a, the summation in each case running over all the n clusters (n=66). For simplicity, the town blocks have been treated as villages randomly selected, as the result is unlikely to be affected appreciably by this procedure. It is known that this estimate is biased but the bias is small and can be ignored.

The variance of this estimate is given by the formula

$$V(\hat{P}) = \frac{P^2}{n}(C_{xx} - 2C_{xy} + C_{yy})$$

where C_{xx} is the square of the co-efficient of variation of x in the population, i.e. $C_{xx} = \frac{\sigma x^2}{\bar{x}^2}$,

similarly $C_{yy} = \frac{\sigma y^2}{\bar{y}^2}$ and $C^2_{xy} = \frac{\sigma xy}{\bar{x}\,\bar{y}}$

Since the variances and the means are not known, they have to be estimated. An estimate of the variance of P is furnished by the formula.

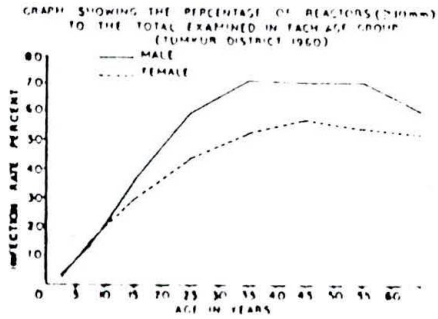
$$V(\hat{P}) = \frac{\Sigma y_i^2 - 2P\,\Sigma x_i y_i + P^2 \Sigma x_i^2}{n(n-1)\bar{x}^2}$$

These procedures applied to the data of the survey furnished the following results.

Category	Estimated prevalence %	Standard error %	Co-efficient of variation %
Infection	38.3	1.84	4.8
X-ray cases	1.9	0.15	8.1
Bacillary cases	0.4	0.05	11.5

Of the total number of 392 X-ray cases among 21,021 X-rayed, 35 belong to the town blocks wherein 1290 were examined. These figures make it appear that the prevalence rate in the towns is higher than in the villages, but this inference is not to be regarded as valid since the total number of persons X-rayed in the towns is 1290 and this figure is rather inadequate for drawing any general conclusions.

525



Wesley Press, Mysore

D15-5.

Information on
TUBERCULOSIS, for NGO staff.

Prepared by S.J. Chander, Community Health Cell, Bangalore

1.Introduction

Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. This disease is systemic often affecting lungs but it can affect other organs of the body also.

- One-person dies of TB every minute.
- TB affects more the people in the most productive age group
- Four out of every thousand people suffer from TB of (all forms) in India (prevalence)
- One sputum positive, infectious TB patient who is not on treatment infects 10 –12 people a year.

2. What are the common signs and symptoms of TB?

- Cough with or without sputum *(kafa)* for more than three weeks
- Rise of temperature in the evening for more than two weeks with sweating particularly at night
- Coughing of blood
- Chest pain
- Loss of appetite, loss of weight, and increasing fatigue.
- Children usually do not bring out sputum, but experience loss of weight even though they eat well.

People with these symptoms should be referred to a doctor for diagnosis. Some of these symptoms are common in other diseases and affect investigation, the doctor would be able decide.

3.Who does TB affect more

TB can affect any one from any socio economic and cultural background but it most often affects people between the age groups of 20-45. TB affects more people who live in a overcrowded place, those who are underrated and women who are married early and have repeated pregnancies. TB can cause serious complications among children. TB occurs more in men than women, however women have less access to care and some times there is a greater tendency to hide TB among girls of marriageable age due to stigma attached to the disease. Older people with TB are some times neglected by the family and their treatment may be delayed or irregular. Untreated elderly persons with sputum positive TB are source of infection to others especially to young children in the family. Persons with HIV positive are more likely to develop TB, but it shold be remembered that with treatment it can be completely cured. Certain occupations such as mining and silicosis put people at greater risk of TB.

4. Is TB a curable disease?

Yes, TB is curable if the treatment is taken regularly without discontinuing for the duration specified by the physician. Usually the duration is between 6-9 months. The patient would begin to feel better within a few months of treatment and some of them may want to discontinue the treatment. This can lead to drug resistance, which means the signs and symptoms would reappear and the patients would not respond to drugs, which he/she was taking earlier. The newer drugs are costlier and would not be affordable by the poor, and not many drugs are available. Which means patient would go to a chronic state and continue to spread the disease as they go through a gradual and painful pathway to death.

5. Is TB an infectious disease and how is it spread?

Yes TB is a communicable disease. It spreads from person to person. The TB germ is carried in air when a patient suffering from TB coughs, sneezes or while talking. It does not spread through handshake or by using the same glass, plate and clothes of the infected person.

6.How can TB be prevented from spreading to others?

- Early diagnosis is important of persons with the symptoms mentioned earlier should be referred to a health institution.

- A person suffering from TB must cover his/her mouth while coughing with a handkerchief or a piece of cloth.

- He/she must take the treatment prescribed by the doctor immediately after diagnosis and should not discontinue the treatment for any reason till treatment completion. The short course chemotherapy is given for 6 months. In center cases decided by the doctor, it may extend longer.

- BCG vaccination is not useful in preventing adult pulmonary lung TB and is not used as a public health measure to control transmission of TB. It may however prevent complications of childhood TB and is therefore used in the universal immunization programme.

- Adequate nutrition helps developing resistance against the disease.

- Proper disposal of sputum of the patient by use of bleaching powder or any other method as advised by the doctor.

7. Who should be approached when signs and symptoms are noticed?

One can approach the corporation health center nearest to his/her residence. If that center is not under RNTCP, then the patient would be referred to the nearest RNTCP center for diagnosis and treatment if found positive. Bangalore City Corporation has 7 TB units where there is a medical officer Tubercles control, senior treatment supervisor and a senior laboratory supervisor. Under each TB unit there are 100-120 DOTS (Directly Observed Treatment Short course) treatment centers. There are 40 microscopic centers located around the DOTS centers to help with the diagnosis.

8. How TB is diagnosed

Usually TB is diagnosed by doing three sputum examinations. The patient just gives a spot sample to the Lab during his/her initial interaction. He is given a sputum container to take home. Next day he collects the early morning sputum (second) and brings it to the lab where he/she again gives the third and final on the spot sputum sample.

The patient might have TB even when all the samples are negative. If doctor still suspects TB, he/she might tell the patient to take a chest X-ray or other investigations to confirm his doubts.

9. What is the cost of treatment?

It **is absolutely free** from the government run institutions through the Revised National Tuberculosis Control Progarmme (RNTCP) The person suffering from TB has the right to receive free diagnosis and treatment for whatever duration specified by the physician.

10. Treatment

Depending on the severity of the disease the patient has to take 3 to 4 drugs for duration of 6 to 8 months. (Category II patients have to take an injection for initial 2 to 3 months). The first two months of starting the treatment is termed Intensive Phase in which patients have to take the drugs on alternate days in front of a service provider or non family member (3 days in a week, Monday, Wednesday, and Friday in BMP RNTCP centers). In the subsequent 4 to 5 months the patient will be given one week's dose to take home and can take it there only. But he should come to RNTCP center for every week on a fixed given day to collect the next weeks dose.

Three sputum samples will be taken at the end of two months and if found positive then intensive phase is extended by one more month.

For further information

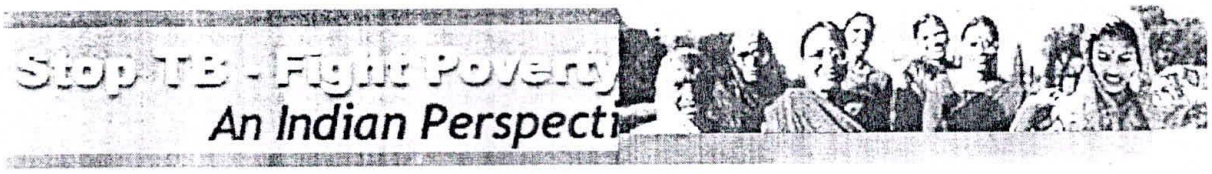
In case of money demanded by staff in any corporation run TB center or if you face any problem, it should be reported to

Dr. Narayanamurthy, Joint Director TB,
Lady Wellington TB center
Beside Sampanigi Ramnagar Police Station,
Mission Road
Bangalore – 560 027, Telephone: 2249364

Or

Dr. Sarojamma
Project coordinator
RNTCP
Bangalore Mahanagara Palika
Phone: 2217159

DIS-5.



H&Di

Stop TB-Fight poverty : An Indian Perspective

Introduction:

Stop TB, fight poverty is the theme for World TB day 2002. TB imposes a considerable economic toll on patients and their families. Because more than three-quarters of people with active TB are in the economically active age group (15 to 54), the economic and social costs to them and society are huge. They are income providers of the family. They are the parents of young children who need their economic and emotional support in order to thrive. They have elderly parents and relatives who depend on them. They are the citizens whose productivity and talents are essential to their countries' development. The result of TB is that access to opportunities and choices- a key principle of human development –is blocked.

Ill health, malnutrition and high fertility are three main reasons why households become or remain poor. They cause poverty through diminishing productivity, reducing household income and increasing health expenditure. A more complete view of poverty includes deprivation not only from money income, but also human development, financial and physical security, expanding opportunities and especially participation in key aspects of social life.

Poor families have no buffer against loss of income-no savings and very limited access to borrowing. The way they cope with this economic adversity may provide short-term benefits –that is cash-but in long term makes them and their children destitute. The sale of assets such as land is a common response to large medical expenses.

Income poverty leads to ill health and ill health contributes to income poverty. A more complete view of poverty includes deprivations from not only money income, but also human development, financial and physical security. Poverty is also seen as a lack of basic human development indicated by poor health, malnutrition and educational development. Gender is in particular an important variable affecting both health and poverty.

TB and Poverty Links

The global experience with TB control has been able to define certain clear-cut linkages between TB and poverty:

- TB is more prevalent among low-income groups than among high-

income groups.

- The cost of TB care, if borne by families alone can be unaffordable.
- TB is a chronic ill ness and requires care over a relatively long period-during which productivity is reduced, leading to interruption of education and work.
- Household income is severely reduced, family dysfunction increases, particularly if mothers are ill and poverty increases.
- Lower productivity and more poverty impede social and economic development and increase inequalities in society.
- Lower income people are higher risk-as TB spreads in crowded places-households, school, workplace, marketplace and commuting between them.

The real stakeholders in TB control

- A. **The people: -** the low-income groups are the most vulnerable people with limited resources to over come poverty-related TB risks viz:
  - Barriers in access to primary health acre ans appropriate diagnosis and treatment for TB
  - Emerging HIV/AIDS –TB co-infection
  - Lack of knowledge about the disease
  - Overcrowded living and transport conditions
  - Urban congestion/pollution
  - Poor nutrition

- **B.Society: -** as represented by politicians and policymakers, with power to reduce risks.

Poverty in India

Statistics as provided Government of India show that about 240 million people live below the poverty line. (The poverty line is really the line of destitution. At this line, people just enough money to provide them with food, converting to 2,200 calories and with nothing else. No roof, no clothes, no security, no minimal comforts, let alone schools, medicines and any fruits of industrial revolution.)

Poverty alleviation remains pronounced challenge before the Government. Though there ahs been a steady decline in poverty over the last two decades, the total number of poor people has remained more or less constant due to growth in population. The inter-regional disparities in poverty levels are quite alarming. According to National Sample Survey Organization (NSSO) the poverty situation ins several states in India is appalling: Orissa 47.15%, Bihar 42.6 %, Madhya Pardesh 37.4%, Sikkim 36.55% and Tripura 34.44%. In terms of numbers Uttar Pardesh has 53 million, Bihar 43 million, Madhya Pardesh 30 million, Maharashtra 22 million, West Bengal 21 million, Orissa 17 million and Andhra Pardesh 12 million people below the poverty line. (Economic Survey 200-2001)

Poverty alleviation programmes are still ineffective because they have not reached the poor.

Surveys by the NCAER (National Council of Applied Economic Research) reveal that almost 59% of all households, accounting for 526 million people, have an annual income of less than Rs. 12500. This means a monthly household income of Rs.1000 or about Rs. 200 per head. This by any yardstick is abysmally low income.

Households with incomes between Rs.12500 and Rs.40, 000 per year account for 331 million people.

Only 4.1 percent, accounting for 37 million have an income of over Rs 40,000 a year.

(Life above poverty line: Rs 264 per month is all you need –Mohan Guruswamy, Courtesy www.tehelka.com)

Tuberculosis in India: (1)

General facts

- India carries a third of global TB burden. An estimated one in two of the adult population are infected with TB bacterium.
- The estimated incidence of all cases of TB is whopping 185 cases per 10,000 population.
- The TB epidemic continues to grow, every year, two million people develop active tuberculosis (more than any other country in the world).
- More people now die from tuberculosis than ever before -nearly 4,50000 every year. More than 1000 persons die of the disease each day.
- Only one in four people with tuberculosis is treated with DOTS. The current rate of DOTS expansion is still far too slow to reach the global targets by 2005. Failure to reach these targets will condemn millions of people to disease and death.
- Tuberculosis is inflicting enormous socio-economic costs. In India the estimated economic cost of TB is US $ 3 billion per year.
- India's DOTS programme is mainly financed through a US$ 142 million low interest loan from World Bank with increasing costs already being met by national and state governments.
- The quantum of human cost of TB in the country is 4.56 –6.28 Disability-Adjusted Life Years (DALYS). (The DALY combines a measurement of premature mortality and morbidity and reflects the 'burden of disease' in a population)
- The cost to the patient for successful treatment of TB averages US$ 100 to US$150, more than half of the annual income of a daily wage labourer. The estimated cost of MDR-TB to an Indian patient is approximately Rs 6500 a month (US$135).
- Research shows that 20% of rural patients and 40% of urban patients borrow money to pay for expenses due to TB.

Tuberculosis in India: (2)

Tuberculosis and Women's Health

Jackie Jackson Joint UK Coordinator of Institute for Indian mother and Child (UK), in an article entitled Multiple disadvantages: India, women's health and tuberculosis, enlists the factors that make Indian women more susceptible to TB. Poverty whom she describes as the main cause of TB, affects 70% of women worldwide compared to 30% of men. Poverty predisposes women to poor living conditions and nutrition and renders them vulnerable to disease and infection. Research has shown that in their reproductive years (15 -49 years), women are at greater risk of developing the disease after infection than men at the same age. They may also be exposed more to TB than their men folk due to their particular duties and tasks. Besides these physical consideration the shame and stigma of disease affects women more-to the point where women commonly keep their diseased state a secret and unmarried girls fear that it will affect their marriage chances.

As regards the pattern of early marriage in both the major communities of the country, young brides are encouraged to begin a family early on. It reduces women's financial independence-which she would be able to use to good effect were she to develop the disease.

Clearly tackling TB in India raises many questions about the socio-economic and political structures within society. Can TB be tackled in India without tackling behaviors in the society, such as the low status of female, she asks? Certainly a husband or a father with TB puts an enormous strain on the family whenever it threatens his wage earning powers, however she warns that social cost to the family is much higher when the disease affects mother. Her need to attend treatment programmes takes her away from the children, the cost of treatment cuts into family budget and a child is at a 3-10 times greater risk of dying within two years if he/she loses their mother than those with both parents alive. She suggests that TB programmes in future shall not use the medical model instead tackle all factors operating on women with respect to disease side by side. The multiple disadvantages for women in India that operate through gender and associated factors will only be addressed by first understanding their role in both infection, disease and treatment stages and then formulating successful strategies to reduce their influence. Therefore solutions that apply to both women and men should be implemented.

Tuberculosis in India: (3)

TB and HIV

The Prime Minister of India in his speech at a meeting on National Program for prevention and Control of HIV/AIDS on December 12th 1998, said," the health ministry puts the figure of HIV infections in the country as of now at three million to four million. In some states, the infection rate is one percent of the populations. Since we have these three to four million infections today from a base of just a few infections in 1986, imagine what the scene will be in another twelve years from the base now of three to four million. I shudder even to contemplate the numbers."

As per National AIDS Control Organisation estimates the total number of HIV infections in the country at the end of year 2000 stood at 3.86 million.

A document on Revised National TB Control Program (RNTCP) published on the official web site of the National TB Control Program sums up the situation rather crudely: "while the size of the HIV epidemic in India is presently not known, it is clear that HIV will worsen the TB epidemic". The document makes no further reference to the problem

The Draft National AIDS Control Policy has only to say this much for the dual HIV-TB epidemic "with about 14 million TB cases existing in India, HIV/AIDS also poses a twin challenge of HIV/TB co-infection. Nearly 60% of the AIDS cases are reported to be opportunistic TB infection cases. Treatment of TB among the HIV-infected persons is a new challenge to the National TB Control Programme, which has now adopted DOTS strategy for control of TB infection. At the same time looking for HIV among TB infected persons will also cause the problem of scaring away of a large number of TB infected cases in the country from seeking treatment under the DOTS strategy. There is no risk of any TB patient getting infected with HIV unless he or she practices high risk behavior or gets infected from transfusion of HIV-infected blood." The draft policy document makes no further reference to meeting of two programs (National AIDS Control Program and Revised National TB Control Program) to meet the twin challenge.

There is no reliable data available to determine how the HIV prevalence has affected the TB epidemic in India. There are only apprehensions and estimates. Even the NACO or RNTCP have not come out with any studies to document the linkage. The extent of collaboration (or lack of it) between the two programmes is reflected in the documents of two programmes available on their web sites.

On surface they appear to be two divergent lines, emanating from a common point but distancing from each other as they travel to states, districts and community health centers.

Why tackle Tuberculosis ?

Potential economic benefits for India

Effective TB control can help break the cycle of poverty and disease. It cures people and returns them to active, productive life, which in turn benefits their children and contributes to the economic and social development of their country. As more people are cured, the cycle of transmission is broken and fewer people are infected. Ultimately this leads to fewer cases of active TB.

TB control is rated by the World Bank as one of the most cost-effective health intervention because of its potential to avert a large percentage of the global disease, its low cost for each year of healthy life saved, the low cost per capita, and the potential impact on socially excluded and poor people.

Ravindra Dholakia, Professor of Economics from Indian Institute of Management, Ahmedabad in an article, Potential Benefits of DOTS Strategy

against TB in India, divides these into two broad categories:

- Pure social welfare increasing effects of DOTS, which do not generate direct tangible economic benefits. These include reduced suffering of TB patients, quicker and surer cure from the disease, lives saved and disability reduced for dependents and non-workers suffering from TB, poverty alleviation etc.
- Direct tangible economic benefits of DOTS which include: reduction in prevalence of TB due to DOTS which improves the efficiency and productivity of workers, TB deaths averted among current and future workers and release of hospital beds currently occupied by TB patients.

He postulates that that even if the Indian government spends about US $0.74 billion per year to ensure the success of DOTS strategy the investment would fetch a return of 16% p.a. in real terms.

Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year, the article notes.

Conclusion

India carries a third of global TB burden. Every year two million people develop active TB. TB accounts for nearly 4,50000 deaths every year and more than 1000 persons die of the disease every day. TB is inflicting enormous economic and social costs on the country. The estimated economic cost of TB is US $ 3 billion per year.

In India 240 million people live below the poverty line. Poverty alleviation remains a pronounced challenge before the government. Surveys reveal that almost 59% of households accounting for 526 million people have an annual abysmally low income of less than Rs 12500 (US $260)

Income poverty leads to ill health and ill health contributes to income poverty. The cost to the Indian patient for successful treatment of TB averages US $ 100 to US $150. Research shows that 20% of rural and 40% urban patients borrow money to pay for expenses due to TB.

Indian women have to pay much higher social and personal costs if suffering from TB. Besides poverty the shame and stigma associated with the disease, early marriage and social pressures to start a family early on and limited access to treatment facilities makes them more vulnerable to disease more so during the reproductive age group of 15 – 45 years.

The nation has not risen adequately to meet the twin challenge of TB and HIV/AIDS. The number of HIV positive persons has risen above 3.86 million. Nearly 60% of AIDS cases are reported to be opportunistic TB infection. This is going to add to the national load of 14 million TB cases.

Effective TB control can help break the cycle of poverty and disease. It cures

people and returns them to active, productive life, which in turn benefits their children and contributes to the economic and social development of their country. A cost-effective health intervention exists for TB control and treatment: DOTS. Increasing public awareness about proven, effective interventions like DOTS and providing greater access and benefit to treatment for those with TB, will help put billions back into the economy. Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year. The expenditure on health has declined in last decade and stood at 1.11% of GDP in 1998-99. Indian government will have to increase its expenditure on TB control.

The three aims associated with World TB Day 2002 theme viz DOTS expansion, efforts to raise awareness among political leaders, decision makers and opinion leaders and mobilization of TB sufferers for demanding greater access to treatment are more relevant to India than any other country in the world.

Suggested further reading

Ministerial Conference : Tubeculosis and Sustainable Development
Web Site : http://w3.whosea.org/cds/pdf/16march00.pdf

Potential Economic Benefitys of the DOTS Strategy in India
Web Site: http://www.who.int/gtb/publications/pebdots/

Tuberculosis and Poverty: A PPT Presentation
Web Site : http://www.wpro.who.int/themes_focuses/theme1/focus3/POWERPOINTSTB/IMPO-TB-Poverty-Aviva%20Ron.ppt

Tuberculosis in India : A Critical Analysis
Web Site :
http://apha.confex.com/apha/129am/techprogram/paper_27954.htm

Life above Poverty Line : Rupees 641 per month is all that you need
Web Site : http://www.tehelka.com/channels/currentaffairs/2001/oct/30/ca103001lib1.htm

Multiple disadvantage : India, Women's Health and Tuberculosis
Web Site: http://www.fons.org/tb3.htm

Article Compiled by

Dr. Dinesh Kumar
Director Health and Development Initiative India
email: dinesh_kumar@vsnl.com ,
dinesh@healthinitiative.org

Dr. Jatinder Singh

Executive Editor, Health and Development Initiative India
mailto:dinesh@healthinitiative.org,
jatinder@healthinitiative.org

Article Designed by

VS Christopher
Webmaster Health and Development Initiative India
email : job340@hotmail.com ,
webmaster@healthinitiative.org

56 Pink Plaza, Hall Bazar, Amritsar, Punjab, INDIA, Postal Code 143001
Phone : +91-183-554467, Cellular (Director) +91-98140-50065 , Executive Editor +91-98141-21605

http://www.healthinitiative.org/
A Not-For-Profit Organization

healthlink WORLDWIDE

Strengthening TB treatment

How to implement DOTS

This guide is designed to give a basic overview of the DOTS strategy, including the people who are involved and the resources that are needed to set up a successful programme. The Healthlink Worldwide website (www.healthlink.org.uk) has a list of references where you can find more information.

Why is DOTS needed?

Although health workers in many areas are working hard to diagnose and treat tuberculosis (TB), the number of people with TB is increasing rapidly. Some of the increase is due to the increasing HIV epidemic, but the number of TB cases is also increasing because of failures in existing treatment strategies for TB. People may be unable to access diagnosis and treatment for many different reasons (see below). Effective treatment of TB is important for individuals, their families and communities. People with active TB can spread TB to other members of their families or communities. They become sick, are unable to work or fulfil family commitments, and will eventually die if their TB is left untreated. People who stop TB treatment before completing the course can continue to spread TB and may develop drug resistance.

What is DOTS?

DOTS (Directly Observed Treatment, Short course) is a new treatment strategy for TB that aims to address these challenges. This strategy is usually implemented through local or national programmes. DOTS is based on the direct observation of people taking their TB drugs. However, the DOTS strategy includes much more than direct observation of treatment, as many factors are needed to ensure adequate and accessible TB care. These include:

- political commitment ensuring adequate funding
- education for people with TB and their communities
- reliable case detection using sputum smear microscopy to identify people with active TB
- standardised short course treatment for all people with smear positive TB
- direct observation and support for people taking drug treatment
- a regular and reliable supply of free drugs
- accurate record keeping to identify people who do not complete treatment
- effective monitoring both of people who are receiving treatment and of the performance of the DOTS programme as a whole.

DOTS can be used to treat new TB cases, people who have relapsed, people who have previously had treatment, but not finished the course, and people who need retreatment.

What makes DOTS different?

Many people cannot access TB treatment or do not complete their TB treatment because of:

- the need to take time off work or away from family
- the cost of travel to the health facility or of drug treatment
- a lack of available drugs
- the belief that because they feel better they are cured and can stop treatment
- having to take lots of different pills for a long time
- a lack of user-friendly health services (e.g. unfriendly staff or unfriendly opening times)
- needing permission to travel or to see a health worker (e.g. in some cultures women may need their husband's or father's permission to travel or may need to be accompanied by a family member if they visit a health worker).

Accessibility

The DOTS strategy aims to improve access to TB treatment by:

- making treatment and diagnosis free
- using standardised courses of treatment

Photo by WHO/EPI

- making treatment community-based, so people do not need to take time off work or from domestic responsibilities to go for treatment
- providing community education, so that people can recognise the symptoms of TB and go to a health worker for diagnosis and treatment.

People are more likely to seek diagnosis and treatment if treatment centres are close to where they live. People are also more likely to continue with treatment if it does not interfere with their work or family commitments. DOTS is most likely to be effective in a community setting. By training community health workers or community volunteers as treatment supporters people can have their treatment in a way that does not disrupt their everyday lives.

Support

The person observing treatment is called the treatment supporter. Observing treatment is not the only role of a treatment supporter, they can also provide the support, encouragement and counselling necessary to help people complete their course of treatment.

Currently, research confirms that the DOTS strategy works. However, it is unclear whether it is necessary to observe every dose of treatment or whether less frequent observation (e.g. weekly) is equally effective. Either way, the treatment supporter needs to be someone who is accessible, reliable and concerned for the health of the person with TB. The treatment supporter provides encouragement, checks that the correct number of tablets has been taken, and follows up people who miss treatment.

Monitoring

The recording and follow-up systems that are part of the DOTS strategy mean that both people taking treatment and the DOTS programme as a whole can be monitored effectively. People who stop treatment can be quickly identified and health workers or treatment supporters can work with them to understand their reasons for stopping treatment and try to find a solution. At district level, the TB officer can use the records that are part of the DOTS programme to assess the programme and identify any problems, which can then be tackled effectively.

Making a difference

DOTS is not the final solution to the TB crisis – diagnosis and treatment still need to be made easier for health workers and people with TB. However, with the current resources available, DOTS is probably the most effective way of treating TB and ensuring people complete treatment. In resource-poor countries, DOTS can improve the life of individuals with TB and the whole community.

How a DOTS programme works

Community education

What is it? The first step in encouraging people to seek treatment for TB is educating them about TB, its symptoms and its treatment, so people with symptoms will go to a health facility to seek diagnosis and treatment. Community education plays an important role in this process. Helping people to understand the importance of completing treatment plays an important role in encouraging them to continue taking their TB drugs for the complete six to eight month course.
Who does it? Health workers and community health workers.

Case detection

What is it? Screening people who come to health facilities who have had a cough for more than three weeks is seen by many health workers as the best way to identify people who have pulmonary TB. When the health worker suspects a person has TB and has discussed this with them, the person with suspected TB needs to provide three sputum samples.

Photo by WHO/EPI

Donating sputum for a test

The samples are collected over a 24 hour period: one when the person visits the health facility, one early next morning, and the next when the person with suspected TB returns to the health centre the following day. Samples are then sent to the diagnostic centre (or the person can travel to the diagnostic centre to provide samples).
Who does it? Health worker at DOTS treatment centre or diagnostic centre.

Diagnosis of sputum smear positive TB

What is it? Diagnosis of people with active TB is based on sputum smear microscopy (see page 6).

The laboratory staff complete a laboratory register and return the results of the sputum smears to the treatment centre.

Who does it? Laboratory technician.

Treatment

What is it? Treatment under the DOTS strategy consists of a combination of drugs taken over a six to eight month period. In the first two months (the initial phase), four drugs are taken together, while for the following four to six months (the continuation phase) fewer drugs are taken. If the treatment is carefully followed, a person with infectious pulmonary TB will stop being infectious within two to six weeks. Doctors at the diagnostic centre classify the person with TB and prescribe treatment according to national programme guidelines.

Counselling for people with TB can focus on:

- treatment and its possible side-effects
- the importance of continuing treatment until complete
- how to tell family members and encourage them to be screened for TB.

In some countries with a high burden of HIV, many people with TB will also be HIV-positive. People with TB can be counselled about this possibility, offered an HIV test, advised about the use of condoms and advised to consult a health worker if they become ill with chest or other illnesses.

Who does it? Doctor at diagnostic centre.

Direct observation

What is it? Direct observation of tablet taking during the intensive phase (at least in people with smear positive TB) is currently recommended in the DOTS strategy. However, on-going encouragement from the treatment supporter is the most important part, helping to ensure that people complete treatment and are cured.

Who does it? A treatment supporter — usually a community health worker or a community volunteer, but in some cases a health centre health worker or a work place supervisor, if this is more acceptable and convenient.

Support for people with TB

What is it? Treatment support is one of the most important features of the DOTS strategy. TB treatment continues for eight months and people with TB often need encouragement to complete their course of treatment. This is one of the most important aspects of the DOTS strategy.

Who does it? Treatment supporter.

Identifying people who stop treatment

What is it? It is important to identify people who stop treatment before their TB is cured. People who stop treatment can continue to spread TB to others. Interrupting or stopping treatment can also lead to drug resistance.

Treatment cards can help identify people who stop treatment quickly. These people can then be followed up and encouraged to continue with their treatment.

People who interrupt treatment should be encouraged to re-start treatment, but the management of such cases depends on:

- type of person, e.g. first TB treatment, multi-drug resistant TB, repeat treatment
- length of time the person took treatment
- length of interruption of treatment
- whether they are sputum smear negative or positive when returning to treatment.

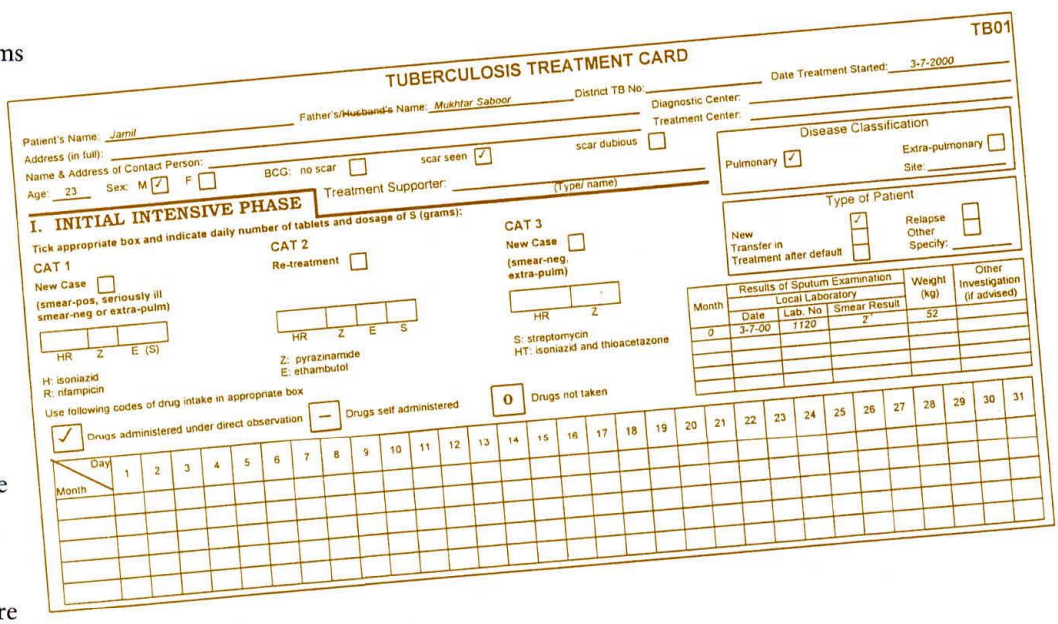
People who interrupt treatment should be referred to a trained TB nurse or doctor, who can assess them and prescribe appropriate treatment.

Who does it? Treatment supporter, late patient tracers (who may be health workers at treatment centres or community health workers), health worker at a treatment centre.

Assessing the DOTS programme

What is it? Monitoring and evaluation of the performance of the DOTS programme using the standard supervision and reporting forms (see page 7). This allows early identification of problems and improvement of the programme.

Who does it? District TB officer.


TUBERCULOSIS TREATMENT CARD

TB01

Patient's Name: Jamil

Father's/Husband's Name: Mukhtar Saboor

District TB No:

Date Treatment Started: 3-7-2000

Diagnostic Center:

Treatment Center:

Address (in full):

Name & Address of Contact Person:

Age: 23 Sex: M ✓ F

BCG: no scar scar seen ✓ scar dubious

Treatment Supporter: (Type/ name)

Disease Classification: Pulmonary ✓ Extra-pulmonary Site:

Type of Patient: New ✓ Relapse Transfer in Other Treatment after default Specify:

I. INITIAL INTENSIVE PHASE

Tick appropriate box and indicate daily number of tablets and dosage of S (grams):

CAT 1 — New Case (smear-pos, seriously ill smear-neg or extra-pulm) HR Z E (S)

CAT 2 — Re-treatment HR Z E S

CAT 3 — New Case (smear-neg, extra-pulm) HR Z

H: isoniazid R: rifampicin Z: pyrazinamide E: ethambutol S: streptomycin HT: isoniazid and thioacetazone

Month	Results of Sputum Examination: Local Laboratory Date	Lab. No	Smear Result	Weight (kg)	Other Investigation (if advised)
0	3-7-00	1120	2+	52	

Use following codes of drug intake in appropriate box

✓ Drugs administered under direct observation — Drugs self administered 0 Drugs not taken

Month \ Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Resources needed for a DOTS programme

The decision to introduce DOTS should be made jointly by the national TB programme and the district health or medical officer. The areas most suitable for first introducing DOTS are districts that are accessible, have a high TB burden and are already using standard short course treatment.

A successful DOTS programme needs: physical resources (e.g. a laboratory, a treatment centre, a reliable drugs supply) and human resources (well-trained laboratory staff and health workers).

Physical resources

DOTS diagnostic centre

A diagnostic centre is the place where people with longstanding cough and other respiratory symptoms are screened for TB and where people with TB can start their treatment. The centre should be easily accessible, well-equipped with a reliable supply of drugs and materials (see below), and have well-motivated and well-trained staff (see page 5), so the DOTS programme is likely to be successful and can be a model for future programmes.

What does a diagnostic centre do?

- Screens people with TB symptoms.
- Carries out sputum smear microscopy.
- Diagnoses TB.
- Registers people with active TB for treatment.
- Starts TB treatment.
- Works with person with TB to identify DOTS supervisor.
- Traces people who stop treatment.

Treatment centres

Many people will live a long way from the diagnostic centre, so treatment centres should be set up. Treatment centres do not diagnose people or start treatment, but are places people can collect their month's supply of drugs and have a monthly review meeting to check their progress. Staff at treatment centres also supervise treatment supporters, refer people with respiratory symptoms or side effects to diagnostic centres and trace people who stop taking treatment.

What does a treatment centre do?

- Identifies and refers people with suspected TB to diagnostic centre.
- Provides or arranges community-based treatment observation.
- Supplies TB drugs.
- Maintains case records.
- Traces people who stop treatment.
- Refers people with major side effects to diagnostic centre.
- Maintains stock books for drugs and materials.
- Supervises treatment supporters.

Laboratory and laboratory supplies

Reliable diagnosis of TB is important to identify everyone who has active TB and who needs treatment. The best way to do this is using sputum smear microscopy, which involves looking under a microscope to see if there are TB bacilli in the sputum sample of a person with suspected TB. Resources needed for good sputum smear microscopy include well-trained staff (see page 7) and well-maintained laboratory equipment.

Equipment needed includes microscopes, refrigerators, clean glass slides, sputum specimen pots, fresh reagents, and a supply of clean water. TB is highly infectious, so laboratories should have facilities to minimise the chances of workers becoming infected (e.g. by using fume cupboards, gloves, masks). Laboratory managers should ensure that there are enough reagents, slides and containers for the following three-month period using the same criteria as detailed below for maintaining a reliable drug supply. A quality control system should also be in place.

Arrangements also need to be made for sputum specimen pots to be available at all necessary health facilities and for the safe delivery of sputum specimens to the laboratory and reliable delivery of results back to the person prescribing treatment.

Laboratory managers should also make sure there are guidelines for safe disposal of slides, used reagents etc and that staff follow these guidelines. It is also important to ensure equipment is used correctly, taken care of (e.g. switching microscope off at the end of the day and covering it with a dust cover) and maintained regularly. Routine care and maintenance can improve the efficiency of equipment and keep it working longer. Managers can set up a system for reporting equipment defects and encourage staff to report problems quickly.

Uninterrupted supply of drugs

The most commonly used TB drugs are isoniazid, rifampicin, ethambutol, pyrazinamide, streptomycin (given by intramuscular injection) and thiacetazone. Thiacetazone is not recommended in areas where HIV infection is common because of side effects. Some of these drugs are available in combination preparations, for example isoniazid and rifampicin. Courses of treatment that contain both isoniazid and rifampicin are the most effective. Programmes should consult national guidelines

for treatment regimes.

Depending on the combination of drugs used, short course treatment usually lasts six or eight months. The treatment comprises:

- **An initial intensive phase** in which a combination of four drugs is taken daily for two months. This is to eliminate as many TB bacilli as possible and prevent the development of drug resistance. Most people will be smear negative (and non-infectious) after two months of treatment.
- **A continuation phase** in which fewer (usually two) drugs are taken. This phase continues for four to six months to ensure the person is completely cured and does not relapse.

People with TB often stop taking medicines because the drugs are not available. To prevent this, TB drugs should be free and an uninterrupted supply of drugs must be maintained. If people have to pay for drugs they may stop treatment as soon as they start to feel better in order to save money.

Treatment centres should hold enough drugs to treat all patients for four months and a 'buffer' stock of drugs, so that treatment can be continued if supplies are delayed. As a guide to ensuring sufficient stocks of TB drugs, the person who manages the drug supply should estimate the number of people who will be diagnosed with TB at the treatment centre over the next four months. Then they can calculate the quantity of drugs needed to provide all these people with a full course of treatment, double the amount and subtract the existing stock. This gives the quantity of drugs needed for four months and an adequate back-up stock in case of delays or interruptions in supply. This should be done for each of the drugs in the treatment regimes.

If TB drugs are out-of-stock, people should not be started on treatment using only some of the drugs in a recommended regimen, as this may lead to drug resistance. It is important to get all the drugs required, before starting treatment.

A health worker gives TB drugs to a patient

Photo by WHO/TDR/M Edwards

Human resources

Commitment at all levels of health service

Commitment to DOTS is necessary at all levels to ensure that essential resources, such as staff, drugs and laboratory supplies, are allocated. DOTS can involve public and private health services, non-governmental organisations and mission health services, private companies who provide health care for their workers, private practitioners, and the local community.

The decision to introduce DOTS is usually made jointly by the national programme and the district TB or medical officer. DOTS can be phased in giving priority to districts that are accessible, have a high number of cases of TB, are already using standard short course treatment and where there is a good chance of success.

Community involvement

Community co-operation is essential for a successful DOTS programme. DOTS committees can serve as a link between health services and local communities. DOTS committees should include motivated people including people with TB, health service managers, civic leaders, representatives of local organisations and local communities. Before DOTS is introduced, the district health officer can call a meeting with community members and leaders to introduce the DOTS programme and suggest forming a DOTS committee. The local community should be involved in the decision about who sits on the committee to ensure that the DOTS programme receives local support.

It is important that the DOTS committee has a clear idea of the activities and involvement required from it.

DOTS committees can:

- increase public awareness about TB in the community through advocacy and education
- support people in the community with TB by providing DOTS supervisors and people to follow-up those who stop treatment
- identify local problems in DOTS implementation and propose solutions at community level
- encourage co-operation between health institutions, health workers and NGOs
- protect health workers at treatment centres from undue political pressures.

The best size for the committee is about 10-15 people, who will need to meet at least every four months in the first year of the DOTS programme and as necessary after that. DOTS committees should ideally include people from each of the groups discussed below.

District TB officers

District TB officers have an important role to play in a successful DOTS programme. It is district TB officers who introduce the idea of DOTS to the district and local communities and suggest the idea for a DOTS committee. District TB officers are usually members of the DOTS committee.

In addition, district TB officers need to assess the training needs of

all those involved in the DOTS programme and plan (and sometimes carry out) training.

It is also district TB officers that carry out supervisory visits to check that guidelines are being followed and that staff are carrying out monitoring and recording procedures according to guidelines. Supervisory visits should cover feedback, education, guidance, co-ordination, problem solving and motivation.

Health workers and staff are more likely to have questions and encounter problems in the early stages, so more frequent supervision is needed during the first few months after introducing DOTS. After that, if there are no problems, the frequency of supervisory visits can be decreased.

A suggested timetable for supervision visits is every month for the first four months, every other month for the next four months and every quarter after that.

District TB officers will check TB registers at treatment centres and also compile and analyse case finding reports, smear conversion reports and treatment outcome reports (see page 8).

Laboratory technicians

The role of laboratory technicians is to correctly identify cases of active TB from sputum samples, using sputum smear microscopy. Laboratory technicians examine three samples from each person with suspected TB. If TB germs can be observed in a sample then the sample is sputum smear positive. If two of the three samples the person supplies are sputum smear positive then they are diagnosed as having active TB. Poorly trained staff or inadequate equipment can lead to misdiagnosis meaning that people with active TB do not receive treatment (and in some cases that people who do not have active TB are treated). Laboratory technicians also need to keep a register of samples received and results and to return a diagnosis report to the treatment centre.

Health workers

Health workers (i.e. qualified nurses and doctors at the diagnostic centre) need training in collecting sputum samples and giving people results of their sputum smear test. Doctors need to be able to classify people with TB correctly (e.g. as new case, retreatment, treatment lapsed) and prescribe drugs according to national guidelines.

Health workers at treatment centres are involved in keeping treatment cards for individuals, detecting and referring people who may have TB, reviewing individuals on a monthly basis and identifying and tracing people who stop treatment before it is complete. At the treatment centre health workers need to keep the TB register up-to-date and to ensure that the contents of the laboratory reports are transferred to the TB register. Health workers may also provide regular and routine supervision of treatment supporters, e.g. weekly visits to the treatment centre, regular meetings of all treatment supporters. During these visits the health workers check the treatment support card, ensuring that all treatments have been observed, and update the treatment card held at the treatment centre.

Community health workers

Community health workers, who may include traditional healers, are often involved in educating communities and people with TB about diagnosis and treatment. They can help to identify people with possible TB at community level and encourage them to go for diagnosis and treatment. Community health workers can also act as DOTS treatment supporters.

Late patient tracers

A variety of different health workers can be trained as late patient tracers. Their job is to identify people who have missed treatment (using treatment records) and follow these people up. Late patient tracers need training to ensure that they follow up people in a sensitive way and can help them identify why they have stopped treatment (although this may also involve other health workers) and encourage them to resume treatment.

Community volunteers

Community volunteers can be trained as treatment supporters. Community volunteers need to be reliable and accessible to the person taking treatment. All treatment supporters need to understand and carry out the seven essential components of treatment support.

1. Collect tablets on a monthly basis and store drugs correctly.
2. Direct observation of treatment (correct drugs and correct dosage).
3. Daily recording of treatment on treatment support card.
4. Understand the need for the person being treated to visit the treatment centre at the end of the intensive phase.
5. How to identify and refer side effects.
6. Discussing difficulties of treatment and how to overcome them.
7. Helping to trace and retrieve people who are late for or who stop treatment.

Supervision checklist for a district TB officer

- Make sure all staff are following national policies and guidelines and are maintaining records and reports correctly.
- Check that health workers strictly follow the First expired, First Out approach to drug dispensing to avoid expiry of shorter shelf-life drugs.
- Ensure that regular reporting on drug use and stocks is carried out.
- Check that the laboratory is working properly and that the laboratory technician is keeping all the slides for quality assurance.
- Check supplies, materials, drugs and equipment are stored correctly.
- Check safe disposal practices for sputum specimens, used reagents, etc.
- Check that centres are ordering sufficient quantities of drugs, reagents, equipment and forms.

Training people involved in DOTS

DOTS programmes should not be introduced until everyone involved has received appropriate training.

DOTS committee members
Training includes an introduction to DOTS and reasons for implementing the strategy. Training takes about one day at district level.

Laboratory technicians
Training in how to carry out sputum smear microscopy and to diagnose smears correctly. Training takes about 10 days at regional or district level.

Health workers at diagnostic centres
Training in treatment regimes and how to classify people with TB, and managing people who do not complete treatment or treating difficult cases of TB (e.g. people remaining positive after extended intensive phase, or those with extra-pulmonary TB). Training takes about six days at district level.

Health workers at treatment centres
Training in current thinking on TB and its treatment and overview of the DOTS strategy, community education, how to take sputum samples, how to observe treatment, and how to keep records. Training courses are about three to six days long at district level.

Late patient tracers
Training will probably take about one day. (This may be part of the training for health workers at treatment centres or community level if they are responsible for tracing people who stop treatment.)

Community health workers
Training in community education and how to observe treatment takes about one day at district level.

DOTS treatment supporters
All treatment supporters should be trained in how to observe treatment, how to fill in treatment support cards and how to support and encourage the person taking treatment. This training can be done at the DOTS treatment centre.

After these initial training courses, people will continue to benefit from 'refresher' training courses, continuous on-the-job training and support from managers and colleagues.

Monitoring and evaluating a DOTS programme

The two most important aspects of monitoring are reports on case finding and outcome of treatment and evaluation. Regular monitoring and evaluation are essential to ensure that policies are being followed, to provide on-the-job training and to help health workers to solve problems at a local level. Identifying and solving problems locally can help health workers to identify gaps in services and encourage them to try to adapt DOTS to suit people with TB (e.g. by travelling to a person's home or choosing someone in their local community to observe them taking treatment, instead of the person with TB having to travel to the health centre).

Treatment support cards

What are they? Cards filled in by the treatment supporter as they observe each dose of treatment.
What are they for? Provide a daily record of direct observation. Health workers can check the treatment support cards on supervisory visits to the treatment supporter.
Who fills them in? Treatment supporter.

Treatment cards

What are they? Each individual has a treatment card kept at the treatment centre, which health workers update at supervisory visits to treatment supporters or monthly review meetings with the person with TB.
What are they for? A central record of treatment observation, drug supply and progress at monthly review meetings. This process of record-keeping ensures that people who stop treatment can be quickly identified and followed up.
Who fills them in? Health worker at treatment centre.

TB register

What is it? A record of everyone in a district who is receiving treatment for TB.
What is it for? To ensure that all those with positive sputum smear results (i.e. those diagnosed with active TB) are receiving treatment.
Who fills it in? District TB officer.

Laboratory register

What is it? A record of the results of all the TB sputum smears carried from the laboratory (the diagnostic centre).

What is it for? For cross-checking with TB register to ensure all those with positive sputum smears are receiving treatment.

Who fills it in? Laboratory technicians.

Case finding reports

What are they? Quarterly reports on new cases and relapses of TB diagnosed and registered during a three-month period.

What are they for? Case finding reports can show progress towards improved detection and identification of people with TB.

Who fills them in? A member of staff at the diagnostic centre (probably the district TB officer) is responsible for filling in these reports. The case finding report needs to be checked against the TB register and the laboratory register to ensure it includes every person on the TB register.

Smear conversion reports

What are they? Every person being treated for TB should have a smear examination at two months (new treatments) or at three months (retreatments). The two-month smear conversion report is for people who were smear positive at the beginning of treatment. Follow up sputum examinations are essential to reduce the risk of treatment failure or relapse and to be able to evaluate cure rate.

What are they for? Smear conversion reports are a measure of response to treatment, and also give an early indication of the effectiveness of the treatment centre in providing DOTS. A change in smear conversion rates can help identify problems quickly (e.g. new staff who may not be properly trained) and solve them quickly (e.g. by providing appropriate training).

Ideally the smear conversion report should show that:

- the number of people with smear positive TB in the smear conversion report is the same as the number in the previous case finding report
- every person treated for TB has a smear examination result at the end of the intensive treatment phase
- the smear conversion rate is between 80 and 90%.

Who prepares them? Health workers at the TB treatment centre prepare the information for the report. The district health officer checks and analyses the results.

Information recorded by health workers is a vital part of effective TB treatment

Photo by WHO/J L Ray

Treatment outcome reports

What are they? Treatment outcome reports include information about how many of people with pulmonary TB, who were registered 12–15 months earlier, have successfully completed treatment and how many have not. Successful treatments include cured and treatment completed, while unsuccessful treatments include treatment failures, people who did not complete the full course of treatment, those who die, and people who transfer out of the programme.

What are they for? These reports can help to identify whether treatment arrangements are working effectively or not. Treatment outcome reports can be used to assess whether programmes are providing high level care or whether quality of care needs to be improved.

Who fills them in? District TB officers, using information available from previous reports, diagnostic and treatment centre registers.

Acknowledgements

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healthlink WORLDWIDE
Healthlink Worldwide
Cityside
40 Adler Street
London E1 1EE, UK
Tel: +44 (0)20 7539 1570
Fax: +44 (0)20 7539 1580
E-mail: publications@healthlink.org.uk
http://www.healthlink.org.uk

DIS-5.

Main identity

From: "Paul Divakar" <pdivakar@satyam.net.in>
To: <pdivakar@satyam.net.in>
Sent: Tuesday, December 30, 2003 7:07 PM
Subject: Rally Flashes

Dear Paul,
It is encouraging to hear about the progress of the Dalit Swadhikar Rally; we are in touch with Ruth (NAWO), KKNSS, and NESA.
The People's Health Movement is organising an International Health Forum for the Defence of the Health of the Poor on 14th - 15th Jan in Mumbai. Details are available at www.phmovement.org
Oblesh from NESA is sharing a testimony of the HIV/AIDS work of the Human Rights Forum for Dalit Liberation - Karnataka.
With regards
Sheba Nargis

NATIONAL CAMPAIGN ON DALIT HUMAN RIGHTS

ATTN: BUREAU CHIEFS PRESS RELEASE DECEMBER 21, 2003

DESPITE ODDS, DALITS SCRIPT TALE OF VICTORY IN BIHAR

(1) The Buddha Route of the Dalit Swadhikar Rally came across examples of Dalits fighting despite the odds stacked against them in Bihar on December 20, 2003. The rallyists started their day with a visit to Jhajjar, where it was welcomed to the resounding beat of Dalit drums. The next stop was Balihadi, home to 1200 Dalits. Till now, though, only four boys have passed their matriculation exams. The tale of the school here buoyed the rallyists greatly. The land on which the school building is, belonged to a businessman. The Dalits here gathered enough money to buy this land and then gave it over to the government so that a school could be built. Education remains low though, and other problems also plague the people here. Most people here make bidis - if they make 1000 per day, they get Rs 20. But 1000 is often an impossible figure to reach. About 10 per cent of the people here were granted some land after independence, and are paying tax for this land. But they have been unable to till the land till now - some of it has been taken over by the forestry department, some of it is hilly and uncultivable and some has been taken over by others. In October, the Bihar government had given out papers for these tracts of land, but these people - who are the owners - were not informed about it, and therefore have no documents to prove that they own the land. Local mass organizations have, however, started mobilizing the Dalits here. The rallyists then went to Charraiyan, where 70 Dalit families live. They unveiled a statue of Babasaheb here. This area used to be a stronghold of Yadavs. Atrocities were often committed against Dalit women. The Dalits here finally got together and decided that as landowners themselves, and given the fact that many of them were educated, they did not have to take the oppression lying down. After a struggle, the Dalit organizations have become strong here and Dalits in this area have stopped labouring for others. However, the atrocities continue - the village head is of the Yadav community and Dalits are often thrown into prison on trumped-up charges. Tales of oppression by the Yadav community came to light at Baanka too. A rape case registered against a member of this community has seen no action so far. The DMD of the station there is Dalit, but he is aiding the upper-caste inhabitants. At Baanka, the turn-out was so high that locals said that even the chief minister of Bihar does not get such attention from them.

(3) On the Bhim Route, the rallyists went to Wazirpur Thikana in Haryana, where they were welcomed by 'been' players belonging to the Adivasi community. The women here saw the rallyists off till the border. The rallyists then moved on to Julana, Saffido and finally reached Jind. The people here had created their own banners and posters to welcome the Rally. A procession was taken out through the city. The rallyists then wended their way to Rohtak, where

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for library - Dalit Issues file
JN 31/12/03.

the Bharat Gyan Vigyan Jattha welcomed them. They visited a Dalit basti here. Many employee associations also participated in the rally here and expressed their support for the Dalit cause. The rallyists got to know about the kidnapping of the Dalit sarpanch of Behervar village on October 12. The sarpanch had obtained the permission to build a school on a piece of public land. But the high caste people opposed it and invited him for a 'dialogue'. He has not been heard of since then. The Haryana government has done nothing about this so far. The Rally leaders then drafted a resolution in this regard, to be read at a mahapanchayat, scheduled for December 21, 2003.

(3) Rallyists on the Thiruvalluvar Route received hearty support from the people on all their stops on December 20. At Karur, 1200 people received them with the support of local Dalit organizations. The rally then went to Tirugumani on the Trichy border, where it was greeted by people in four lorries, two vans and a car. The rally's entry into Trichy was delayed due to the presence of the President in the town. They were welcomed into town by the South India Aravanigal Rights and Rehabilitation group. The rallyists held a meeting in front of the Ambedkar statue at the town junction. The BHEL union, railway union and Dalit organizations had turned up in full strength to support them. The Rally then moved through Pudukudi to Thanjavur. Cultural programmes and meetings marked the Rally's activities here. The next destination was Manakarai, where 300 people received the rallyists. The rallyists then went to Thiruvidaimarudu, a stronghold of the Hindu maths, where the caste factor is very dominant. The meeting here was attended by nearly 1000 people. After this triumphant stand, the rally moved on to Mailaduthurai, where employee and Dalit unions had organized a meeting attending by nearly 500 people. The rallyists on this route are now headed for Sirgazhi, Chidambaram and Mannargudi.

The Dalit Swadhikar Rally has been organised by the National Campaign on Dalit Human Rights. Accompanying the Rally on its four routes is a travelling poster exhibition, 'Hidden Apartheid', which deals with the issues confronting Dalits in the country and has been conceived by ANHAD (Act Now for Harmony and Democracy). The Swadhikar Rally aims to create awareness about globalisation and Dalit rights among Dalit masses across the country, in order to convey their viewpoint at the World Social Forum, to be held in Mumbai in January 2004.

For more information, contact 04055281446 and 04027801268.

Community Health Cell

From: "Ipsita Banerjee" <nhpp@bol.net.in>
To: "pha" <pha-ncc@yahoogroups.com>
Cc: "VHAI" <vhai@vsnl.com>; "Ritu Priya" <ritupriya@vsnl.com>; "Mohan Rao" <mohanrao@bol.net.in>; "navarro" <vnavarro@jhsph.edu>; "frchpune@giaspn01.vsln.net.in" <frchbom@bom2.vsnl.net.in>; "mfc" <samasaro@vsnl.com>; "Vandana Prasad" <chaukhat@yahoo.com>
Sent: Friday, March 05, 2004 7:56 AM
Subject: [pha-ncc] Fw: Article sent

Dear Friends
Fresh from the oven! The Medical Service Centre, headquartered at Kolkata, had asked for a note from me on RNTCP for their annual conference on13/3/04. This might also be of onterest to you. Regards, D Banerji
----- Original Message -----
From: Ipsita Banerjee
To: calcutta heart clinic
Sent: Friday, March 05, 2004 6:27 AM
Subject: Article sent

NTP/CHC
March 5, 2004

SOCIOLOGY AND POLITICS OF IMPOSITION OF THE REVISED NATIONAL TUBERCULOSIS PROGRAMME BY WORLD BANK AND WHO

TH 5/3

Debabar Banerji,
Professor Emeritus,
Jawaharlal Nehru University,
B-43 Panchsheel Enclave,
New Delhi 110017
Tel:649 0851 Email nhpp@bol.net.in

Lib - TB reserve file
Sw 5/3

The imposition of the Revised National Tuberculosis Programme (RNTCP) is a classic manifestation of the quotation from the famous Check author, Milan Kundera "Man's struggle oppression is a struggle between memory and forgetfulness". International instruments of the rich countries, such as the World Bank and WHO had wiped out the memories of India's seminal contributions to the field of dealing with tuberculosis as a public health problem. As a counter-attack against oppression by the rich countries it is necessary for us to 'remind' them about some of these contributions from India, which had brought about fundamental changes in the approach that was being followed all over the world..

The research study, which was carried out at the Tuberculosis Chemotherapy Centre at Madras in the fifties had proved that treatment of tuberculosis patients at home is as efficacious at home as in sanatoria. It was also proved at the National Tuberculosis Institute, Bangalore (NTI) that in the sixties that the BCG vaccination, which was till then so strongly advocated by the rich countries, does not provide any protection at least to adults. Perhaps a more fundamental work at the NTI was to develop a people oriented approach to diagnosis and treatment of tuberculosis under the conditions prevailing in the country at that time on the basis of data obtained by 'going to the people and learning from them'. It was possible to bring down the cost of diagnosing and treating patients from Rs 2,500 to as low as Rs 10. NTI made use of the relevant information to formulate the National Tuberculosis Programme (NTP). It was asserted that the services should be available

free of cost and NTP should be integrated with the general health services – 'it should sink or sail with the general health services'. The government of India had accepted the NTP for nationwide implementation. The solid evidence produced at NTI also made the WHO Expert Committee on Tuberculosis of 1964 to adopt this approach.

People's struggle for health and health services culminated in the Declaration of Alma Ata in 1978 by all the countries of the world. Among others, the Declaration proclaimed health as a fundamental right, people ought to be prime movers for developing their health services, there should be social control over the health services and, as emphasized in the NTP, services should be provided in an integrated form. The response of the rich countries to the declaration of self-reliance by the poor in the world was as sharp as it was swift. They 'invented' what they called Selective Primary Health Care (SPHC). RNTCP is one such programme fabricated by them and made agencies like WHO, UNICEF and the World Bank. Advocate this utterly unsubstantiated approach. It was an awesome and shocking (the same 'shock and awe' of Iraq!) use of raw power by those who called themselves as children of European Enlightenment.

It is a grim irony that they first 'destroyed' the NTP by destroying the infrastructure of the health services in India by imposing vertical programmes like the Universal Programme of Immunization (UIP), AIDS Control and Polio Eradication and then made a case for RNTCP by blaming the victims the people. It had been emphasized on numerous occasions that, as designed, the NTP was not performing because of a virtual breakdown of the public health system of the country. Proponents of RNTCP made the preposterous allegation that the tuberculosis patients are defaulters or non-complaints of the doctor's orders and therefore the only way to 'save' them from their doom is to offer them Directly Observed Treatment with Shortcourse chemotherapy, using a battery of powerful and very expensive and toxic drugs -- the notorious DOTS. RNTCP is several times more expensive than NTP. Despite all the backing it has received, it has fallen far short of the targets it had set for itself. It has further distracted attention from providing other health services to the people. Because of reckless use of multi-drugs, now there is a real danger of large-scale development of multi-drug resistance.

Those who are prepared to take the side of the people, who refuse to 'forget', have not only to expose the designs of the market-oriented rich countries and the exploitative ruling class in the country, will have struggle for an alternative, self reliant health services as a part of struggle for health.

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DIS-5. CD-

TUBERCULOSIS

1. Scenario/ situation/ statistics related to tuberculosis keeping in focus women and gender relations
2. Efforts/ successes to improve the situation with practical examples
3. Technical information on tuberculosis - Fact sheets
4. Module for training
   - Objectives
   - Content
   - Duration
   - Training methodologies
   - Teaching aids required
   - Reference material for the trainer
   - Material to the participants
   - Any other

TUBERCULOSIS

This disease which affects large numbers of Indian people is a major problem in our country because it is so closely linked to poverty and malnutrition. Every minute, two more people in India are becoming 'sputum positive', that means their coughing makes it possible to spread the disease further. Every minute, TB kills one more patient, and although more men than women get TB, more women die of this completely curable disease. In fact, ***more women die of TB every year than of causes related to childbirth.***

The average incidence of lung TB that causes holes or cavities to be made in the lungs is about 2-3/1000 population. This means that if there are 10,000 people in your area, about 25 patients should be taking the treatment for TB. Is it possible for you to find out the numbers from your district TB centre and the groups of women you work with to find out the facts for their local Primary Health Centres?

One important thing you will probably find is that it is not easy to find out who the patients with TB are. People do not like it to be known that they suffer from this disease because even though they can be completely cured, society does not accept patients on an equal footing. They face a lot of problems, particularly in their workplace, sometimes stopping work, and an already poor family is pushed even further into debt. In reality, with the drugs available for the treatment of TB today, ***a patient becomes non-infectious within two weeks of starting the treatment.*** This information must be shared with as many people as possible; changing society's attitudes is a slow and difficult process, but it has to be done in fighting diseases like TB.

TB becomes active when a person' s ability to fight germs, i.e. her immunity is at a low. This is the reason that the women who are at greatest risk are those in the child-bearing group, poor women who generally bear the triple burden of overwork, under nutrition

and motherhood. The first step in the treatment of any disease is the admission of the patient that he/ she is ill, this step is influenced by a number of factors, predominantly cultural. In this context a woman will often deny the seriousness of her symptoms, because in the overall battle for survival in today's world, her health is the least priority. Seeking help is delayed, and this will be worse if she does not have financial independence. This has an important bearing on another aspect of women TB patients as well, there is pressure to become "well" as soon as possible. Hence as soon as the symptoms subside, she will discontinue treatment, especially if there are costs (often hidden) involved in collecting the medicines.

Cough is the most important symptom in lung TB and anyone with a cough of 2-3 weeks must be screened by a sputum test. (See Fact sheet). Chest x-rays alone are not reliable in diagnosing TB, and if treatment with anti-TB drugs has been started without a sputum test, a second doctor should be consulted. If TB has been diagnosed, it is very important that the drugs be taken correctly and continuously for the six month period (See fact sheet). Availability of these medicines is often a problem with the national TB programme. Often the patient is required to travel a great distance every month and as this is impractical and involves loss of a day's wage, treatment is discontinued. The revised programme that follows the DOTS regimen(the patient is supervised daily swallowing the tablets) lessens these problems, but this facility is not available everywhere and in some contexts , impractical. The follow up of patients to ensure that treatment is completed is a very important input, and communities that are aware can help to support and encourage a patient to complete the treatment. Loaning money for travel, baby-sitting for young children and a helping hand with housework are small, but useful ways in which women can support a friend in this illness crises. As a group, they can also help with trying to avail of loans or grants in rehabilitating the patient.

Even when TB affects men, it is commonly in the wage- earning group that the disease strikes, and women in their families who have not worked outside the home are now forced to do so for sheer survival. This places them in a very vulnerable position and they are victims of exploitation, doing the least comfortable jobs for the poorest pay.

Prevention of TB

Unfortunately there is no vaccine that is available that is fully effective in preventing TB. The BCG vaccine that is routinely given to all newborns as part of the immunisation programme helps in making severe forms of extra- pulmonary TB in young children (such as TB in the brain) less severe, so there is less death and disability. The most useful measures are those that improve the lifestyle and living conditions- good food and fresh air. These are interlinked very closely with economic and environmental issues. With the present AIDS epidemic, TB has become once more a very important cause of death and disability.

TB control programme- RNTCP

The government has an excellent programme for the control of TB in our country. Unfortunately the fact remains that out of every 100 patients with TB, 30 are detected

and of these 30,only 12 complete the course of treatment. This is despite the fact that the drugs are entirely free.

Why 30% detection?

- Patients do not use the primary heath care system, as they have little faith in it.
- The doctors and other health care providers are not listening sufficiently to patients in order to be able to make a diagnosis of TB.
- Private practitioners are not aware of the guidelines of the RNTCP, and no local links in the system with generalists.
- Often there are no facilities to check sputum (microscopes and microscopists), or clear instructions not given for taking a sputum sample.

Why do people give up and become defaulters?

- Drug supply is not regular due to budgetary cuts and poor management.
- Doctors under prescribe drugs(both dosage and duration).
- Health care givers are not geared to motivating the patient to complete treatment-indifference
- Patients are apathetic, cure seems too slow, they change doctors
- Patients tempted to stop as they improve.
- Financial and other social problems that are too difficult to handle prompt patients to give up.

Note to trainer

It is important that all the above facts are shared with the participants so that they see the links between the system and the patient, enabling them to intervene with the providers and the receivers.

Case Study- The story of Arasinga Sabar

Source: "This One Child" – Dr. A.V. Ramani, Health Action, Vol.11, No.6, June 1998.

I met Arsinga Sabar in July last year at the Gangabada 'Swasthya Mela'. With much fanfare, the state Government had organised this health camp, trumpeting this "special attempt to deliver health care to remote areas". The Gram Vikas staff had been asked to inform people in the surrounding villages about the camp.

I had gone to the camp to help. Having spent the entire morning alone, trying to cope with a crowd of over three hundred patients, I was both angry and relieved when the government doctors arrived past noon. Angry that they could be so indifferent as to turn up so late for this; relieved that the patients could now be seen faster and return home earlier.

But my relief was short-lived. The government doctors were prescribing medicines without even examining the patients – "you see, there is no time to see each patient properly", they said. They prescribed injections for everyone – "you see, this camp is for the patient's satisfaction", they said.

And I felt like shouting, "No, I don't see."

So I walked out of the steaming hot classroom which was being used as the examination room. I sat on the floor of the verandah of the school building and took my time to examine patients that the field worker, Jaya, referred to me. He had asked several patients with suspected tuberculosis to come for a check-up. One of them sat a short distance away, on the edge of the verandah: a 7 year old boy.

By 2 pm, the sky was overcast with monsoon clouds. Soon, there was a heavy downpour accompanied by thunder and strong gusts of wind. Everybody ran into the shelter of the classrooms, but I did not move because I was quite dry and protected. And I noticed that the little boy was still sitting there on the edge of the verandah, even though he was getting drenched by the rain. Then his father ran back out, picked him and brought him to me, saying he could not walk.

That was how I met Arsinga.

He was thin, pale, and wasted. In obvious pain, he was also hunched by TB of the spine. It had caused his vertebrae to collapse and left him unable to use his legs. The disease had also affected his lymph glands, so that the right side of his neck was full of sores.

My heart sank as I examined him, as I saw how weak he was, how severe the disease was in him. He was with Kutukudi, his grandmother, who had a hacking cough herself. I weighed Arsinga, took a sputum sample from Kutukudi and went on with my examinations. But I could not stop thinking of the boy and his grandmother Both were seriously sick and all that the government could offer them was this farce of a clinic.

We started them both on anti-TB drugs which Jaya used to deliver to their home each month. Kutukudi had sputum-positive TB and died in October last year, Arsinga continued with the treatment.

I was in Gangabada again in February, examining malnourished children. The first child I saw was Arsinga. But this was a smiling Arsinga. He walked towards me, steadily, on his own two feet, while his proud father looked on. He still had a back deformity, but his neck wounds had healed and he had put on weight. "He even goes to the forest to fetch firewood," Jaya told me happily.

I looked at Jaya, at Arsinga and at his father. And I realised once again that all the months of hard work, the frustrations, were worth this one moment. This one child, back on his feet again, on the road to recovery.

TRAINING MODULE

Objectives of this module

1. Trainers be able to visualise the picture of a patient with lung TB and share it with the participants in order that they can guide suspects in their communities to the appropriate centres.

2. Trainers internalise and share key messages in preventing the spread of this curable disease like
   - Early detection
   - Sputum testing
   - Regular and complete treatment – infectivity of germ lost within a month of starting drugs.

   with the participants so that these messages filter through the community.

3. Trainers are sensitised to the cultural and social factors that come in the way of achieving the above due to certain gender dynamics in families and communities. These must be articulated in the discussions with the women's groups, so that they may think of ways to handle these problems.

4. Trainers can focus on the way this disease affects women, financially, socially, and that deaths occur due to poor access to care and lack of support systems. They can then, using examples, explore solutions with participants.

5. Trainers are exposed to the deficiencies in the implementation of the national TB programme so that they can enable the women's groups to act as pressure points as they become aware of their rights.

Duration of session	Content of session	Methods that can be used	Materials/ Skills required
	Experience with TB patients , what is TB?	Group discussion Case study from their experience	
	Who gets TB? Symptoms that should alert you to visit the HC	Qs and answer , role play of a woman seeking care	Charts/ posters/ qs and answer
	Diagnosis of TB	Flashcards/ board	Microscope and slides
	Treatment of TB including drugs and duration of therapy	Lecture	Pamphlets in local language Blackboard Drugs
	Why does treatment fail? Cover factors - related to system - related to patients	Brainstorming Case study	Group dynamic skills
	Women and TB- Special factors acting which affect the outcome of therapy in a woman's life	Group discussion/ role play	" Focus on finding solutions
	What can the participants do- evolution of an action plan	Group sharing-positive experiences	Group dynamic skills Follow-up

References and further reading suggested

1. Tuberculosis, Still Killing, Health Action Vol 12, No 2
2. What you should know about TB , (1995) GOI –NTI pamphlet
3. TB its diagnosis and treatment (1985), NTI pamphlet
4. TB –A guide for the health provider (1998) RNTCP pamphlet from NTI
5. Better Care of TB (1998) – VHAI publication
6. A Lady Doctor's Anxieties –3, "This One Child" by Dr. A.V. Ramani, Health Action, Vol 11, No.6, June 1998.

The following material is suggested to be part of the trainers kit

1. TB Its diagnosis and treatment
2. Flashcard set on TB – CMC Vellore
3. A set of tablets of the drugs used in the treatment of TB
4. A treatment card

7.17

D15=5.

Main Identity

From: "Ritu Priya" <ritupriya@vsnl.com>
To: "Thelma Narayan" <sochara@vsnl.com>
Cc: <abhayseema@vsnl.com>
Sent: Thursday, July 31, 2003 4:41 PM
Attach: Synopsis RP.doc; TB ISHA (PART).doc
Subject: Cehat report on health

Dear Thelma,

Attached is a very brief synopsis of the section I have promised to do for our joint chapter. Please give comments/suggestions.

Attached is also an article on the TB programme which contains some data which might be relevant. In any case I would value your comments on the article.

Warm regards,
Ritu

Synopsis

Section I of chapter on Public Health System in India

This section of the chapter will give a broad overview, dealing with development of public health services in the post-Independence period with greater focus on the developments since 1990 and the present situation. It will relate to the institutional framework for public health services, manpower development and deployment, research, surveillance, and regulation of the health sector including drugs and equipment, research, quality of services.

Health service development will be described over time with state-wise differences and some comparative international data. The quality of services, their relevance in the morbidity profile of the country, and their implications for access and utilization as well as links with private and NGO sectors will be discussed. Finally, efforts at improving performance of public health services will be examined, such as decentralisation, control by PRIs etc.

ETHICAL ASPECTS OF THE TUBERCULOSIS PROGRAMME

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Ritu Priya & Kaushal K. Singh

Health activities can be broadly grouped into three for consideration of ethical issues – public health, clinical medicine and research. Public health as the over-arching discipline, which develops policy for the health sector as a whole, considers all three spheres together. Therefore it has to take into consideration the issues relevant to each. However, the perspectives of the three may often be contrary to each other, sometimes making it very difficult to reach decisions about interventions. Clinical practitioners diagnosing and treating TB cases too, often face difficult decisions amidst the multiplicity of diagnostic tests and drug regimens, their differential costs and the social constraints of patients. Often there are diverse perspectives and opinions on the best option. Therefore it would be useful to have a general, commonly shared framework to guide the process of decision-making by policy makers, programme administrators and service providers. Bio-medical ethics and social ethics can provide such a framework. The ethical guidelines could provide a benchmark against which to test the available options, develop and implement the programme.

This paper first sets out an ethical framework for public health and then uses it to examine issues for the national programme against tuberculosis and the delivery of medical services to persons suffering from tuberculosis.

An Ethical Framework for Public Health

There is an on-going discussion around ethics in public health policy-making in general (Kass, 2001) and tuberculosis control in particular (Porter & Ogden, 1999; Priya, 1999). However ethical issues have been formulated more for biomedical research than for provision of medical care or the practice of public health (CIOMS, 1993). Four principles for ethics of biomedical research on human subjects currently provide the basis for much of the discussion on ethical guidelines for all health interventions (Box – 1).

BOX – 1

General Principles for Bio-ethics

i) *Autonomy* - of individuals to decide about biomedical interventions for themselves. Consent of individuals for participating in any research becomes important here. Similarly, in clinical practice it requires participation of the patient in decisions about management of their problem. For a mass programme, responding to the expressed needs of the affected persons/community and allowing for initiation of action by them would allow for their autonomy.

ii) *Non-maleficence* – the intervention must not have negative impact, or have only minimal negative impact that is outweighed by the benefits to the participating persons.

iii) *Beneficence* – the intervention must give benefit to those participating.

iv) *Justice* – the benefits must be equitably distributed, to each according to his/her

need.

(Based on Beauchamp & Childress, 1983)

These general principles can be taken as universally applicable. However they are open to very different interpretations when translating them into concrete action. A common source of disagreement and controversy in the translation of such ethical principles is the dichotomy existing between the operational spheres of public health as intervention at population level and clinical medicine as intervention at individual patient level. This applies very centrally to debates on the tuberculosis progamme.

There is an inherent professional logic of each of the three operational spheres, depending upon their respective primary objectives. Sources for interpretation of the general ethical principles into concrete plans and practice can be the internal logic of the operational sphere and external influences. While it is generally the internal logic by which decisions are taken within each sphere, it is being proposed here that the final translation of the principles into implementable decisions requires a mix of the internal and external logic. External influences on decisions within each sphere include the overlap with other spheres as well as social values that influence all spheres. It is also being proposed that, as ethics have to be practiced in very diverse real life settings, decisions must be made with due consideration to the given situation so that the spirit of the ethical principle is brought into effective practice (Table-1). When applying the principles in a specific context, ethical decisions will have to take into consideration the local epidemiological condition, the existing health services, and the economic, social and cultural context. For actual decision taking, it will have be a mix of the various kinds of logic, maximising the points of convergence and resolving points of conflict between them, in the real life situation.

Table - 1

Sources for Interpretation of General Ethical Principles		
Internal to operational sphere	***External to operational Sphere***	***Mixed***
Dominant professional logic	- Inter-sphere logic (i.e. public health logic for clinical issues and clinical logic for public health issues). - Social values. - Ground reality in specific context.	An attempt to practically integrate both internal and external logic for achieving desired outcome in the real life situation.

Among the differing social value positions relevant to bioethics, two of which are considered central to public health are the utilitarian and the deontological perspectives. These can help understand the implications of various options better. ***The utilitarian conception*** is one that provides public health its inherent logic of maximum good for the maximum number. The utilitarian evaluation of an intervention is based purely upon its consequences for the larger number in the physical sense, without emphasis on the process and moral implications of the means employed. In contrast ***the deontological conception*** of 'moral imperative' places a focus on each individual as an end in himself/herself, not to be viewed as the means to an end. This conception gives importance to the motivation for an intervention, not only its consequences, demands adherence to universal and absolute moral imperatives such as 'do not kill', 'do not lie'. (Schuklenk U, 2000). The former taken to its logical extreme can even justify coercion in the name of 'larger good', for example as was seen in the family planning programme of the 1975-77 Emergency. The latter can, similarly, lead to victim blaming at individual level, while allowing for non-action at the mass level. Yet both are of value for health service decisions if all of the four general principles are to be adhered to. Table 2 outlines the dominant principles for the public health and clinical sphere that are directly relevant to the discussion on tuberculosis.

Table – 2

Conceptual Basis of Interpretation of General Ethical Principles in the Operational Spheres of Public Health and Clinical Services

Basis for Operational Principles			
Technical Tenets	***Public Health***	***Clinical***	***Common***
Internal Disciplinary Logic	Maximum good to maximum number in a society	Healing and prevention at individual level	Non-maleficence Beneficence Autonomy Justice
Areas of Decision-Making	Prioritising Problems, Interventions and Delivery Systems	Treating all diseases through Accurate Diagnosis & Choice of Most Effective Treatment Regimen	Determining Relative Effectiveness of Various Options
Measure of Effectiveness	% Coverage x Treatment Completion Rate x Regimen Efficacy	Treatment Efficacy in ideal situation	Decrease in Morbidity and Mortality
Social Perspectives in Ethical Considerations			
Conceptual Basis of Social Values	***Public Health***	***Clinical***	***Common***
Dominant Internal Logic	Utilitarian	Deontological	Positivist, Reductionist, Science
Supplementary External Logic	Deontological	Utilitarian	Social Science Determined Context
Basis for a Holistic	Caring and	Caring and	Laypeople's

Praxis	Cooperation	Cooperation	Perspective and Action

While the utilitarian and deontological conceptions seem diametrically opposed to each other, it is being argued here that neither of them can effectively retain their basic ethical spirit when applied in practice without the other. There appears to be the need for public health to somehow bring them together in practical terms. The former reflects the basic tenet of public health from a population perspective, while the latter does so for clinical practice where the duty to treat the individual patient to the best of ones ability is the basic tenet. If the processual dimension is ignored, the utilitarian ends up excluding one or more sections of the population through bureaucratic categories, thereby minimising the spread of benefits. On the other hand the deontological perspective remains limited in practice as it ends up giving maximal service to a few and denying any service to many. It is being proposed here that the two can be brought together in a common framework by incorporating two other kinds of ethic that have been proposed in the context of health services – the ethics of caring and cooperation (Table 2). The utilitarian emphasis is on the role of experts in making rational choices to be applied for maximum good of the maximum number. Deontological conceptions rely upon the performance of 'duty' to individuals by detached rational professionals. Both are thus based on technocratic abstractions. When these become the basis for planning the health services, notions of a human relationship between service provider and patient, of 'responsibility' and 'caring' slide downwards. ***The ethic of caring***, as developed by women scholars and feminists since the 1980s (Gilligan, 1982; Tronto,1987) is a response to this bureaucratisation of dealing with human suffering in the liberal welfare state and its services. It is also responding to the abstract discourse of rights and justice which allows this bureaucratisation to occur. It is not for women alone but as an input into conceptualising ethics beyond that of 'rights' and 'justice' (Visvanathan, 2000). The ethics of caring includes the practice of equity, non-discrimination, a sympathetic and responsible attitude towards the suffering of patients, and a relationship of trust. This implies a transparency in decision-making and implementation. Its practice beyond bureaucratic services structured by the 'larger good' requires cooperation between public action and civil society, with public services not being rolled back or absolved of their responsibility. Caring health care providers could act as the bridge between the public service programme with a utilitarian basis for mass programmes and civil society initiatives that could supplement it with resources for the fewer number requiring additional inputs.

Finally there is the issue of work culture and ***the ethics of cooperation*** becomes significant here. "Cooperation throughout a health care system can produce better outcomes and much greater value for individuals and for society. Such cooperation requires agreement across disciplinary, professional, and organizational lines about the fundamental ethical principles that should guide all decisions in a truly integrated system of health care delivery." (Tavistock Group, 1999). It has been well documented even for health systems of several European countries that shifting from public services to market mechanisms as part of the present health sector reforms led to disenchantment with competition. There was a sense of conflict between the culture of public service and the culture of the market, the greater demands for 'efficiency' making health care providers cut corners that went against their professional ethics, and finally leading to a shift back from competition to cooperation" (Segall, M, 2000). The deontological perspective of individual doctors would benefit by a utilitarian understanding e.g. in making them more conscious of the issue of access for all, and in their cooperating with the public health programme, in appreciating the logic of its regimen for their own patients. Thus the 'caring and cooperation' discourse is not mutually

exclusive or conceptually opposed to 'rights and justice', but their complementarity in practice is the ideal public health needs to strive for. Accountability to the wider community has to be a corner- stone of any programme espousing these ethics.

Ethics of the Tuberculosis Programme

The ethical framework for public health outlined above, can be applied to several debated issues within the national programme for tuberculosis, where it can help evaluate interventions and improve the programme. It needs to be recognised that in India the providers of tuberculosis treatment include the public services and the private sector in equal measure. The public health programme must therefore address both. Secondly, the public services have two different management structures, the Revised National Tuberculosis Control Programme (RNTCP) and the National Tuberculosis Programme (NTP), and at least three different regimens in use – Directly Observed Therapy Strategy (DOTS i.e. patients come to the TB center and take the short course chemotherapy under observation of the TB health worker), (non-DOTS i.e. patients take away drugs for a fortnight to a month) with short course chemotherapy (SCC) and non-Dots with the longer standard regimen (SR).

The districts under RNTCP with DOTS-SCC and non-DOTS-SR, and the districts with NTP with non-DOTS-SCC and non-DOTS SR are as given in Table 3. The private practitioners use an even greater plethora of combinations of drugs, some rational by pharmacological principles and others which are irrational (Uplekar & Rangan, 1996). Currently the dominant understanding being propagated among service providers and to the general public is that SCC with DOTS is 'the best'. It is being implemented with wide international and national support, additional funding coming as loans to the government of India. It is in this whole context that the ethical principles are being applied to the tuberculosis programme.

Issues

I. Criteria for Inclusion and Exclusion

Ideally, all persons needing treatment should be able to get it. However, that being an unreachable goal, the principle of justice demands equitable distribution, i.e. the resources be evenly distributed so that each one has an equal chance of getting treatment, without any structural exclusion. But exclusion often occurs due to resource constraints, operational feasibility and epidemiological or technological rationale. The basis of exclusion in any programme is therefore a primary ethical concern. The criteria used for analysing cost and benefit in order to maximize the impact of resources used are crucial arbiters here. If cost and benefit take only the supply side considerations then the differential impact of social context on access and utilisation of programme services is ignored. This excludes the most vulnerable in society in the name of cost-effectiveness. The tuberculosis programme currently demonstrates such exclusion at different levels.

The tuberculosis programme, working through the District Tuberculosis Programmes (DTPs), still does not cover all parts of the country. The rationale earlier (i.e. in the 1960s when the NTP was initiated) was primarily 'operational problems' (lack of roads etc.) that now no longer holds. Decades ago the understanding was also that hill regions have little tuberculosis relative to other regions. Now this too does not hold. The first ethical task in

strengthening the programme should be to remove this exclusion by expanding the programme to all districts. But this exclusion by geographical area still forms a primary basis of exclusion of over $1/5^{th}$ of the country's population as there is no District Tuberculosis Programme (DTP) in 119 districts (Table 3).

Table 3
Coverage of Districts by the National Programme against Tuberculosis

Districts with RNTCP (DOTS-SCC + non-DOTS-SR)	- 149
Districts with NTP (non-DOTS-SR + non-DOTS-SCC)	- 320
Total DTP districts	469*
Districts with No DTP	119**
Total districts	588*

* Total more than total districts (457 DTP districts and 576 total districts) due to overlap of NTP and RNTCP in some.
** Districts not implementing a TB programme largely in J&K, Uttaranchal, 5 N-E States, Chhattisgarh, Goa.
Sources: NTI, Annual Report 2001, pp 57-58
Ministry of H&FW, Annual Report 2001

Among the districts where DTPs are operational, the DOTS programme covers less than one-third of total population of the country because of 'operational feasibility' (Khatri, 2002). The criteria used for choosing districts to implement SCC and DOTS are those that lead to selection of the better ones (WHO, 1999). So the already endowed get even better services and the deprived remain with what are considered poorer service structures. The ethics of justice requires just the reverse.

Further in areas with DOTS implementation, several criteria lead to exclusion of diagnosed patients from the DOTS scheme (Priya, 1999): -

a) inability to produce proof of stable residence (most difficult to obtain by the migrant poor)
b) lack of acquiescence or ability to come to the DOTS center every alternate day (which is difficult for daily wagers and the severely ill)
c) the health care provider's (TBHVs, Treatment Organisers, Supervisors and medical officers) assessment of the patients' incapacity to complete treatment. Many therefore are then sent to what is considered 'second rate' regimen and services, the non-DOTS,

and often end up going to the private sector. This leads to an increased time lag in starting treatment and to a higher default by those outside the DOTS programme.

The bases for discouraging registration in DOTS are justified on the grounds that any patient who does not complete treatment is likely to acquire multi-drug resistant tuberculosis (MDR-TB) i.e. the ethical ground of 'non-maleficence'. So to ensure good completion rates, those who are most likely to default are excluded. However, this is a distorted utilitarian perspective, as leaving out the most vulnerable (through a system such as that of DOTS that does not allow for continuation of treatment by migrants and the poorest) is likely to create conditions of greater number of cases with incomplete treatment in the community and an increase in MDR. The outcome would thus be contrary to the very reason for developing such a 'rigorous' discipline into the programme. This is a violation of the principle of justice and of non-maleficence from the public health logic (see measure of effectiveness given in Table 2). The low level of primary resistance even after 40 years of the earlier strategy of giving home-based treatment to all (Central T.B. Division 2002; Paramasivan, 1998; Paramasivan et al, 2000; Sharma & Mohan, 2001) demonstrates the low risk of MDR developing with an open strategy based on convenience and initiative of the patient.

And thus the DOTS centers provide services to only 9% of total estimated cases in the country (calculated as given in Table 4).

Table 4
Calculation of Percentage of Total Estimated Cases Treated Through DOTS

Expected Break-up of cases[@]:

New smear positive cases: New smear negative cases :: 1:1

New smear positive cases: Re-treatment smear positive cases :: 1:0.5

New smear positive cases: Extra Pulmonary :: 1: 0.2

Total cases =230/ 100,000 population annually

60 % of community load is expected to come into RNTCP = 135/100,000 annually

1 % Annual Risk of Infection (ARI): 50 New Smear Positive Pulmonary Cases/ 100,000 annually

In India, Average ARI = 1.75%.

Therefore New Smear Positive Pulmonary Cases = 85 / 100,000 annually

(Chakraborty 1997, page 16)

	Expected ratios[@]	**Estimated Cases in the Community /100,000**	**Expected Cases under RNTCP[@] /100,000**
		(a)	*(b)= 60%of (a)*
New smear positive cases: New smear negative cases	1:1 = 85:85	85+85 (New smear positive + New smear negative cases)	50+ 50
New smear positive cases: Re-treatment smear positive cases	1: 0.5 = 85: 43	43 (Retreatment smear positive cases)	25
New smear positive cases : Extra Pulmonary	1.0.2 = 85:17	17 (Extrapulmonary cases)	10
Total		230	135
Estimation for the whole country (10^9 population)		**Cases=23,00,000**	**Cases =13,50,000**
Performance of RNTCP	Total cases treated 2,11,751[$]	211751/23,00,000 x 100 = **9.2%**	211751/13,50,000 x 100 = **15.69 %**

Source*: @ *DGHS, Central TB Division, 'RNTCP at a Glance'

$ World TB report 2002 (calculation based on data provided for year 2000)

ChakrabortyAK, 1997.

There is in effect also an exclusion of the multi-drug resistant (MDR) cases on economic grounds, as there is no provision for specific treatment of MDR cases. The treatment is extremely expensive and not feasible in the mass programmes based on utilitarian principles. This denies treatment to the individuals with MDR-TB and increases the risk of spread of MDR-TB in the population. One possibility of providing treatment to such cases comes from

the 'ethics of caring' of the TB programme personnel, leading them to utilise community mobilisation to obtain treatment for such cases. The onus would then be on the programme to inculcate an ethics of caring in its personnel. We examine this aspect in the next section. The other could be a more efficient programme i.e. one which gives similar returns for less input. The financial resources thus conserved could then be used for treatment of MDR-TB cases. We will examine the possibility of this in the section on technological options.

Thus one of the first ethical imperatives is to limit the processes of exclusion that are operating at each level, as they deny justice to the individual *and* lead to negative consequences for disease in the population.

II. Providers' Attitudes

Some processes of exclusion arise out of the health care provider's attitudes and practices, which are shaped by the structure of the programme, their training and the wider social attitudes. The training of workers emphasizes the seriousness of the disease and the problem of MDR-TB in order to enthuse them for their tasks. The Information, Education and Communication component, undertaken to make patients adhere to the alternate day DOTS regimen, does the same. This is bringing back the fear and stigma of the disease, which the stable, low key, NTP had helped to decrease, even when inadequately implemented. The doctors have now started insisting on patients covering their mouth and, as observed in DOTS centers and T.B. Hospitals, often maintain a physical distance from them as far as possible, despite the scientific irrationality of such behaviours. This fear conveys itself down the line and stigmatisation increases (Priya et al, 2000; H.T., 2002). This hinders early diagnosis, accessing and continuation of treatment.

Non-DOTS regimens have been declared 'second rate'; in training manuals, popular IEC and technical papers (WHO, 1996; DGHS, 2002). Focus is shifted to 'the best'. The pre-existing services under NTP get discredited as a second grade service in the minds of providers and patients. Morale of workers in it plummets and the patients catered to by it become only those unable to go elsewhere and most vulnerable to default. The performance thereby further declines. Those filtered out of DOTS now have an even poorer option left for them in the public system. Turning to the private sector, many drop out soon due to the inability to continue payments. Strengthening the drug supply to the NTP as well in recent years has been an extremely positive outcome of the RNTCP, but the perception of this as 'second rate' colors its implementation and prevents it from achieving its potential.

Autonomy of the patient is decreased with DOTS as the patient is now not trusted and needs 'policing' in the name of 'observed therapy'. However it is also true that for complete treatment of a disease like tuberculosis, support is often necessary for the patient to keep up morale and persist with treatment. A caring attitude, rather than policing for ensuring compliance, would provide this without violation of the ethical principles and limit the stigmatising attitude.

However the structure of the programme does not allow inculcation of an ethics of caring. The programme literature, guidelines, regimen and structure all communicate a very straitjacketed technocratic approach to the programme personnel. There is little sense of 'dealing with suffering'. When they are expected to turn the most vulnerable over to what has been communicated as 'second rate services', the sputum negative T.B. cases are shunted back and forth between microscopy centers and T.B. clinics, when they leave the MDR cases

with no real option, it does not cultivate a sense of dealing empathetically with patients. Ensuring implementation according to the technocratic logic becomes the sole purpose. Further, inability of the T.B. treatment providers in the T.B. centers to cater to any of the patient's other health problems, whether co-morbidities or side-effects of the anti-TB drugs, tells them that the programme is 'non-caring' of suffering and only concerned about decreasing the 'pool of infectious cases'. A number of the problems in this regard arise out of non-integration of the TB services with the general health services. If integrated, many of the ethical problems, e.g. non-treatment of co-morbidities and side-effects or stigmatizing behaviour, could be automatically dealt with.

When they themselves are insecure (as contract workers which is an integral part of the programme's management structure) or feel compelled to ensure fulfilling of quantified targets, they become more concerned with the programme evaluation criteria rather than well-being of the patients. They adopt even more rigorous criteria for registration of cases under DOTS than demanded of them by the programme guidelines, and add to the exclusion of the more vulnerable that are likely to default.

With all this they themselves see no 'caring' in the system and so do not trust its intentions. Then, instead of being able to convince the skeptics among other medical treatment providers of the public health logic of the programme, they imbibe their skepticism, e.g. about efficacy of an alternate day regimen relative to a daily regimen, which they still have to continue to propagate. Thus the system generates a work environment of 'non-caring'. The management sciences too emphasise that work ethics arise out of what the management structures communicate. It is important to acknowledge the significance of this deontological dimension for implementation of public health programmes and incorporate considerations of the ethic of caring in the tuberculosis programme as well.

III. Technological Options

At population level, the benefit of any tuberculosis programme, with current technological capacity for diagnosis, can at best be 'containment' of the problem, not even expecting a decline in prevalence, leave alone elimination or eradication (Banerji, 1981; Chakraborty, 1993). Any claim of 'control' is therefore epidemiologically unjustifiable. It must be remembered that the declines in prevalence in the industrialized countries had occurred as a consequence of socio-economic development and the natural cycles of the disease in any population, not any medical technological intervention (Dubos & Dubos, 1954). So the programme is more to deal with the suffering being caused by the disease than decreasing the number of persons getting infected. In this context 'caring' becomes important again.

The options for treatment regimens lie in the drugs to be used and the strategy for their administration. Relative to DOTS with 82% success rates among the registered patients, the use of SCC in unsupervised programme (non-DOTS) has shown a rate of 72% with assured drug availability (Chaudhari et. al 1993). In the situation of erratic drug availability, as prevailing in the old non-DOTS situation, completion rates were found in a TRC study to be 54% with unsupervised SCC treatment and 49% with fully supervised regimen (TRC, 1996).

A 7-year feasibility study by the Tuberculosis Research Centre, providing 3 different regimens in 3 different groups covering 18 districts found that the completion rate of unsupervised treatment is similar, and in fact better, than the supervised one (table 5; comparing regimens 1,2 and 3). Also that the inclusion of Rifampicin for only two months of

the intensive phase gives either same or better rate of sputum conversion (comparing regimens 1 and 2). The third regimen's mechanism of delivery, i.e. self-administered for the first two months and then observed therapy for the next four, takes patient behaviour pattern into account (as maximum stoppage of treatment by patients occurs after 2 months when they start feeling relief from symptoms) and minimizes patients coming to the center for treatment on that basis, so treatment is higher than for the other two regimens. However sputum negativity by the end of treatment is similar in groups 2 and 3. The point is that programme managers should examine these options for their suitability to extend the benefit to a maximum through rational options of regimen and flexibility in treatment choices.

Table 5
Results of A Seven Year Feasibility Study Introducing SCC under Existing NTP Conditions and Comparing Three Optional Regimens

No.	Drugs	Delivery Regimen	Total patients	Completed treatment (>80 % of total days)		Patients available for Sputum examination	End of treatment			
							Sputum examined		Sputum negative	
				No.	%		No.	%	No.	%
1.	$2RHZ_2$ /$4RH_2$	Drugs being given **twice a week under supervision** *for 2+4 months*	12929	6349	49	5334	3441	64	3276	95
2.	2RHZ/ 6 TH	Drugs being **self-administered** for 2+6 months	44383	23944	54	22609	18065	80	17842	99
3.	2RHZ/ 4 RH2	**Self-administered daily for the first 2 month and under supervision for the next 4 month twice a week**	**7417**	4541	61	4374	3665	84	3643	99

Source: *Tuberculosis Research Centre (ICMR), Madras 1996*

Technological reasons for exclusion from 'full treatment' have been three –

(i) Sputum positive cases getting greater importance because they are infectious to others, and therefore sputum negative and non-pulmonary cases being put in category 3-DOTS, to get INH + Eth/Thia without Streptomycin or Rifampicin, i.e. getting one drug less in the combination therapy than sputum positive new cases and two drugs less than retreatment cases and the non-DOTS regimen.

(ii) Another reason for this approach to sputum-negative pulmonary cases has been that they are more likely to be false positive cases. It has been argued by many

that radiologically active cases should be given the same treatment as sputum positive ones, now that X-ray facilities are available. As only 35% of all new pulmonary cases are estimated to be sputum positive, not doing so is a form of exclusion. Diagnosis of the other 55% i.e. radiologically active cases needs to be simultaneously strengthened so that the over-diagnosis occurring on radiological grounds can be minimised and so greater reliance can be placed on radiological diagnosis even in the programme (Banerji, 1998). (10% of TB cases have non-pulmonary disease).

(iii) Focus of DOTS being preventing default rather than increasing diagnosis, because Rifampicin regimens are expensive and because if resistance develops to these drugs there is little to offer, leading to exclusion of the most vulnerable. This we have already discussed.

It can be argued that the additional 'cost per patient cured' due to the shift from NTP to the DOTS within the programme structure itself (Chakraborty, 1997; Qadeer, 1994) could be more profitably utilised for support to radiologically active cases and to MDR cases.

Table 6
Additional Cost Of Cure in Sputum Positive Cases Under DOTS System

i. Total likely smear positive cases in 5 years in project area= 1.9 million*
ii. Total cured in 5 years of project =1.08 million[$]
iii. Total project cost in RNTCP Area phase II= 5459.6 million Cost of Dots strategy = 4094.0 million Cost of NTP in the phase II = 1365.6 million
iv. Additional cost of cure per smear positive case under DOTS system +0.38[#] X 4094.0 / ii = **1307.00** (the cost of curing each patient under DOTS including those for drugs, special supervisory staff at TUs, training, etc., for category one cases. This cost is in addition to that already spent for basic DTP operation and services, including maintenance at services in a given area.)

Source: Chakraborty 1997 app. 16

*(Incidence of smear positive cases 50/100,000 p.a., corresponding to ARI of 1%,i.e 437.5/100.000 say 450.in 5 years at 1.75% ARI) x project population, 271.21 million= 1.9 million

$ Cure rate 85% in Smear positive cases under DOTS X 1.9 million

Proportional expenditure under RNTCP on smear positive new cases

There is no treatment for MDR cases in the public programme as the only available regimens are exorbitantly expensive. The denial of treatment because of economic cost justified on grounds of maximum good for maximum number violates the deontological logic and the ethics of caring, besides increasing the maleficence of MDR. While upholding the validity of the utilitarian principle for a mass public programme, the ethic of caring can be applied here. The technical guidelines state that MDR cases should be sent to 'specialised institutions' (DGHS, 2001). The same document then argues that TB Hospitals are not cost effective and implicitly discourages a policy for their use. The widely reported closure of a TB Hospital in Bhopal and another in Chennai, in the recent past, throwing out the indoor patients in a most callous manner, then becomes a natural consequence.

IV. **Community Involvement**

Social and economic support to patients is an important input to prevent default by the most vulnerable but is not part of any official programme strategy. Some programme implementers have attempted to provide such support and find it very useful (personal communications). Community resources can be mobilised for this by a caring system.

The WHO estimates 2-6% cases of failure to cure even with complete treatment through DOTS in the Indian context (WHO, 2001). The caring health system should also be able to mobilise civil society for the more expensive treatment for these cases.

Community mobilization for both these tasks requires a shared understanding of ethical principles between the programme and the community. The onus on the programme formulators would therefore be to consciously make efforts to know the community's perception of ethics of a health service and to relate to it, even while communicating its own ethical logic. A process of organic linkages and dialogue between the providers and the community would make this possible.

Often there is a conflict of views on the management of TB cases between public and private providers as well as between providers and patients. Shared ethical considerations could help resolve the conflicts. The programme itself would have to be more flexible to incorporate local innovations developed to improve access and utilisation in specific contexts. This can be witnessed in the DOTS adaptation of adopting members of the community as the 'observers' for DOTS rather than health workers only.

Besides giving information to the community about TB treatment and how it can be accessed, the collective family process of decision-making about treatment will have to be considered. With 'passive case finding' i.e. the patient coming to the TB centers upon suffering the symptoms, the extent of trust in the public programme will determine utilisation to a large extent. Generating this relationship of trust is important for community involvement and giving access to the most vulnerable.

V. Transparency and Accountability

Trust can come only with transparency. Complete and correct information to the patients and their relatives is one ethical requirement. Providing complete and clear data on the programme, showing both its achievements and limitations is just as important an ethical public health requirement. The published reports do not provide data on the number or proportion of cases put on non-DOTS regimen in RNTCP areas, which is essential for any evaluation of impact of RNTCP. On the other hand there is discrepancy in report of different agencies (DGHS, NTI & WHO) creating doubts about the mechanisms for monitoring and transparency of the programme (Table 7).

Table 7

Non-Transparency and Discrepancy In Published Data On DOTS And Non-DOTS Programme Performance, 2000-2001

Source **Information**	**Central T.B. Division, DGHS, MOHFW, Quarterly reports 2001 and Others (about DOTS)**	**Annual Report NTI, 2000-2001** **(about non-DOTS)***	**WHO Report, Global Tuberculosis Control, 2002**
RNTCP District	212	149 (Page 57)	
RNTCP Districts Reporting Non DOTs		207 (page 58)	
Patients Diagnosed and Registered	***1,29,328***	**8,98,807** ***(Non DOTS)***	*211,751* (DOTS) **903,967** (Non DOTS) *(Table 9)*
Treatment Completion and Success Rates	83%	***Non DOTS*** **63% *(SCC)*** **41% *(SR)***	DOTS: 82%, ***Non DOTS*: 10** % (Table 11B)
Cure Rate	82%		Non DOTS: 7 % Table 11 B (Not evaluated 82%) DOTS: 80% Table11 A

(Base year 2000)

* ***NTI*** *analyses NTP and non-DOTS component of RNTCP*

In Conclusion

Ethical principles are very general and universally applicable but their translation into concrete practice requires a consideration of specific context and a holistic rather than a technocratic perspective. Here we have dealt with the case of a public health programme dealing with a serious communicable disease in a resource poor social setting. The current context is also of a resource intensive internationally backed strategy being introduced along with new management structures replacing the old ones of an indigenously developed programme.

For any health service, exclusion from treatment on non-medical grounds is undebatably unethical. Some exclusion is justified in mass programmes on grounds of resource constraints. But the basis of exclusion on the medical or economic grounds must be transparent so that others can assess them and ideas can be pooled to minimise the exclusion.

The utilitarian logic of maximum good for the maximum number, and the deontological logic of doing the maximum possible for each individual, appear in contradiction to each other. However what experience shows, for example with HIV/AIDS

or tuberculosis, is that one cannot be effective without the other. **Curative care cannot be effective if it is inaccessible and a mass programme cannot succeed if it does not provide a caring attitude towards each patient.**

Good management of a health programme cannot focus only on the supply side issues. A rigorous service delivery structure can become exclusionary and coercive if it is not flexible to adapt to local context and individual needs, or sensitive to the ethical principles of autonomy, justice, and non-maleficence *simultaneously*. Complete transparency on financial and technical assessments with the professional peers and lay public alike, is necessary for sustaining ethical action.

Finally, it needs to be acknowledged that good 'management' alone is inadequate for a democratic system. Priority setting is a political task as it mediates between different sections of society and their interests. What are the ethical considerations of international programme managers in 'generating political will' at the top of the administrative and political leadership in individual countries for specific programmes? Doing so through enticement of foreign currency loans for adjusting the country's balance of payments and not as a way of dealing with suffering of their people cannot generate a 'caring' programme.

'Education funds' for such generation of 'will' led to the Enron phenomenon. It can be viewed as interference in the local social and political dynamics for determining priorities and thereby antidemocratic and unethical. Each health administrator and health care provider therefore needs to understand and weigh the technological options and possible delivery systems against a comprehensive, shared ethical framework. It is hoped that this paper will contribute to developing such a framework.

Ritu Priya, MBBS, Ph.D.
Associate Professor
Centre of Social Medicine & Community Health
Jawaharlal Nehru University
New Delhi-110067
Email: ritupriya@vsnl.com

Kaushal K. Singh, MBBS, MCH
Research Scholar
Centre of Social Medicine & Community Health
Jawaharlal Nehru University
New Delhi-110067
Email: kaushal_kishore9@rediffmail.com

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g) same as ref. 24 in the paper sent earlier. Please change suitably in the text.

h) Please delete from the text.

i) Wrong year given in the text. It should be WHO, 1999. Please change in text accordingly. Table 4

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l) Same as ref. 3. Please change suitably in the text.

m) The year is wrong. It should read (WHO, 2002) ie. Ref. 24. Please change accordingly in the text.

Table 4
Calculation of Percentage of Total Estimated Cases Treated Through DOTS

Expected Break-up of cases[@]:

New smear positive cases: New smear negative cases :: 1:1
New smear positive cases: Re-treatment smear positive cases :: 1:0.5
New smear positive cases: Extra Pulmonary :: 1: 0.2
Total cases =230/ 100,000 population annually

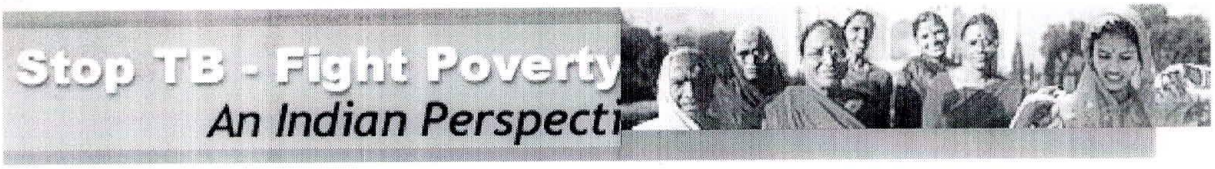
60 % of community load is expected to come into RNTCP = 135/100,000 annually

1 % Annual Risk of Infection (ARI): 50 New Smear Positive Pulmonary Cases/ 100,000 annually
In India, Average ARI = 1.75%. Therefore New Smear Positive Pulmonary Cases/ 100,000 Annually = 85

	Expected ratios[@]	**Estimated Cases in the Community /100,000**	**Expected Cases under RNTCP[@] /100,000**
		(a)	*(b)= 60%of (a)*
New smear positive cases: New smear negative cases	1:1 = 85:85	85+85 New smear positive + New smear negative cases	50+ 50
New smear positive cases: Re-treatment smear positive cases	1: 0.5 = 85: 43	43 Retreatment smear positive cases	25
New smear positive cases : Extra Pulmonary	1.0.2 = 85:17	17 Extrapulmonary cases	10
Total		230	135
Estimation for the whole country (10^9 population)		**Cases=23,00,000**	**Cases =13,50,000**
Performance of RNTCP	Total cases treated 2,11,751[$]	211751/23,00,000 x 100 = **9.2%**	211751/13,50,000 x 100 = **15.69 %**

Source: @ DGHS, Central TB Division, 'RNTCP at a Glance',
$ World TB report 2002 (calculation based on data provided for year 2000)

D15-5



Stop TB-Fight poverty : An Indian Perspective

Introduction:

Stop TB, fight poverty is the theme for World TB day 2002. TB imposes a considerable economic toll on patients and their families. Because more than three-quarters of people with active TB are in the economically active age group (15 to 54), the economic and social costs to them and society are huge. They are income providers of the family. They are the parents of young children who need their economic and emotional support in order to thrive. They have elderly parents and relatives who depend on them. They are the citizens whose productivity and talents are essential to their countries' development. The result of TB is that access to opportunities and choices- a key principle of human development –is blocked.

Ill health, malnutrition and high fertility are three main reasons why households become or remain poor. They cause poverty through diminishing productivity, reducing household income and increasing health expenditure. A more complete view of poverty includes deprivation not only from money income, but also human development, financial and physical security, expanding opportunities and especially participation in key aspects of social life.

Poor families have no buffer against loss of income-no savings and very limited access to borrowing. The way they cope with this economic adversity may provide short-term benefits –that is cash-but in long term makes them and their children destitute. The sale of assets such as land is a common response to large medical expenses.

Income poverty leads to ill health and ill health contributes to income poverty. A more complete view of poverty includes deprivations from not only money income, but also human development, financial and physical security. Poverty is also seen as a lack of basic human development indicated by poor health, malnutrition and educational development. Gender is in particular an important variable affecting both health and poverty.

TB and Poverty Links

The global experience with TB control has been able to define certain clear-cut linkages between TB and poverty:

- TB is more prevalent among low-income groups than among high-

income groups.

- The cost of TB care, if borne by families alone can be unaffordable.
- TB is a chronic ill ness and requires care over a relatively long period-during which productivity is reduced, leading to interruption of education and work.
- Household income is severely reduced, family dysfunction increases, particularly if mothers are ill and poverty increases.
- Lower productivity and more poverty impede social and economic development and increase inequalities in society.
- Lower income people are higher risk-as TB spreads in crowded places-households, school, workplace, marketplace and commuting between them.

The real stakeholders in TB control

- A. **The people: -** the low-income groups are the most vulnerable people with limited resources to over come poverty-related TB risks viz:
  - Barriers in access to primary health acre ans appropriate diagnosis and treatment for TB
  - Emerging HIV/AIDS –TB co-infection
  - Lack of knowledge about the disease
  - Overcrowded living and transport conditions
  - Urban congestion/pollution
  - Poor nutrition

- **B.Society: -** as represented by politicians and policymakers, with power to reduce risks.

Poverty in India

Statistics as provided Government of India show that about 240 million people live below the poverty line. (The poverty line is really the line of destitution. At this line, people just enough money to provide them with food, converting to 2,200 calories and with nothing else. No roof, no clothes, no security, no minimal comforts, let alone schools, medicines and any fruits of industrial revolution.)

Poverty alleviation remains pronounced challenge before the Government. Though there ahs been a steady decline in poverty over the last two decades, the total number of poor people has remained more or less constant due to growth in population. The inter-regional disparities in poverty levels are quite alarming. According to National Sample Survey Organization (NSSO) the poverty situation ins several states in India is appalling: Orissa 47.15%, Bihar 42.6 %, Madhya Pardesh 37.4%, Sikkim 36.55% and Tripura 34.44%. In terms of numbers Uttar Pardesh has 53 million, Bihar 43 million, Madhya Pardesh 30 million, Maharashtra 22 million, West Bengal 21 million, Orissa 17 million and Andhra Pardesh 12 million people below the poverty line. (Economic Survey 200-2001)

Poverty alleviation programmes are still ineffective because they have not reached the poor.

Surveys by the NCAER (National Council of Applied Economic Research) reveal that almost 59% of all households, accounting for 526 million people, have an annual income of less than Rs. 12500. This means a monthly household income of Rs.1000 or about Rs. 200 per head. This by any yardstick is abysmally low income.

Households with incomes between Rs.12500 and Rs.40, 000 per year account for 331 million people.

Only 4.1 percent, accounting for 37 million have an income of over Rs 40,000 a year.

(Life above poverty line: Rs 264 per month is all you need –Mohan Guruswamy, Courtesy www.tehelka.com)

Tuberculosis in India: (1)

General facts

- India carries a third of global TB burden. An estimated one in two of the adult population are infected with TB bacterium.
- The estimated incidence of all cases of TB is whopping 185 cases per 10,000 population.
- The TB epidemic continues to grow, every year, two million people develop active tuberculosis (more than any other country in the world).
- More people now die from tuberculosis than ever before -nearly 4,50000 every year. More than 1000 persons die of the disease each day.
- Only one in four people with tuberculosis is treated with DOTS. The current rate of DOTS expansion is still far too slow to reach the global targets by 2005. Failure to reach these targets will condemn millions of people to disease and death.
- Tuberculosis is inflicting enormous socio-economic costs. In India the estimated economic cost of TB is US $ 3 billion per year.
- India's DOTS programme is mainly financed through a US$ 142 million low interest loan from World Bank with increasing costs already being met by national and state governments.
- The quantum of human cost of TB in the country is 4.56 –6.28 Disability-Adjusted Life Years (DALYS). (The DALY combines a measurement of premature mortality and morbidity and reflects the 'burden of disease' in a population)
- The cost to the patient for successful treatment of TB averages US$ 100 to US$150, more than half of the annual income of a daily wage labourer. The estimated cost of MDR-TB to an Indian patient is approximately Rs 6500 a month (US$135).
- Research shows that 20% of rural patients and 40% of urban patients borrow money to pay for expenses due to TB.

Tuberculosis in India: (2)

Tuberculosis and Women's Health

Jackie Jackson Joint UK Coordinator of Institute for Indian mother and Child (UK), in an article entitled Multiple disadvantages: India, women's health and tuberculosis, enlists the factors that make Indian women more susceptible to TB. Poverty whom she describes as the main cause of TB, affects 70% of women worldwide compared to 30% of men. Poverty predisposes women to poor living conditions and nutrition and renders them vulnerable to disease and infection. Research has shown that in their reproductive years (15 –49 years), women are at greater risk of developing the disease after infection than men at the same age. They may also be exposed more to TB than their men folk due to their particular duties and tasks. Besides these physical consideration the shame and stigma of disease affects women more-to the point where women commonly keep their diseased state a secret and unmarried girls fear that it will affect their marriage chances.

As regards the pattern of early marriage in both the major communities of the country, young brides are encouraged to begin a family early on. It reduces women's financial independence-which she would be able to use to good effect were she to develop the disease.

Clearly tackling TB in India raises many questions about the socio-economic and political structures within society. Can TB be tackled in India without tackling behaviors in the society, such as the low status of female, she asks? Certainly a husband or a father with TB puts an enormous strain on the family whenever it threatens his wage earning powers, however she warns that social cost to the family is much higher when the disease affects mother. Her need to attend treatment programmes takes her away from the children, the cost of treatment cuts into family budget and a child is at a 3-10 times greater risk of dying within two years if he/she loses their mother than those with both parents alive. She suggests that TB programmes in future shall not use the medical model instead tackle all factors operating on women with respect to disease side by side. The multiple disadvantages for women in India that operate through gender and associated factors will only be addressed by first understanding their role in both infection, disease and treatment stages and then formulating successful strategies to reduce their influence. Therefore solutions that apply to both women and men should be implemented.

Tuberculosis in India: (3)

TB and HIV

The Prime Minister of India in his speech at a meeting on National Program for prevention and Control of HIV/AIDS on December 12th 1998, said," the health ministry puts the figure of HIV infections in the country as of now at three million to four million. In some states, the infection rate is one percent of the populations. Since we have these three to four million infections today from a base of just a few infections in 1986, imagine what the scene will be in another twelve years from the base now of three to four million. I shudder even to contemplate the numbers."

As per National AIDS Control Organisation estimates the total number of HIV infections in the country at the end of year 2000 stood at 3.86 million.

A document on Revised National TB Control Program (RNTCP) published on the official web site of the National TB Control Program sums up the situation rather crudely: "while the size of the HIV epidemic in India is presently not known, it is clear that HIV will worsen the TB epidemic". The document makes no further reference to the problem

The Draft National AIDS Control Policy has only to say this much for the dual HIV-TB epidemic "with about 14 million TB cases existing in India, HIV/AIDS also poses a twin challenge of HIV/TB co-infection. Nearly 60% of the AIDS cases are reported to be opportunistic TB infection cases. Treatment of TB among the HIV-infected persons is a new challenge to the National TB Control Programme, which has now adopted DOTS strategy for control of TB infection. At the same time looking for HIV among TB infected persons will also cause the problem of scaring away of a large number of TB infected cases in the country from seeking treatment under the DOTS strategy. There is no risk of any TB patient getting infected with HIV unless he or she practices high risk behavior or gets infected from transfusion of HIV-infected blood." The draft policy document makes no further reference to meeting of two programs (National AIDS Control Program and Revised National TB Control Program) to meet the twin challenge.

There is no reliable data available to determine how the HIV prevalence has affected the TB epidemic in India. There are only apprehensions and estimates. Even the NACO or RNTCP have not come out with any studies to document the linkage. The extent of collaboration (or lack of it) between the two programmes is reflected in the documents of two programmes available on their web sites.

On surface they appear to be two divergent lines, emanating from a common point but distancing from each other as they travel to states, districts and community health centers.

Why tackle Tuberculosis ?

Potential economic benefits for India

Effective TB control can help break the cycle of poverty and disease. It cures people and returns them to active, productive life, which in turn benefits their children and contributes to the economic and social development of their country. As more people are cured, the cycle of transmission is broken and fewer people are infected. Ultimately this leads to fewer cases of active TB.

TB control is rated by the World Bank as one of the most cost-effective health intervention because of its potential to avert a large percentage of the global disease, its low cost for each year of healthy life saved, the low cost per capita, and the potential impact on socially excluded and poor people.

Ravindra Dholakia, Professor of Economics from Indian Institute of Management, Ahmedabad in an article, Potential Benefits of DOTS Strategy

against TB in India, divides these into two broad categories:

- Pure social welfare increasing effects of DOTS, which do not generate direct tangible economic benefits. These include reduced suffering of TB patients, quicker and surer cure from the disease, lives saved and disability reduced for dependents and non-workers suffering from TB, poverty alleviation etc.
- Direct tangible economic benefits of DOTS which include: reduction in prevalence of TB due to DOTS which improves the efficiency and productivity of workers, TB deaths averted among current and future workers and release of hospital beds currently occupied by TB patients.

He postulates that that even if the Indian government spends about US $0.74 billion per year to ensure the success of DOTS strategy the investment would fetch a return of 16% p.a. in real terms.

Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year, the article notes.

Conclusion

India carries a third of global TB burden. Every year two million people develop active TB. TB accounts for nearly 4,50000 deaths every year and more than 1000 persons die of the disease every day. TB is inflicting enormous economic and social costs on the country. The estimated economic cost of TB is US $ 3 billion per year.

In India 240 million people live below the poverty line. Poverty alleviation remains a pronounced challenge before the government. Surveys reveal that almost 59% of households accounting for 526 million people have an annual abysmally low income of less than Rs 12500 (US $260)

Income poverty leads to ill health and ill health contributes to income poverty. The cost to the Indian patient for successful treatment of TB averages US $ 100 to US $150. Research shows that 20% of rural and 40% urban patients borrow money to pay for expenses due to TB.

Indian women have to pay much higher social and personal costs if suffering from TB. Besides poverty the shame and stigma associated with the disease, early marriage and social pressures to start a family early on and limited access to treatment facilities makes them more vulnerable to disease more so during the reproductive age group of 15 – 45 years.

The nation has not risen adequately to meet the twin challenge of TB and HIV/AIDS. The number of HIV positive persons has risen above 3.86 million. Nearly 60% of AIDS cases are reported to be opportunistic TB infection. This is going to add to the national load of 14 million TB cases.

Effective TB control can help break the cycle of poverty and disease. It cures

people and returns them to active, productive life, which in turn benefits their children and contributes to the economic and social development of their country. A cost-effective health intervention exists for TB control and treatment: DOTS. Increasing public awareness about proven, effective interventions like DOTS and providing greater access and benefit to treatment for those with TB, will help put billions back into the economy. Projected incremental costs to the government for successful DOTS implementation throughout India are of the order of US $ 200 million per year, compared to the tangible economic benefits of at least US $ 750 per year. The expenditure on health has declined in last decade and stood at 1.11% of GDP in 1998-99. Indian government will have to increase its expenditure on TB control.

The three aims associated with World TB Day 2002 theme viz DOTS expansion, efforts to raise awareness among political leaders, decision makers and opinion leaders and mobilization of TB sufferers for demanding greater access to treatment are more relevant to India than any other country in the world.

Suggested further reading

Ministerial Conference : Tubeculosis and Sustainable Development
Web Site : http://w3.whosea.org/cds/pdf/16march00.pdf

Potential Economic Benefitys of the DOTS Strategy in India
Web Site: http://www.who.int/gtb/publications/pebdots/

Tuberculosis and Poverty: A PPT Presentation
Web Site : http://www.wpro.who.int/themes_focuses/theme1/focus3/POWERPOINTSTB/IMPO-TB-Poverty-Aviva%20Ron.ppt

Tuberculosis in India : A Critical Analysis
Web Site :
http://apha.confex.com/apha/129am/techprogram/paper_27954.htm

Life above Poverty Line : Rupees 640 per month is all that you need
Web Site : http://www.tehelka.com/channels/currentaffairs/2001/oct/30/ca103001lib1.htm

Multiple disadvantage : India, Women's Health and Tuberculosis
Web Site: http://www.fons.org/tb3.htm

Article Compiled by

Dr. Dinesh Kumar
Director Health and Development Initiative India
email: dinesh_kumar@vsnl.com ,
dinesh@healthinitiative.org

Dr. Jatinder Singh

Executive Editor, Health and Development Initiative India
mailto:dinesh@healthinitiative.org,
jatinder@healthinitiative.org

Article Designed by

VS Christopher
Webmaster Health and Development Initiative India
email : job340@hotmail.com ,
webmaster@healthinitiative.org

56 Pink Plaza, Hall Bazar, Amritsar, Punjab, INDIA, Postal Code 143001
Phone : +91-183-554467, Cellular (Director) +91-98140-50065 , Executive Editor +91-98141-21605

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DIS-5

Main Identity

From: "Sunitha Srinivas" <s.srinivas@ru.ac.za>
To: "INDIA DRUG" <india-drug@usa.healthnet.org>
Sent: Wednesday, September 03, 2003 2:02 PM
Subject: [india-drug] TB News from India

TB News from India: September-October 2003

Health and Development Initiative-India, (www.healthinitiative.org), publishes 'TB News from India' once every two months. The objective of newsletter is to highlight issues related to Tuberculosis and HIV/AIDS control in India and enlist political, public, professional and administrative support for its cause. Health and Development Initiative-India is a not-for-profit organization and the news items have been quoted from various sources for fair use and in public interest. Reproduction of the material published is welcome provided a reference is made to the original source of the news item and 'TB News from India.'

Editorial Note:
Where there's smoke there's fire

A landmark study conducted to study the relationship between smoking and mortality from tuberculosis in India has come out with shocking results. The authors of the study concluded that three-quarters of the smokers who became ill with TB would not have done so if they had not smoked. "Almost 200,000 people a year in India die from TB because they smoked, and half of the smokers killed by TB are still only in their 30s, 40s or early 50s when they die," says Dr. V Gajalakshmi, lead researcher with the Epidemiological Research Center in Chennai, India.

Smoking and tuberculosis "are two huge and two preventable epidemics," says Dr. Thomas R. Frieden, who is credited with kick-starting the Revised National Tuberculosis Control Programme (RNTCP) in India. He and other experts in tuberculosis and public health say that the new findings underscore the need to reinforce the tobacco treaty that the member countries of the World Health Organization approved in May 2003.

Sounding a note of caution Dr. Frieden says that tobacco companies are intensifying their efforts to increase the market for cigarettes in third world countries, particularly among women. "Asian women are the No. 1 target of the tobacco industry," he warns.

Countries like India need to do more in order to ban cigarette advertising, increase cigarette taxes and educate the public about the hazards of smoking. People also need to be informed about the perilous connection between smoking and death due to tuberculosis. Those who manage IEC activities in the Central TB Division cannot

WB

TB Resource file

TH

9/3

The Indian study, which demonstrates that, the combination of cigarette smoking and tuberculosis is far deadlier than previously believed, has evoked a keen interest amongst public health experts the world over.

Smokers are four times as likely as nonsmokers to die of tuberculosis in India, the study found. The researchers estimated that nearly 200,000 people die there from tuberculosis every year because they have been smokers. At every age, smokers in the study had twice the risk of dying as nonsmokers. The study also found that Indian smokers, on average, die about 20 years earlier from all causes than they would if they did not smoke.

Smoking and tuberculosis "are two huge and two preventable epidemics," said Dr. Thomas R. Frieden, who investigated tuberculosis in India before he became New York City's current health commissioner. The two epidemics kill more than five million people worldwide each year, Dr. Frieden said.

"It's a dynamite study," said Dr. Lee Reichman, a leading tuberculosis expert at the University of Medicine and Dentistry of New Jersey. "Everyone knows that cigarette smoking is bad and causes all sorts of terrible things," Dr. Reichman said, "but none of us thought that it could be stretched to enhance an infectious disease like tuberculosis, especially one that is responsible for so many deaths."

Developing countries account for about 95 percent of the world's tuberculosis cases, said Dr. Marcos A. Espinal, the acting director of tuberculosis control at the World Health Organization. China and India head the list of 22 countries that account for about 80 percent of all the cases.

"We are far away from conquering tuberculosis" in the world, Dr. Espinal said. But India is one country where the situation seems to be improving.

"India is well on its way to controlling tuberculosis, if the AIDS epidemic does not take off," Dr. Frieden said in an interview. A new control program (RNTCP) in India "is drastically reducing deaths from TB," Dr. Frieden said. But smoking is a different matter.

Tobacco companies are intensifying efforts to increase the market for cigarettes in third world countries, particularly among women. In India and elsewhere in Asia, the vast majority of smokers are men. "Asian women are the No. 1 target of the tobacco industry," Dr. Frieden said.

There are about a billion women in Asia, where about 30 percent of men smoke, Dr. Frieden said. If cigarette companies could get the same smoking rate among women, "that's another 300 million smokers and a lot of money," Dr. Frieden said.

Dr. Frieden and Dr. Espinal said there were methodological problems with the Lancet study, which could affect the figure for the death rate from smoking. But they said they agreed with the authors of the study, who said, "Smoking is a cause, and an important cause, of death from tuberculosis."

Illness Fund May Bring Happy Tidings for TB Patients.

(Times of India, New Delhi, August 19, 2003)

Underprivileged patients with multi drug-resistant tuberculosis (MDRTB) may get financial assistance if a proposal to divert funds allotted to the Government Chest Hospital, Erragadda situated in South Indian state of Andhra Pradesh, wins approval. At the Erragadda hospital, 10 percent of the TB patients are diagnosed as MDRTB cases. On average, 10 MDRTB patients are admitted to the Government Chest Hospital every month and most cannot afford the expensive drugs that must be administered for up to two years. MDRTB patients are prescribed a three-drug therapy, and in the case of HIV-positive patients, therapy can include up to five drugs. A MDRTB committee has been established at the Erragadda hospital to address these issues. (Source: CDC HIV/STD/TB Prevention News Update Week of August 24 to 30, 2003)

TB is enemy no. 1 for India's health: WHO report says more than 45 million people in India are suffering from the disease.

(Toufiq Rashid, The Indian Express, New Delhi, July 16,2003)

If you thought AIDS would be India's Enemy Number One, think again. A World Health Organisation (WHO) report released in Paris in July this year says more than 4.5 million people in India are suffering from Tuberculosis, making it home to the highest number of TB cases reported in the world.

With about 1.8 million new cases detected every year and about 460,000 deaths so far, there seems to be no end near to the disease in the country. Though the report credits India with having the most rapidly developing free DOTS (Directly Observed Therapy) programme in the world, it rues the fact that about 900 million people in India and China do not have access to the programme. Only 55 percent Indians were covered by DOTS in 2002, says the study WHO Stop TB initiative that recommends DOTS as the ideal mode of treatment.

Calling India the most-challenging environment for implementation of DOTS, it identifies the massive intra-country migration levels as the single biggest hurdle. "They come here from other cities, other villages, looking for work. Many find employment in the textile industry, thousands work as porters or vegetable-sellers. These people stay together in groups, live in congested and unhygienic environments and stand a high risk of contracting TB," the report quotes Jayashree Parab, who runs KARM, an NGO in Mumbai.

WHO squarely blames India's healthcare sector as 'under-funded,' and notes: "Unless both public and private doctors participate,the disease will continue to spread. Patients pay for any medication they are given, which means private practitioners may see DOTS as a threat."

Navi Mumbai is the hope that WHO identifies as a model for India.

Citing it as an example for how attitudinal changes can make a difference in the implementation of DOTS, it says: "Here the health authorities are more people- and service-oriented. The doctors

practising in the slums are DOTS providers. There's an indirect benefit to these private doctors involved in the programme, the patients whom they help combat TB become their regular patients and go to them for other ailments."

TB Control Programme to Cover Entire Karnataka by Year-End.

(The Hindu (Chennai, India), August 22, 2003, By Nagesh Prabhu)

The Revised National Tuberculosis Control Programme (RNTCP) will be extended to cover the entire South Indian state of Karnataka by the end of 2003. This extension will make Karnataka the 10th state in the country to be fully covered under the comprehensive TB prevention program. Currently 22 districts are covered under the program. The Central TB Division approved the extension of RNTCP to Haveri, Uttara Kannada, Udupi, Kodagu, and Chamarajanagar districts. Upgrading of laboratories, training for volunteers and Health Department officials, installation of equipment, and civic works are ongoing. The World Bank-assisted RNTCP was launched as a pilot project in areas covered by the Bangalore Mahanagara Palike (BMP) in 1994, and has gradually extended to other parts of the State. A total of 77,782 TB patients have been treated through the RNTCP since 1998, and 22,611 patients have been administered drugs during the past six months.
(Source: CDC HIV/STD/TB Prevention News Update Week of August 24 to 30, 2003)

National AIDS Control Organization prepares a Draft on Guidelines for Management of TB in HIV Infected.

National AIDS Control Organization (NACO) has prepared a draft on guidelines for management of TB and HIV infected and has invited comments and suggestions from members of public, public health experts and clinicians. This initiative deserves to be applauded and supported.

The draft proposes that in view of the fact that tuberculosis is one of the commonest infectious disease seen in HIV infected individuals, there is a clear case for active collaboration between the HIV and TB control programmes to ensure the early diagnosis and successful treatment of tuberculosis and extending adequate care and support facilities to People Living with HIV/AIDS (PLHA). TB shortens the survival of patients with HIV infection and accelerates the progression of HIV as observed by a six-to seven-fold increase in the HIV viral load in TB patients. In fact TB is the cause of death for
one out of every three people with AIDS worldwide.

In order to ensure optimal synergy between the NACO and RNTCP the draft guidelines put forward an 'Action Plan for

Co-ordination'. It calls for service delivery coordination and cross-referral at local level and joint efforts at IEC particularly with regard to de-stigmatization.

The draft makes only a passing reference to the delicate issue of Voluntary Counseling and Testing (VCT) for diagnosis of HIV infection in a tuberculosis patient. This vital issue needs to be discussed threadbare so that clear-cut guidelines can be framed and passed on to health care providers in the field.

The draft guidelines can be accessed at NACO website at the following URL:http://www.naco.nic.in/announcements/tbhiv.zip

Web Call- a visit to Joint Effort to Eradicate Tuberculosis web site.

OurJEET.com (Joint Effort to Eliminate Tuberculosis) is a website hosted by the trans-national pharmaceutical giant Novartis through its Indian offices. A number of common facts on the disease, its pathogenesis and epidemiology both in the global and Indian context are provided. The association of TB with HIV and diabetes is explored through separate links, as are the connotations that the ailment has in context to special circumstances like poverty, women in children. DOTS is explained on another link in a rather elementary manner for professionals. The pages that are meant for patients are well designed and easily readable but are heavily biased in favour of an urban audience. Novartis, in a page highlighting its products could have added FAQs regarding drug therapy and its pitfalls, which would have enhanced the usability of the link. The banner and other messages displayed throughout the website aim to shock rather than allay doubts; whether this has been done for a certain design is best left to the visitor to ponder upon. The website has certain links which are only accessible from the sitemap and consist of case studies, the facility to upload cases and require a password and login information. On the whole, a useful site to visit if one is looking for variety of information relating to TB.

Editors: Dr. Dinesh Kumar Sharma, dinesh_kumar@vsnl.com
Dr. Jatinder Singh, jatindersingh@vsnl.com

Access Essential Drugs Monitor #32 at http://www.who.int/medicines/mon/mon32.shtml

The INDIA-DRUG discussion group is a partnership between SATELLIFE (www.healthnet.org), WHO Essential Drugs and Medicines Policy

(www.who.ch), and the Delhi Society for the Promotion of the Rational Use of Drugs (DSPRUD) in India.

To send a message to india-drug, write to: india-drug@healthnet.org
To subscribe or unsubscribe, write to: majordomo@healthnet.org

28/11/02

~~Dr. C.S.~~ DIS-5.

Diagnostic strategies under RNTCP

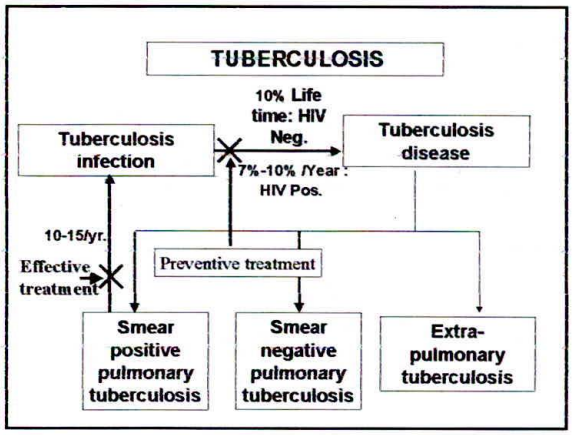
Reliable and early diagnosis with effective treatment to control tuberculosis

National Tuberculosis Institute

Bangalore

Diagnostic Strategies

- **Priority to Sputum Smear Positives**
- **Passive Case finding**
- **Chest symptomatic (cough of 3weeks with or without other symptoms) subjected for investigation**
- **Diagnosis by Smear Microscopy**
- **Confirmation based on three sputum examination**
- **Diagnostic algorithm**
- **External quality assurance**



Priority to sputum smear positive cases

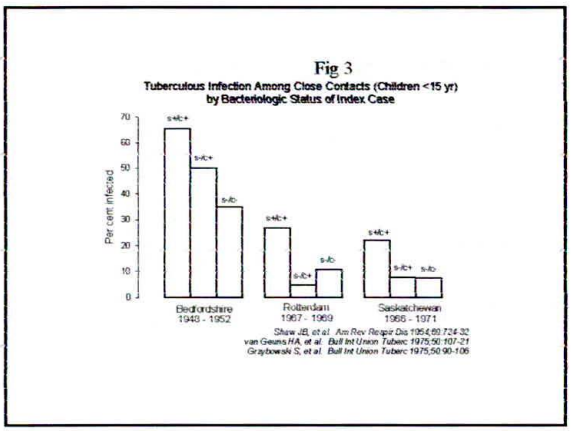
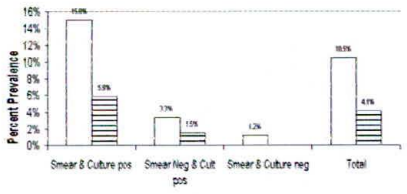


Fig 6

Prevalence of active disease among contacts of Index cases



Grzybowski S, Barnett GD and Stybio K, Bull IUAT, 1975; 50, 90

Transmission of infection

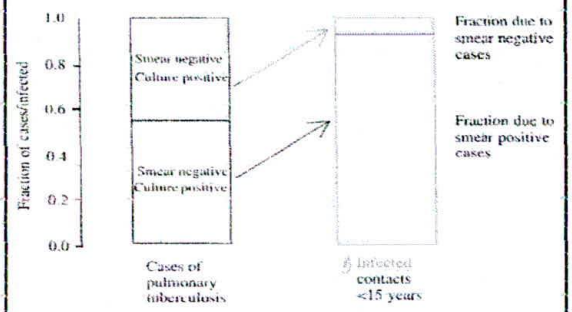


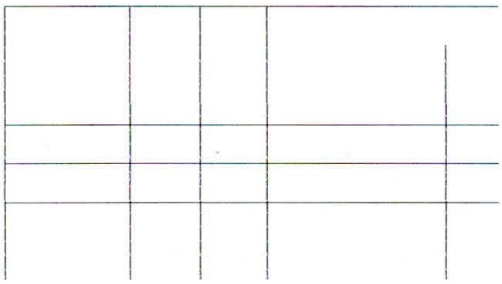
Fig. 2. Proportion of transmission attributable to smear-positive and to culture-only-positive pulmonary tuberculosis in British Columbia and Saskatchewan (6)

MORTALITY AMONG TB PATIENTS

Country	Year	Years of observation	Type of patients	Death (%)
USA	1919	4	Smear pos.	53.4
EUROPE	Before 1939	10	'Open' TB	59.84
INDIA	1960	1.5 - 2	Smear Pos.	48.0
INDIA	1960	1.5 - 2	Culture Pos.	31

Active v/s passive case finding

Mode of detection of sputum-positive tuberculosis cases (8.9)

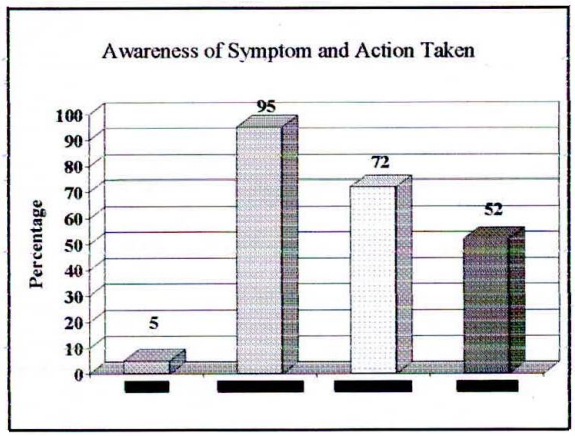


Bulletin of IUAT 1971, 45: 5-54
Bulletin of WHO 1974, 51: 59-69

Cost and Efficiency of Case finding in Rural Areas in an Operational Study (1961 –1962)

Method of Case finding	Cost per Case * found Rupees(Proportionate Values with Value of dispensary method as "1" shown in bracket	Proportion of Prevalent Cases found %
Examination of Symptomatic at Dispensary	16.00 (1)	33
Mass Examination of population by Sputum	685.00 (43.1)	26
Mass examination of Symptomatic by Sputum	133.00 (8.1)	39

* Sputum Positive Cases



Think TB

- Chest symptomatics - cough of 3 weeks duration with or without other symptoms
- Contacts of smear positive cases having cough
- Extra pulmonary TB with cough

Definition of chest symptomatics

Prevalence of Four Main Symptoms, By Bacteriological and X-ray Classification

Category	No. Inter viewed	Cough %	Chest Pain %	Fever %	Haemoptysis %	Presence of at least one symptom
Sputum Positive Cases	36	69.4	19.4	33.3	11.1	69.4
X-ray active or Probably active Case	282	46.1	22.3	9.2	7.1	51.8
X-ray inactive Cases	541	21.8	15.3	3.1	4.3	29.0
Non Cases	916	9.4	8.6	2.0	1.0	15.4

PROPORTION OF CS AND CASES BY DURATION OF COUGH (COMPARSION OF 1966 AND1991-1993 DATA)

	1966			1991-1993		
	n 10792	% CS	% Cases	n 25774	% CS	% cases
Symptomatic out-patients	724	6.7	6.2	949	3.7	9.4
Cough of ≥2 weeks	381	3.5	11.3	944	3.7	9.4
Cough of ≥3 weeks	275	2.5	13.5	722	2.8	11.1

Rationale of duration of cough under RNTCP

- Cost effective
  - Reduction in work load
    - 24%* to 28%@ reduction from 2wks to 3wks
  - Yield of cases not changed
    - 9.4*-11.1%@ for 2wks vs 11.3*-13.5%@ for 3wks
  - Maintain the quality
    - **More time available for sputum examination**

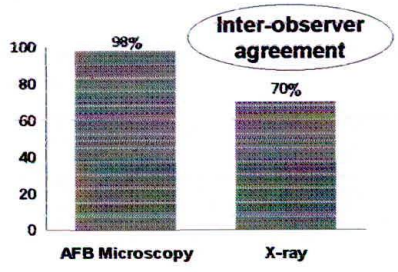
*GVJ Baily et al. Bull WHO, 1967, **37**, 875-892.
@P. Jagota, B. Mahadev, N. Sreekantaramu, V.H.Balasangameshwara, TR Sreenivas, Ind. J. TB., 1998, **45**, 39.)

How do you diagnose pulmonary tuberculosis

Diagnostic tool

- Smear microscopy
- X-ray

Microscopy is more objective and reliable than X-ray



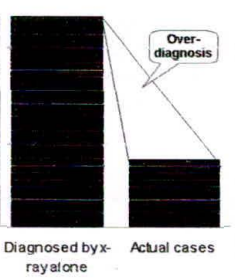
Correlation of the yields of X-ray Examination and Sputum Culture

X-ray	TB		Sputum Culture		
			Positive	Negative	Total
		Yes	142	85	227
		No	20	1982	2002
		Total	162	2067	2229

Source: Bulletin of WHO 1970, 43: 17-34

NTI, Bangalore Study on X-Ray Diagnosis of TB

- A systematic evaluation of well-functioning District TB Centres by the National TB Institute, Bangalore found that nearly 70% of the cases diagnosed and put on treatment on the basis of x-ray, ***did not have tuberculosis at all***
- The proportion of cases diagnosed on the basis of x-ray alone and put on treatment unnecessarily is likely to be even higher in many centres



NTI, IJT, 1974

Limitations Of X-ray As A Diagnostic Tool

- Interpretation purely subjective
- Etiology - difficult to ascertain
- Activity difficult to judge
- Operational disadvantages are many
  - delay in results, non-applicability on large scale,
  special training, costly equipment & consumables

➨**Unreliable for diagnosis & monitoring treatment**

IUATLD International Study

Indices of disagreement on X-ray classification

Abnormality in lymph nodes?	60
Abnormality in lung, probably tuberculous	45
Calcification in lung?	42
Non-calcified abnormality, probably tuberculous	37
Is the film abnormal?	34
Need for medical action?	31

Source: Bulletin of IUATLD, 1968, 41: 110-114

IUALTD International Study

- 5% of smear positives reported as - normal X ray
- 17% of smear positive as - non TB abnormality
- 24% TB patients as - no need for clinical action
- 50% of experts as - omit 2/3rd of smear positives
- 50% diagnosing TB would initiate on treatment 4-5 times bacteriologically negative persons compared with smear positives.

Source: Bulletin of IUATLD, 1968, 41: 110-114

Problems with Over-Reliance on X-ray for TB Diagnosis

- **Misclassification of non-TB as TB, resulting in unwarranted treatment and avoidable expenditure**
- **Inability to distinguish between smear+ and smear-negative patients, resulting in inadequate priority to true smear+ patients**
- **Failure to give appropriate treatment**
- **Inability to monitor progress accurately**

⇒ ***Lower cure rates and increased spread of TB***

Indications for X-ray

- Clinical work up of:
  - Only one Smear out of three are positive
  - all three smear are negative
  - Household contacts of smear positive cases, especially children of Pulmonary TB with complications like pnuemothorax
- Miliary TB or Pleural effusion
- Suspected HIV infection

Diagnosis of pulmonary tuberculosis

- Patients with TB feel ill and seek care promptly
- Active case finding is unnecessary and unproductive
- Microscopy is appropriate technology, indicating infectiousness, risk of death, and priority for treatment
- X-ray is non-specific for TB diagnosis
- Serological and amplification technologies (PCR, etc.) currently are of no proven value in TB control

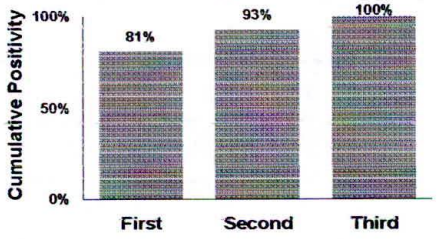
Yield in cases from concurrent smear and culture examination

Bacteriological category	No. of cases	No. of cases according to serial No. of specimens yielding first positive result							
		i	ii	iii	iv	v	vi	vii	viii
Smear and culture positive	46	34 (74)	7 (15)	1 (2)	1 (2)	-	-	1 (2)	2 (4)

( ) percentage

Proceedings of the 9th Eastern Region TB Conf and 29th Natl Conf on TB and Chest Dis, Delhi, Nov 1974

Three sputum smears are optimal



Diagnosis of Pulmonary TB

Cough 3 weeks

If 1 ***positive*** X-ray and evaluation ← AFB X 3 → If 2/3 ***positive*** Anti-TB Rx

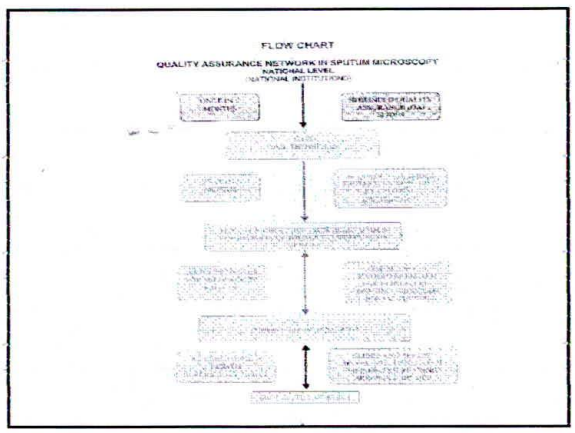
If ***negative***

Broad-spectrum antibiotic 10-14 days

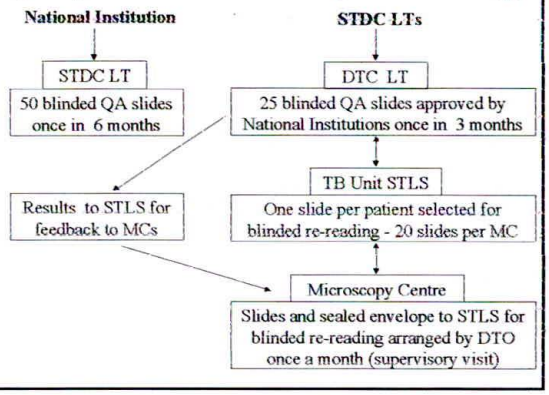
If symptoms persist, repeat AFB smears, X-ray

If consistent with TB

Anti-TB Treatment



Quality Assurance Network In Sputum Microscopy



Quality Assurance Network In Sputum Microscopy

STLS

Designated MC once in a month

1. Inspects microscope, supplies and lab using checklist - Annex - B
2. Re-examines all positives and 5 negatives - feedback on quality of smear, staining, reading and reporting
3. Gives LT 3 unstained smears for staining & reading
4. Collects selected slides (1 per patient) sealed envelope with Annex - A from LT
5. Clear labeling of box and sealed envelope

TB Unit

1. DTO receives sealed envelope with Annex-A and slide boxes
2. DTO interchanges slide boxes among STLS retaining sealed envelopes
3. STLS reads & records 20 slides per box using Annexure - C
4. Umpire reading organized by DTC by DTO
5. STLS/DTO/MO-TC evaluates results & gives feedback to MCs/CMOs

International Definitions for TB Control....

- Smear Positive pulmonary TB
  - Two or more initial sputum smear examinations positive for AFB, or
  - One sputum smear examination positive for AFB plus radiological abnormalities consistent with active pulmonary tuberculosis as determined by a clinician, or
  - One sputum smear positive for AFB plus sputum culture positive for *M. tuberculosis*.

Revised international definitions in tuberculosis control, Int J Tubere Lung Dis 5 (3(:213-215.

International Definitions for TB Control....

- Pulmonary tuberculosis – sputum smear-negative for AFB.
  - At least three sputum specimens negative for AFB, and
  - No response to a course of broad spectrum antibiotics, and
  - Decision by a clinician to treat with full course of anti-tuberculosis chemotherapy.

Revised international definitions in tuberculosis control, Int J Tuberc Lung Dis 5 (3(:213-215.

International Definitions for TB Control....

- Extra-pulmonary tuberculosis
  - Diagnosis based on one culture positive specimen, or histological or strong evidence consistent with active extra-pulmonary tuberculosis,
  - Followed by a decision by a clinician to treat with a full course of anti-tuberculosis chemotherapy.

Revised international definitions in tuberculosis control, Int J Tuberc Lung Dis 5 (3(:213-215.

Challenges in diagnosis

1. Diagnosis of TB in persons infected with HIV
   - Clinical pattern contacts with the immune status
2. Extra pulmonary TB
   - Difficulty in diagnosis and lack of facilities
   - Empirical diagnosis
3. TB in children

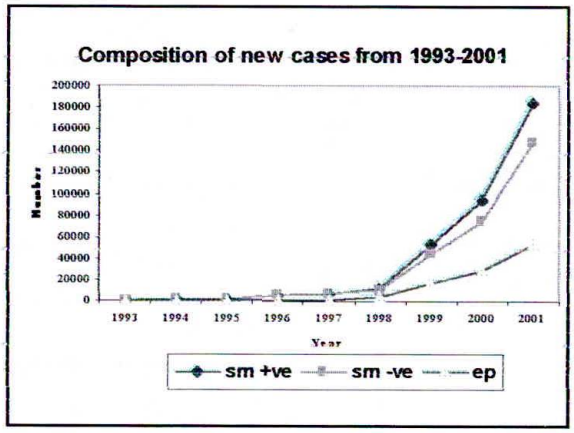
Quality diagnosis under RNTCP ensures;

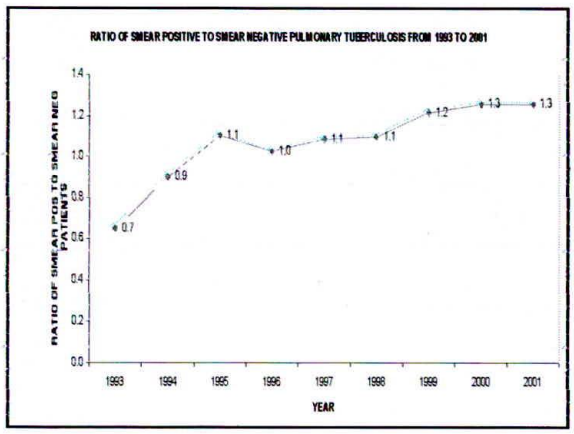
- Reliable diagnosis
- Identification and treatment of infectious cases of tuberculosis
- Reduction in the over-dependence on x-ray
- Ratio of smear positive: smear negative (x-ray suspects) to 1:1.2

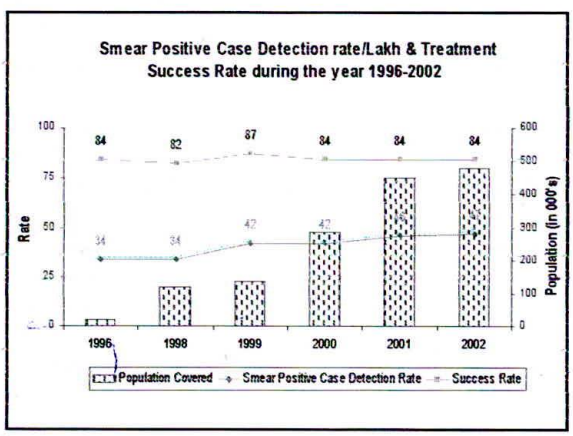
Indicators of Case finding in RNTCP

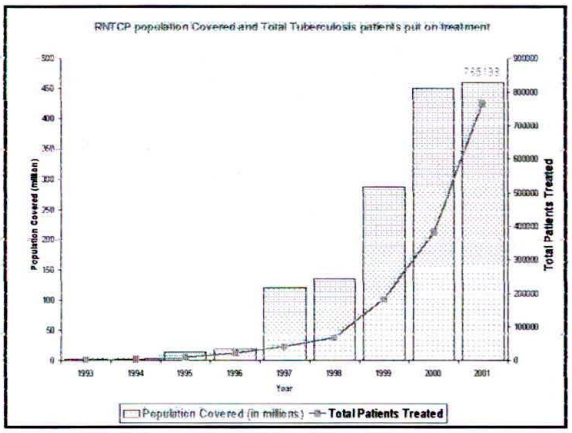
- Proportion of chest symptomatics among outpatients = 2% to 3%[1]
- Sputum positivity rate among = 10%
- New smear positive cases = 45-85/100,000
- Ratio of smear positive to smear negative = 1:1
- Extra pulmonary = 20% of new smear positive

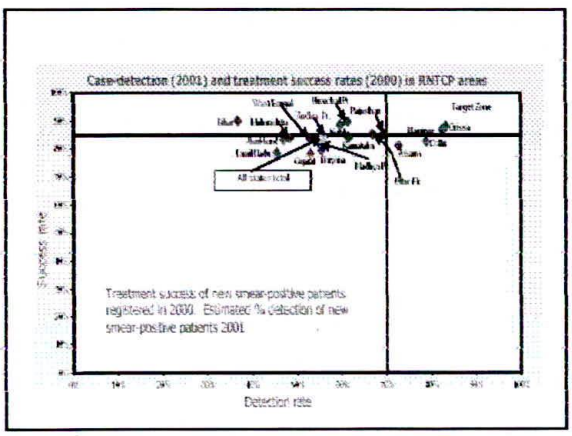
RNTCP performance


Composition of new cases from 1993-2001
Number
Year
sm +ve
sm -ve
ep


RATIO OF SMEAR POSITIVE TO SMEAR NEGATIVE PULMONARY TUBERCULOSIS FROM 1993 TO 2001
RATIO OF SMEAR POS TO SMEAR NEG PATIENTS
YEAR


Smear Positive Case Detection rate/Lakh & Treatment Success Rate during the year 1996-2002
Rate
Population (in 000's)
Population Covered
Smear Positive Case Detection Rate
Success Rate





Role of Medical Colleges

Partners in RNTCP:

1. Diagnostic algorithm to be advocated and practiced
2. Establishment of microscopy centres
3. Efficient & streamlined referral system within and outside
4. Involvement in quality assurance network
5. Diagnosis of extra pulmonary TB
6. Operational research:
   - **-For case detection of smear positive**
   - **-To develop guidelines for diagnosis of extra pulmonary TB**


Thank you

D15-5.

CHAPTER 21

EDUCATIONAL APPROACHES IN TUBERCULOSIS CONTROL: BUILDING ON THE 'SOCIAL' PARADIGM

Thelma Narayan and Ravi Narayan

Introduction

From the orthodox biomedical perspective, tuberculosis is a 'chronic mycobacterial infection' requiring early diagnosis by sputum microscopy and culture; radiological investigation; and chemotherapy, consisting of prompt, regular and extended treatment by a combination of anti-tuberculosis drugs. This perspective generates a restricted view of the challenges of educational approaches in tuberculosis control as it focuses primarily on motivating patients to take regular treatment and not to become 'defaulters'.

There is an urgent need to broaden the understanding of the disease by applying a socio-epidemiological perspective, which focuses on the larger socio-economic-political-cultural context in which the disease spreads and thrives in the community. This paradigm shift in understanding would lead to a recognition of a multi-disciplinary and multi-dimensional educational response that should become a major part of the control effort. The most significant aspect of this proposed change would be the contextualisation of tuberculosis control efforts to the important policy imperatives of equity and social justice — helping initiatives to reach those who are not reached by our present educational or health care efforts.

In this chapter this broader understanding is explored and a framework for a multi-pronged educational initiative that addresses these imperatives is evolved.

Recognising and Evolving the 'Social' Paradigm

The Medico Friend Circle is a national network of doctors and health workers in India concerned that health care and medical education in the country should become more relevant to the needs of the poor and the marginalised. In 1985, it organised an interactive dialogue on 'Tuberculosis and Society' which brought together 110 doctors, social workers, health and development activists, and many others concerned about

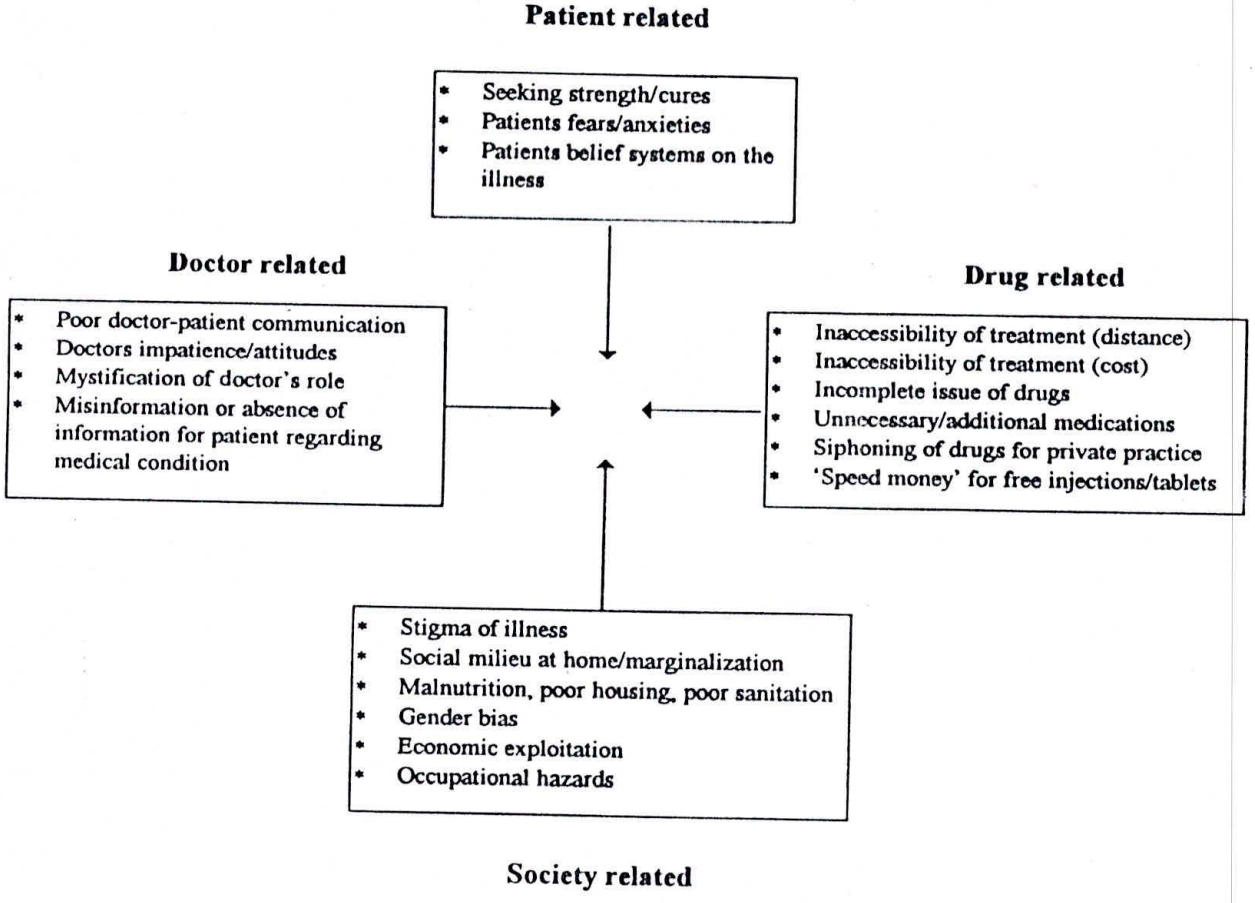


Fig. 1. The Social Paradigm — Some Significant Social Factors.
Source: Sadgopal (1983) and Medico Friend Circle (1985).

Table 1. Responding to the Social Paradigm — Some Suggestions.*

System Development
• Increasing health budget and reducing urban bias.
• Increasing accountability and responsiveness in the health care delivery system.
• Training paramedicals and community-based health workers to enhance accessibility.
• Reorienting medical/nursing education towards the social paradigm.
Community Involvement
• Interactive, culturally sensitive health education efforts.
• Tackling stigma of disease among health professionals, community and patients. Enhancing community participation at all levels.
• Tuberculosis control linked to grassroots peoples' movements.
Seeking New Partnership
• Involvement of Trade Unions and the 'Womens movement'.
• Involvement of local healers and practitioners of all systems of medicine.
• Involvement/orientation of community leaders, politicians, policy makers.
• Introducing 'Tuberculosis Control' in High School Science syllabus.
Tackling the Determinants of the Disease
• Intersectoral action to improve nutrition, housing, sanitation, working environment and wages.
• Minimum Wages Act and Right to Work. Land Reform.

*Source: Sadgopal (1983) and Medico Friend Circle (1985).

the tuberculosis problem in India. While the discussions explored the challenges of case-finding, case-holding and the alternative 'regimens of chemotherapy' there was also an identification of a large number of significant social/societal factors and issues of concern, from the field experience of the participants, that constituted a 'social paradigm' (Medico Friend Circle, 1985).

Figure 1 lists some of the factors that appear to play a key part in the patient's experience of the disease and the response of various types

of health care providers to the disease (Sadagopal, 1993; Medico Friend Circle, 1995). Table 1 lists a series of ideas and initiatives that were suggested during the group discussions as ways and means of addressing the social factors and issues of concern listed in Figure 1 (Medico Friend Circle, 1985).

It was evident at this meeting that if the factors responsible for the occurrence, spread and maintenance of the disease were social and societal, then the responses needed to be social/societal as well. This shift of emphasis would not only change the framework of tuberculosis control but would lead to a broader framework of educational effort to support action towards control.

Table 2. Tuberculosis and Society — Levels of Analysis and Solution.*

Levels of Analysis of Tuberculosis	Causal Understanding	Solutions/Control Strategies
Surface phenomenon (medical and public health problem)	Infectious disease/germ theory	BCG, case-finding and domiciliary chemotherapy
Immediate cause	Undernutrition/low resistance, poor housing, low income/poor purchasing capacity	Development and welfare-income generation/ housing
Underlying cause (symptom of inequitable relations)	Poverty/deprivation, unequal access to resources	Land reforms, social movements towards a more egalitarian society
Basic cause (international problem)	Contradictions and inequalities in socio-economic and political systems at international, national and local levels	More just international relations, trade relations, etc.

*Source: Narayan (1998).

More recently, a comprehensive review has once again stressed that the level and depth of analysis of the problem of tuberculosis and its causative factors influence the construction of the solution. Table 2 indicates different levels of analysis and different solutions and control strategies, highlighting once again the shift from a 'biomedical' to a 'social' paradigm (Narayan, 1998).

Widening the Educational Framework: Reaching All

The orthodox biomedical paradigm usually results in an educational effort that has a two-pronged focus: on the patient and on the health team. Health education efforts are directed at the patients to make them more informed and aware of all aspects of the disease and its treatment and the basic rules to prevent spreading the infection to others in the family or the community.

Instruction in all aspects of tuberculosis, including epidemiology, clinical, laboratory, therapeutic, preventive and public health aspects, has been an important part of medical and nursing education as well as a component of the curriculum of paramedical workers and health auxiliaries for many years.

The biomedical paradigm also stresses the technological component of tuberculosis control — BCG vaccine, sputum microscopy, radiological diagnosis, and varying regimens of chemotherapy. It focuses on individual patients, stresses only physical aspects of the illness, highlights mainly the role of the health care provider — doctor or nurse — and considers the role of the patient as a passive beneficiary of a top-down providing system who must be prevented, through health education, from becoming a 'defaulter'. Finally, the biomedical paradigm also stresses the challenges of research in molecular biology or pharmacotherapeutics.

The new 'social paradigm' discussed in the previous section and increasingly recognised in the last decade (CHC, 1989; Qadeer, 1995; Nikhil, 1995; Uplekar and Rangan, 1996; Narayan T, 1997; Narayan R,

1997; Chaturvedi, 1997) requires a totally different framework of education that is both multi-dimensional and multi-pronged in its orientation. While neglecting neither the patient nor the health care provider, the focus of such education goes beyond to a larger section of society and a broader range of groups in the community so that tuberculosis control efforts get the support, encouragement and involvement of many people. These include:

The patients' family. This is particularly important because tuberculosis has psycho-social dimensions that need family support for their amelioration. Care providers are therefore an important focus group.

The people of the community in which the patient lives. These include community leaders — both formal and informal, school teachers, non-governmental organisations, women's groups, other community-based organisations and educational institutions (Kaul, 1996).

Occupational groups. Those in which the patient works and, particularly, the occupational groups in which the risk of tuberculosis is higher.

Health care providers. This focuses beyond education of doctors nurses and paramedical personnel to a host of other formal and informal health care providers including practitioners of alternate systems of medicine, traditional birth attendants and other types of local folk healers, private practitioners and health teams, and technicians of the large number of private laboratories and health institutions.

Marginalised social groups. The 'social paradigm' should also lead to a special educational effort focused towards high risk groups and marginalised groups in society, including residents of urban slums, those who are HIV positive and those with AIDS, the homeless, destitute and pavement dwellers, ragpickers and street children, addicts — both drug users and alcoholics — and refugees, including those displaced by war, ethnic conflicts and development projects.

Policy makers. Most significantly, however, the recognition of the 'social paradigm' leads us to focus educational/awareness building efforts towards those within society who make decisions, those who are involved in policy planning and implementation, as well as those who support the programme initiatives. These include political leaders at all levels — particularly elected representatives at state, district and municipal corporation levels, government bureaucrats and technocrats, the pharmaceutical industry, and civic society. Finally, all those groups who are contributors to the 'watch dog' role of civic society also need to be addressed through educational efforts: these include the media, consumer groups/organisations/associations and non-governmental organisations.

Content of Educational Approaches: From 'Biomedicine' to 'Socio-epidemiology'

The recognition of the 'social paradigm' will necessitate a different framework of tuberculosis education and so the focus and content will have to experience a paradigm shift. The focus will move from individual tuberculosis patients, increasingly to focus on a community of potential sufferers. It will move beyond the physical dimension and explore the psycho-social-economic-cultural and political dimensions of tuberculosis including relationship to poverty, the problem of stigma and marginalisation, and the 'social burden' of the disease. It will move beyond vaccine/drug distribution to include components that enhance awareness, motivation and empowerment of patients through counselling. The focus will therefore be on educational and social processes and other enabling and autonomy-building skills, and will emphasise the supportive role of family members, other care providers, community leaders and grassroots and community-based health workers. It will also emphasise a change of role of the patient from a passive beneficiary of treatment to an active participant of the control strategy whose autonomy and sense of responsibility is to be respected and enhanced.

Clearly, such a framework of education must emphasise the key contributions from behavioural science and a qualitative approach to research, including both action and participatory research, and must encourage attempts to understand attitudes, belief systems, knowledge levels and practice options at the community level. This would also encourage an increasing shift from the orthodox 'clinical' and 'molecular biology' fixation of tuberculosis researchers to a more broad-based sphere of interest.

Table 3. The Paradigm Shift.*

Parameter	Biomedical Approach		Social/Community Approach
Focus	Individual	→	Community
Dimensions	Physical (tuberculosis pathology)	→	Psycho-social, economic, cultural, political and ecological (stigma, poverty, social burden)
Technology	Drugs/vaccines	→	Education and social processes
Type of service	Providing/Dependence creating	→	Enabling/Empowering Autonomy building
Patient	Passive beneficiary	→	Active participant
Research	Molecular biology	→	Socio-epidemiology
	Pharmaco-therapeutics	→	Behavioural sciences

*Adapted from CHC (1989).

Table 3 summarises this shift so that the broadening of the framework and content is clearer. It is important here to emphasise that a case is being made not for a biomedical versus a community/social model of public health dialectic, but for the broadening of the orthodox biomedical approach by the inclusion of a social/community/societal dimension (CHC, 1989). This will make the tuberculosis control initiative more holistic, more responsive, more relevant and definitely more effective in the complex environment and societal reality in which tuberculosis thrives and continues to be a major public health problem today.

An important feature of this recognition of the social paradigm in tuberculosis is the consequent need to give socio-economic-political-

cultural determinants an important role in policy review and programme planning.

Many determinants of tuberculosis have been known for some time (Narayan, 1997):

(1) Tuberculosis is related to industrialisation, which resulted in a process of urbanisation with overcrowded, unhygienic living conditions for the working class in the new industrial and mining towns. These were further complicated by low wages and longer hours of work. Research has indicated that, in the USA and Africa, there was an increase in the prevalence of tuberculosis at a time of industrial and urban growth.
(2) Population growth, migration, colonialism and war-initiated epidemic waves of tuberculosis in different regions of the world.
(3) The incidence of tuberculosis often increases in times of war and during ethnic conflicts and among refugees. In India, tuberculosis was a big problem among post-partition refugees.
(4) Disrupted social conditions, malnutrition, poor housing and physical and emotional stress are predisposing factors. In India, it is not surprising that the incidence of tuberculosis is relatively high among Tibetan refugees in the resettlement colonies.
(5) Housing is a key factor, especially small, overcrowded tenements in shanty towns and urban slums.
(6) Poor sanitation and unregulated growth of hazardous industries further compound the problem.
(7) Smoking, pollution and rapid industrialisation driven by an economic imperative which sacrifices safety procedures and compromises regulatory mechanisms are all contributory factors.
(8) Finally, there is growing evidence that new economic trends that promote 'globalisation', liberalisation and privatisation — increasingly have an adverse effect on the health of the poor by making health care more and more inaccessible (Chaulet, 1998). In Africa and the Philippines, the documented ill effects include a higher incidence of tuberculosis. State-run health services

experienced cut-backs in expenditure which particularly affects services for the poor.

While these factors are all very significant, it is equally significant that most of the literature, pamphlets and reports from the World Health Organization (WHO), the Government of India and non- governmental organisations ignore these dimensions (National Tuberculosis Institute, 1994; Government of India, 1995; World Health Organization, 1995a, 1995b; World Health Organization/UNAIDS, 1996; Voluntary Health Association of India, 1994, 1996; Chakraborthy and Choudhury, 1997). Hence the narrow biomedical perspective continues.

Educational Approaches — What Do We Seek to Achieve?

While all educational approaches at all levels, and for all the target groups mentioned earlier, must emphasise these broader factors in addition to the biomedical ones, the objectives of education will shift from enhancing case-detection, case-management, and tuberculosis treatment *per se* to a host of initiatives that would address the determinants and deeper causes of the illnesses. Tuberculosis treatment and control will become part of a wider social movement that seeks to address poverty, illiteracy, poor environment, marginalisation, unplanned urbanisation and industrialisation, poor housing and to increase access to, and options of, health care for the poor.

In 1981, the Indian Council of Social Science Research and the Indian Council of Medical Research in their Health for All Strategy in India, outlined a prescription for Health for All, which included such a broad concept of health action (ICSSR/ICMR 1981). They emphasised the need for a mass movement to reduce poverty and inequality and to spread education, to organise the poor and underprivileged to fight for their basic rights, and to move away from the counterproductive consumerist Western model of health care and replace it by an alternative based in the community.

More recently, echoes of this broader action are seen even in the writings of orthodox epidemiologists who stress that medicine and politics should not be kept apart. The late Professor Rose wrote, in what was perhaps his final work after decades of extensive epidemiological research, that "Medicine has indeed delivered effective answers to some health problems and it has found the means to lessen the symptoms of many others. But by and large, we remain with the necessity to do something about the incidence of disease, and that means a new partnership between the health services and all those whose decisions influence the determinants of incidence. The primary determinants of disease are mainly economic and social and therefore its remedies must also be economic and social. Medicine and politics cannot, and should not, be kept apart" (Rose, 1992).

The objective of a comprehensive educational initiative — comprehensive both in target groups and in content — is to facilitate a more comprehensive anti-tuberculosis programme that would locate programmatic action in a mosaic of multi-dimensional and multi-sectoral action impacting on all aspects of the problem. Such a programme would include an increase in health budgets — including funding for tuberculosis control, poverty alleviation programmes focused on marginalised peoples, housing and planned urbanisation programmes, occupational safety focused on high-risk individuals and high-risk occupations, personal and social support to affected people and their families — particularly those from the marginalised sections and initiatives to address social and economic inequality and injustice.

Such a broad based, social/societal-oriented model of a health programme for tuberculosis would then strike at the roots of the problem and not fritter away resources in superficial biomedical reductionist strategies that have a limited impact on the disease.

It is rather unfortunate that, in more recent times, the WHO and other international funding agencies have failed to establish their programmes for tuberculosis on a broad base and have advocated ideas such as DOTS that are at best 'reductionist' and at worst totally inadequate for the treatment of the complex social pathology of tuberculosis

in society. This continued 'technomanagerialism' at the cost of a comprehensive, integrated social strategy is particularly disappointing and, as usual, the poorest among the tuberculosis patients will bear the consequences of this public health reductionism (Banerji, 1996, 1997).

Educational Initiatives — Moving from Content to Process

In the earlier sections of this chapter, the 'who', the 'what' and the 'why' of educational initiatives in tuberculosis control in the context of the 'social paradigm' have been explored. In this section, the 'when' and 'where' of some aspects of such an educational response are explored. Broadly, these are described under the headings of basic and continuous health professional education and patient/community education.

Health Care — Professional Education

There is urgent need to enhance and strengthen the framework of tuberculosis education for medical practitioners and nurses. To make an impact on professional education, there is need to focus both on 'basic education' and continuing education.

Basic Education

There a is need to make tuberculosis education comprehensive, integrated, multi-systemic, multi-disciplinary, problem-based and sociologically and epidemiologically orientated. Doctors and nurses must be sensitised to the wider socio-economic and cultural factors in the disease causation and encouraged to see the patients as active participants and not as passive beneficiaries of the control strategy.

Increasing patient awareness and understanding of the disease process is a challenge in doctor-patient communication and, rather than 'victim blaming' and considering the patient as a 'potential defaulter',

an attempt must be to enable and empower the patient to adhere to treatment and other procedures.

Skills in listening, motivation and supportive counselling need to be enhanced and humane attitudes and behaviour towards patients, which are primarily non-stigmatising, must be emphasised. Education in pathology and therapeutics must be balanced by instruction in ethics and the social sciences. This is particularly important because the availability of effective chemotherapy has often tended to emphasise the curative aspects of the disease control strategies while disregarding the caring aspects. Tuberculosis is a very stressful disease and, although the clinical manifestations are irksome and often very discomforting, the patient suffers more than just physical illness. It is very important that the curing aspect of disease control strategies becomes more effective, but it is equally important that the caring aspects of the strategies are enhanced.

It is also important to ensure that training moves from didactics and a focus on minutiae to a more interactive, bedside and community-based education that emphasises the practical aspects of the disease and enhances skills in patient care and counselling. Where necessary case studies may replace case demonstrations. But the training must always be rooted in the human problem.

While stressing the component of tuberculosis in medical and nursing education will enhance the leadership of the tuberculosis control team, it is equally important to impart proper knowledge, skills and attitudes in tuberculosis treatment to all grades of health care workers — multi-purpose and community-based — who are often the peripheral health workers. They are most in touch with those who suffer from tuberculosis. An initiative at this level will strengthen first-line/first-level care and will ensure that the patient, who according to most socio-epidemiological surveys is already 'knocking at the health service door' (Narayan, 1998), will be given a supportive and relevant response by adequately sensitive and skilled health workers.

Continuing Education

While the focus on basic professional education will ensure that health professionals of the future will be better informed, better skilled, and better orientated to the socio-epidemiological challenges of tuberculosis control strategies, an urgent need today is to reach the present generation of health care providers with relevant, meaningful, authentic and practical information and updates on tuberculosis to enhance their involvement in, and contribution to, the fight against this disease. For it to be effective, this must be sponsored by professional associations or colleges and the National Health Programmes.

Much of the ongoing education on tuberculosis in many developing countries is presently done by the pharmaceutical industry. The focus and content of education is often orientated towards the promotion of specific prescriptions or remedies over others that are available in the market; to enhancing brand choice and subtly promoting the 'me-too' drugs that have additional, and usually unnecessary, components such as cosmetic embellishments or they may contain irrational combinations of drugs. In addition, they are often inadequately evaluated. Depending on the skills and vigilance of drug controlling agencies and the level and extent of legislation in each country, this 'drug' education is often supported by the subtle misinformation in which indicators for treatment are enhanced and side effects and contraindications are played down, thereby enhancing profits and sales, often at the cost of patient safety. It is not at all surprising that the Report on Health for All Strategy of ICMR/ICSSR (1981) exhorts us that "eternal vigilance is required to ensure that the health care system does not get medicalised, that the doctor-drug producer axis does not exploit the people, and that the 'abundance' of drugs does not become a vested interest in ill health".

In the area of anti-tuberculosis drugs, however, sometimes other forms of irrationality creep into the situation. If such drugs are included in the essential drug list and the prices are controlled, then the mark-up allowed on them is often reduced, leading to a decreased incentive

for drug manufacturers to produce them. Shortages of anti-tuberculosis drugs have not been uncommon in the past.

Another challenge in current continuing medical education (CME) is to ensure the emphasis on the use of standardised regimes for treatment which have often been evolved at the national level by expert committees who have considered clinical and epidemiological factors in the situation analysis and have looked at other relevant factors including the availability and cost of drugs and the logistics of their supply and distribution.

A number of very effective drug regimens for tuberculosis have been evolved on the basis of extensive and good clinical and field trials. Unfortunately, private practitioners and even hospital-based clinicians in most countries tend to evolve their own very individualistic, and often irrational, regimes based on what they consider to be 'clinical experience'. Costly and therapeutically unsound regimens, supported by a host of complementary and supplementary medications that are invariably unnecessary, ineffective and irrational are all part of regular practice. At best, these are merely symptomatic and play on the psychology of the patient. A good CME programme in tuberculosis should not only emphasise rational and therapeutically sound regimens but also discourage the use of all types of irrational and unnecessary complementary medication and always stress the social context as well.

Patient/Community Education

Education of the patients, their relatives and those caring for them within the family is an important challenge in tuberculosis control.

While making the patients aware of all aspects of the disease, its prevention and cure, the challenge is to do so by means and orientation that primarily enhance their autonomy, provide informed choices and options for treatment, and enable and empower them to abandon superstition and stigmatising concepts and to take responsibility for their own health. Motivation and supportive counselling must be built into

the whole educational effort so that the patients build up confidence in 'cure' in an environment of 'care'. The effort must also emphasise 'care' after 'cure'.

Such effective education is best achieved by culturally sensitive, interactive, low-cost approaches including puppetry, street theatre, folk methods, role play or even flipcharts and flashcards, and planned games whereby the patients learn in small groups, at their own pace, supported by other adult learners in an environment of collective trust and sharing. Whether clinic or community-based, the process of health education is as important as its content (Kaul, 1996).

Case Study: Health Education for Tuberculosis in Urmul Trust (a non-governmental organisation in Rajasthan)

Health education is working on three fronts (Kaul, 1996):

(1) Street theatre and puppet shows in the villages highlight the symptoms of the disease and the need to identify it as early as possible. It also gets the message across that irregular treatment is not only detrimental to the patients but also to people around them so that they must chip in to ensure that the patients take the full course of treatment without a break.
(2) The importance of the regimen and its regularity and duration and what to do in case of side effects are explained to the patients and their relatives in groups. All this is done with the help of television, puppet shows or playlets on the day of the tuberculosis camp held on a fixed day of the month.
(3) The doctor spends at least 15 minutes with each new patient and at least 5 minutes with each old one.

In addition, every few months, some cured patients are assembled to talk to the newer patients. The camp-like atmosphere on a single day of the month encourages the patients to share experiences.

In a country such as India and in most other parts of the developing world, the large majority of the people are illiterate or semi-literate and 'adult learning' techniques need to be used, moving away from the didactic approaches of orthodox education.

Recent studies and experiments done by a group of non-governmental organisations in India have demonstrated that even visual aids used in pamphlets, posters, flipcharts and flannel graphs need to be culturally sensitive and geared to the perceptions of illiterate adults which are rather different from those of urban literate adults. While an understanding of 'magnification' and 'depth perspective' by those who have had some school education including an exposure to scientific concepts nd experimentation and demonstration may be taken for granted, these are not comprehended in the same way by adults without a basic school education.

Health education materials must therefore be developed locally and must relate sensitively to local socio-cultural realities. Decentralised health education efforts are therefore a very important component of any health programme strategy.

The centralised production of DOTS-related educational materials and the attempts to distribute so-called standardised, top-down guidelines on contents and messages are the very antithesis of current understanding of adult education for health and are another example of the overemphasis of the 'global' approach in what is essentially a local pproach or strategy.

Much health educational material including that currently available for tuberculosis is still rather urban in orientation, context and visual content. A concerted effort needs to be made to ensure that material more relevant to rural and indigenous populations is evolved so that the process of learning and motivation is greatly enhanced.

There is, nowadays, a tendency to get on the 'electronic bandwagon' and videos, slides, cassette sets and even computer software programmes are being promoted. While they have their uses in situations where there is electricity and where people are habituated to such adjuncts to learning and recreation, they are not as widely relevant or as effective as

they are often perceived to be. To an illiterate audience, they are often more a source of entertainment than an effective tool for learning and, of course, the absence of continuous electricity in a large number of urban towns and in most rural and tribal areas in many developing countries limits their use and effectiveness. Even in this era of space and cyber technology, traditional and time-tested folk methods and interactive approaches still have great relevance and their importance must not be underestimated or inadvertently played down.

Conclusion: Towards an Alternative Strategy

In these reflections on educational approaches to tuberculosis control, an attempt has been made to highlight the following:

- Tuberculosis control initiatives need to move from the orthodox biomedical approach to a more social/community-oriented approach.
- This shift of emphasis will depend upon a creative educational initiative that helps to broaden the understanding of the problem and locate it in the wider social paradigm.
- The focus of education must expand beyond patients and health providers to a wide range of other involved persons including the patients' families, the people in the community where the disease occurs, occupational groups, health care providers including those in the private and alternative sectors, marginalised social groups, policy makers and society at large.
- The educational process must be primarily enabling and empowering and must transform the role of the patients from passive beneficiaries to active participants in the programme.
- Treatment and control of tuberculosis must form part of the wider social movement that seeks to address poverty, illiteracy and poor environment, marginalised peoples and unplanned urbanisation and to increase access to, and options for, health care for the poor. Such a broad-based model would then strike at

the roots of the problem and not fritter away valuable resources in implementing superficial, biomedical, reductionist strategies.

- Health care professionals must be sensitised to the wider socio-economic and cultural factors in the causation of disease and are encouraged to see the patients as active participants in the control strategy rather than passive beneficiaries.
- Skills in listening, motivation and supportive counselling must be enhanced and humane, primarily non-stigmatising, attitudes and behaviour towards patients must be emphasised.
- An initiative at this level will strengthen primary health care and ensure that the tuberculosis patient will be given a supportive and relevant response by sensitive and skilled health workers.
- A good continuing medical education programme in tuberculosis should not only emphasise rational, epidemiologically sound treatment regimens, but also de-emphasise all sorts of irrational and unnecessary complementary medication, as well as stressing the social context.
- Culturally sensitive, interactive, low-cost educational approaches, such as puppetry, street theatre, folk methods, role play or even flipcharts, flashcards and planned games, that enable the patients to learn in small groups, at their own pace and with the support of other adult learners in an environment of collective trust and sharing, must be promoted.
- Health education materials must be locally developed and be both sensitive and relevant to local socio-cultural realities. Decentralised health education efforts are therefore a very important component of any health programme strategy.
- All this will lead to the tuberculosis control initiative becoming more holistic, more responsive, more relevant and definitely more effective in the complex environment and societal reality in which tuberculosis thrives and continues to be a major public health problem today.

The continuing problem of tuberculosis has been accepted all over the world as a major public health issue of our times. Much is planned and much is being done. The sustained success of our efforts will, however, be determined by the extent to which we understand and respond to the challenge of the 'social paradigm' and the creative nature of our supportive educational response. The way forward is a paradigm shift from 'Directly Observed Therapy, Short Course' (DOTS) to 'Community Orientated Tuberculosis Service' (COTS).

Are we ready for this paradigm shift?

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Dr.G.Visweswaraiah
Hon.Secretary, KSTBA.

Karnataka State Tuberculosis Association, Bangalore.

Understanding the Nature and magnitude of TB in India and Karnataka

Tuberculosis in India happened to be the major public health problem. The National sample survey was conducted in India in 1955 - 1958, as per the report of NSS prevalence of Tuberculosis was 20 / 1000 and incidence of Bacillary Tuberculosis Cases was 4 / 1000. Men are more suffering than women, old age than young age. The distribution of Tuberculosis is almost equal in urban and rural areas. However since 4 times the population lived in the villages than the urban areas. The burden of Tuberculosis in the rural areas could be 80% as compare to that of about 20% in urban areas. This means that the resources for the control programme has to be reallocated proportionately.

40% of Indian population are infected, by TB in the community . Among the infected 10% of them may get TB at any time during their life time, if their natural resistance to the disease is reduced.

14 million Tuberculosis patients are there in India. Out of this 3.5 million are actually coughing out TB Bacilli in their sputum for the spread of Tuberculosis in the community. .5million (5 lakhs) deaths are caused by tuberculosis. One TB patient can spread the disease to 10 - 15 healthy persons in a year. Thus there are 10 lakhs of new TB patients added every year . One person in India die of TB every minute.

Tuberculosis is killer number one in the community. Of every 100 death due to all causes in the community 10 are estimated to be due to infectious forms of pulmonary tuberculosis. There could be many more deaths due to TB in children. Tuberculosis causes more deaths in women in child bearing age and even among the men in the productive age group of 15 - 49 years
(productive age group).

- Proportion of Tuberculosis cases remains same year to year
- Every year 1 / 3 of existing cases either die or cure . But the same number join the existing cases maintaining the same number in the community.

National Tuberculosis programme (NTP) was started in the year 1962 in India to meet the felt need of patients in community. It could not achieve its objectives as there was 30% treatment completion and 70% were dropouts and with other technical, administrative and inadequate budgetary outlet, It was reviewed by a committee of National and International experts in 1992 as a failure programme. The WHO declared tuberculosis as the global emergency in the year 1993 and formulated the Revised National TB Control Programme (RNTCP) providing all feasible requirement to run the RNTCP in India in a phased manner in the states, through District TB Centres, to be delivered through the primary health care infrastructure, to achieve 85% cure rate and to detect atleast 70% estimated smear positive Pulmonary TB Cases.

In Karnataka the RNTCP was launched in 10 districts including Bangalore Mahanagara Palike in the first phase covering 218 lakhs population. The 12 districts were taken in the second phase covering 257 lakhs population. The remaining 54 lakhs population has been covered in the third phase having 5 districts in the state by the end of 2003.

The Role of the Private Sector in TB
Community Health Cell, June – August 2000

Notes on the Study : **Non Governmental Organizations in Tuberculosis Control: A study in Western India** (by Sheela Rangan, Aditi Iyer, Sushma Jhaveri)

Objective :

To investigate the role of the Private Sector in Tuberculosis control. This includes launching an organized effort aimed to understand the nature and role of the private sector in health care in the arena of Tuberculosis control. (TB control has three main parts : case finding, treatment, and case holding. The private sector would be defined as including non governmental organizations (NGO's) , including voluntary organizations, for-profit establishments, grant-in-aid funded projects and finally a range of private physicians who practice anything from tribal to allopathic medicine.

Importance of Understanding this Project :

Although the National Tuberculosis Program (NTP) has been in existence for more than 30 years, many health care providers and patients are unaware of the benefits and reaches of the program, thereby encouraging the notion that the programs must be re-vamped and revitalized. The focus of the revitalized programs is the detections of at least 70% of the incident cases and ensuring cure of 85% of the detected cases. (This is what is projected to favorably alter the course of TB worldwide) In addition, plans are underway to involve the non governmental sector (NGO's), voluntary and non-profit sectors that all constitute the private sector. NGO participation in the social sector ranges from assistance to policy making to actual field based service delivery.

With the onset of HIV, TB has renewed global interest, and a large percentage of cases occur in India. However, despite the urgency of prudent action, a lack of interest has rendered NTP programs ineffective. Furthermore, although the Private Sector takes care of most TB programs nationwide, they have not been involved in the NTP programs. However if their input is taken, information could be provided that would improve the performance of the NTP as well as the quality of TB care available to patients nationwide.

Stages in the study:

Compile complete lists of the NGO's working in TB from lists of NGO's in the health field. This was then narrowed down to include those that had a significant TB component to their agenda.

-
- A survey undertaken using a mailed questionnaire to understand the number of and nature of private sector health care providers as well as approaches to TB control. (obtains a directory of NGOs in the area with their profiles)

- Case studies of a few selected NGO's to document the effectiveness and implementation of TB control programs. (from this, a detailed report can be prepared identifying the strengths and weaknesses)

Here, it is important to document the follwing categories :

- *Exact response rates* (% replied, etc)

The Role of the Private Sector in TB
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- *Location / Geographical Distribution* (Rural/Urban … etc)
- *Source of Funding for NGO's* (including individual donors, state govt. and municipal govt., international funding agencies, other NGOs, central govt., public/private corporation, etc)
- *Nature of Support Received from the Government* (including supply of drugs, grants, supply of stationary, deputation of workers, etc)
- *Nature of TB Work* (including only providing assistance, only case finding , only follow-up, case finding and treatment, treatment and follow-up, only health education, case finding, treatment and follow up)
- *Case Load and Number of New Patients registered in Previous year, and Case Detection.*
- *Diagnosis, Treatment and other Facilities* (including X-rays or Sputum examinations conducted by organization, referred to private laboratories, or referred to government facilities.
- *Treatment Methods of TB Patients* (Regimens, Medicines, etc)
- *Case Holding and Methods to Improve Regularity and Treatment Adherence*
- *Comparative Performance of NGOs and State TB Programs*
- *Nature of Assistance Provided to Patients*

Problems in Conducting Cohort Analysis :

- Poor Record Keeping contributed to the majority of problems in the study
    - Treatment Outcome was not usually recorded . This leads to inaccuracies in completing optimum period of treatment (COPT) numeric values.
    - Cohort analysis was not restricted to sputum positive patients and so it's all bunched up.
    - No continuity in collecting sputum samples. Hard to get patients to comply when treatment starts to work As a result, the cure rates could not be accurately assessed in all cases.

Important as a factor in the NGOs that deal with TB include the case load that they handle (usually from a third to a half of all state cases), the amount of reach that they have the urban and rural areas, as well as their infrastructure and ability to handle massive loads of cases. Many NGO's have more of a clinical approach rather than a public health approach : in these cases, there is not much concept of case holding nor treatment completion rates. The emphasis is placed on case detection.

Not many of the NGOs deal only with TB cases -- here, TB is usually only a component of the overall health activities. Some of the NGO approaches to tackling TB included :

- Institution/Hospital/Clinic Based Programs : outreach programs from clinics, hospitalization facilities and ambulatory treatment,
- Use of Community Based Workers in well integrated programs : incentives were given to workers for case finding and treatment completion. This was found to be fairly successful provided that there was adequate monitoring and supervision.

The Role of the Private Sector in TB
Community Health Cell, June – August 2000

- Using Public Health Services and dependence on governmental services. (i.e. diagnostic and treatment facilities), but taking care of the drug dispersion. This lead to higher treatment completion rates.
- Involving Private Doctors : trying to including this sector in the TB program by setting up a proper referral system.

There is a hesitation in relying on sputum examinations for the diagnosis of TB, and patients prefer the chest X-Ray.

1/ Definition of NAO.
2/

- St Teresa Sanatorium
- Hope foundation.
- Chikmaich Mission Hosp. Dr Bojwani

Rajendra Raj

Rajendra Raj

Bangalore Mahanagara Palike Society for Revised National T.B. Control Programme

Dot Directory

BANGALORE MAHANAGARA PALIKE
R.N.T.C.P.

opulation	-	50 Lakhs
No of T.B. Units	-	7
Formation of T.B. Society	-	No.145/97-98, Dated 19-06-97
No of D.M.C	-	36
No of Dot Centers	-	133

Health Facilities

1)	General Hospitals (Govt.)	-	4
2)	General Hospitals (NGO)	-	5
3)	No of Mat. Homes	-	31
3)	No of Health Centers	-	75
4)	No of P.H.U. Govt. of Karnataka	-	21
5)	No of Anganavadies	-	350

BANGALORE MAHANAGARA PALIKE SOCIETY

FOR R.N.T.C.P.

Bangalore

Registration No.: No.145/97-98 Dated :19-06-97

Chairman	Commissioner	Bangalore Mahanagara Palike
Vice Chairman	Chief Health Officer	Bangalore Mahanagara Palike
Member Secretary	Project Co-ordinator T.B	Bangalore Mahanagara Palike

Member

1) Joint Director (T.B) LWSTC, Bangalore.
2) Director, National Tuberculosi's Institute, Bangalore.
3) Chief Auditor, Bangalore Mahanagara Palike.
4) Surgeon, Bangalore Mahanagara Palike.
5) Chief Accounts Officer, Bangalore Mahanagara Palike.
6) Hon. Secretary, K.S.T.B.Association, Bangalore.
7) Director, Hope Foundation, Bangalore.
8) Executive Engineer, Bangalore Mahanagara Palike.

BROAD WAY UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Broadway T.B. Disp.	Dr. Gayathri Devi 5551442/3476217 (R)	Prabhakar	Behind C.S.I. Hospital Broadway Road, Shivaji Nagar.

STLS : Elsy Abraham

STS : Guruprasad M

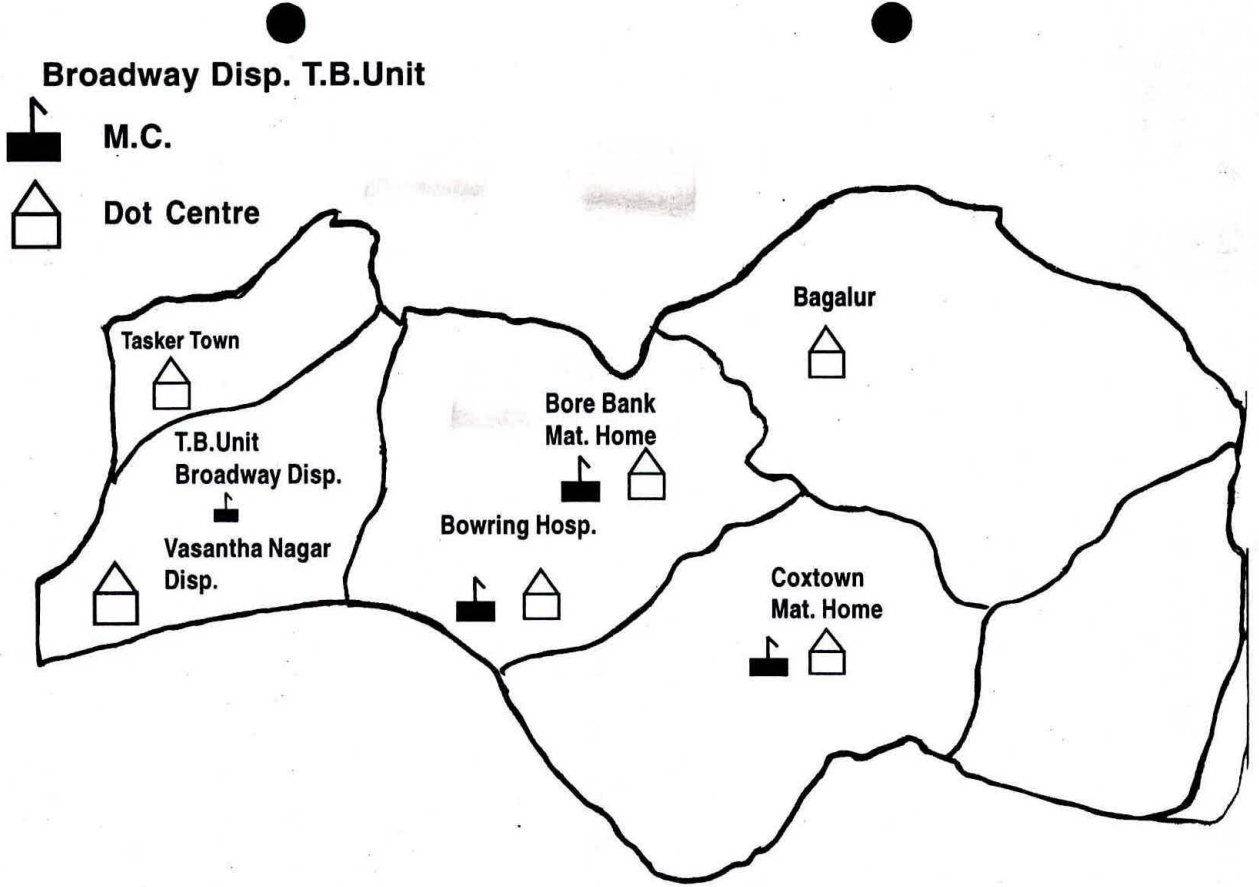
MICROSCOPIC CENTRES

.. Broadway T.B. Disp.	Dr. Gayathri Devi 5551442/3476217(R)	Prabhakar	Behind C.S.I. Hosp. Broadway Road.
2. Coxtown Mat, Home	Dr. Girija 5486091 5484373 (R)	Sugandhi	Coxtown Main Road Opp. Market, B'lore.
3. D.J. Halli M.H.	Dr. Rahat 5469931/3536147 (R)	Chamundeshwari	Behind Anand Theatre, D.J.Halli.
4. Thimmaiah Road M.H.	Dr. Chandrashekar 5510551/5658080 (R)	Jyothi	Sepping Road Cross, Thimmaiah Road.
5. B.S.A.Road, Dispensory	Dr. Gayathri Devi 3476217 (R)	Srinath	Tannary Road, Near Ambedkar Statue Bangalore.

DOT CENTRES

1. K.G. Halli H.C.	Dr. Sarojini 3102387	Behind K.G.Halli, PHC.
2. Taskar Town H.C.	Dr. Kalavathy	Behind Shivajinagar, Police Station, Habeeza School.
3. Nehrupuram Disp	Dr. Narayan swamy 3476217 (R)	Near Mosque
4. Robertson Road, H.C.	Dr. Shobha 5490278	Behind Ashoka Theatre

5. Bagalur Layout H.C.	Dr. Nayan Thara 5490851 (R)	Opp. Charles School
6. Coxtown Disp.	Dr. Girija 5486091	Coxtown, M.M.Road.
7. Frazer Town P.H.U.	Dr. Kalyani	Vasanth Nagar, Near Kodava Samaj,
8. Vasanth Nagar Disp.	8460636 (R)	Shampur Main Road Busstop.
9. **Ambedkar Medical College**	Dr. Huliraj	
10.Bowring Hospital	Dr. Chandramma(Supt.)	Shivaji Nagar, Kamaraj Road.
11. Aurvedic Disp.		Bradway Road, Shivaji Nagar- Police Station.
12. Unani Corporation Disp.		
13. Velu Mudhaliyar Disp.		Kamaraj Road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M.C.
Dot Centre
Tasker Town
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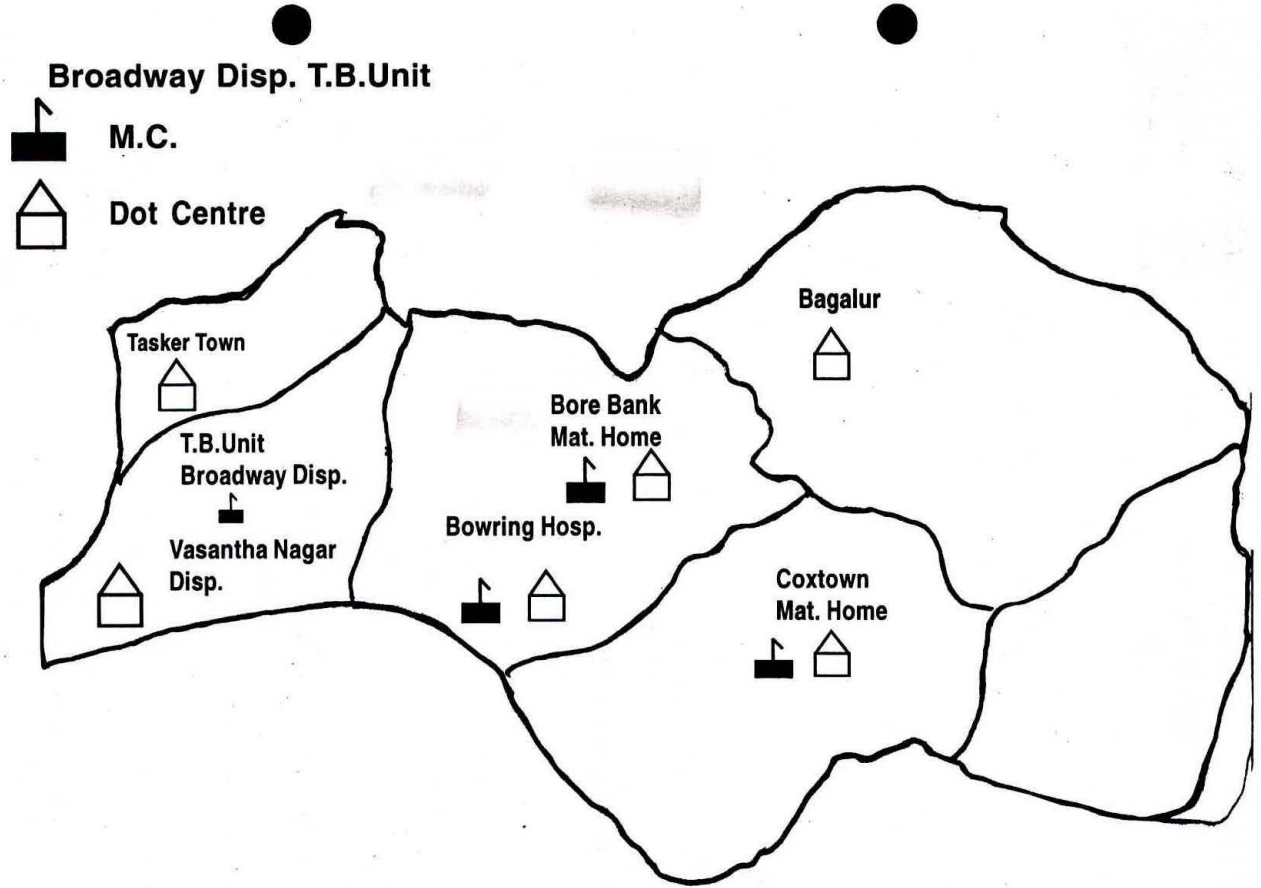
Disp.
Bore Bank
Mat. Home
Bowring Hosp.
Bagalur
Coxtown
Mat. Home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Dot Centre
Tasker Town
T.B.Unit
Broadway Disp.
Vasantha Nagar
Disp.
Bore Bank
Mat. Home
Bowring Hosp.
Bagalur
Coxtown
Mat. Home

HANUMANTH NAGAR

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Hanumanth Nagar Disp.	Dr.MohanKumar	Niloferjan	Opp.Gavigangadhareshwara Temple, Gavipuram, B'lore.

Stls : Dasegowda K.

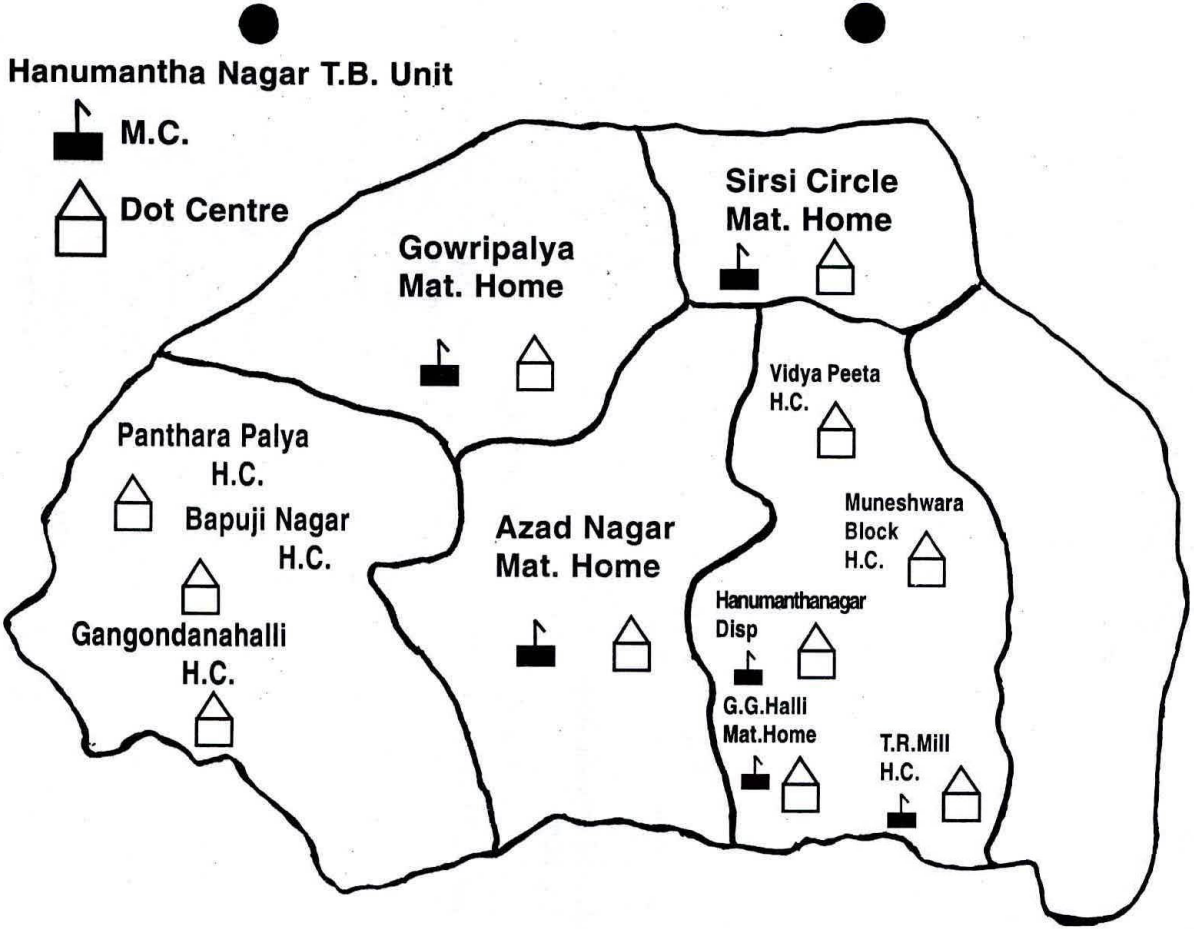
Sts : Babu.H

MICROSCOPIC CENTRES

1. Hanumanth Nagar Disp.	Dr. Mohan Kumar	Niloferjan	Opp.Gavigangadhareshwara Temple, Gavipuram, B'lore.
2. Azad Nagar Mat, Home	Dr.Usha 6744175 6611087 (R)	Latha Kumari	Mysore Road
3. Gavipuram Guttahalli M.H.	Dr. Sridevi 6611231	Vasudha	Near Gavigangadhara Temple
4. Sirisi Road Mat. Home	Dr. Indira 6703533	Indira	Mysore Road, Sirsi Circle
5. Goripalya Mat. Home	Dr. Nalini Kumari 6748467	Brunda	J.J.R.Nagar Bangalore -

DOT CENTRES

1. Bapuji Nagar H.C	Dr. Bhagyalaxmi 6748450 (R)	Bapuji Nagar
2. Avalahalli H.C	Dr. Muktha Bai 6696856 (R)	Avalahalli, Near Venkateshwara Theatre.
3. Vidhyapeetha H.C.	Dr. Anusuya 6525523 (R)	Vidhyapeeta Circle
4. Panthra Palya H.C.	Dr. Sudha 3355668 (R)	Mysore Road, B-26.
5. Gangondanahalli H.C.	Dr. Surekha 6741267 (R)	Azeezsait, Industrial Area Mysore Road, Bangalore.
6. Bangarappa Nagar H.C.	Dr. Padmavathy 8602450 (R)	Rajarajeshwari Nagar, Bangalore.
7. Mallathanahalli H.C.	Dr. Shailu	Opp. Ambedkar Engineering College
8. T.R.Mill H.C.	Dr. Muktha Bai	Near Dobhi Ghat, Opp. Green Park, Srinagar.


Hanumantha Nagar T.B. Unit
M.C.
Dot Centre
Gowripalya
Mat. Home
Sirsi Circle
Mat. Home
Vidya Peeta
H.C.
Panthara Palya
H.C.
Bapuji Nagar
H.C.
Gangondanahalli
H.C.
Azad Nagar
Mat. Home
Muneshwara
Block
H.C.
Hanumanthanagar
Disp
G.G.Halli
Mat.Home
T.R.Mill
H.C.

HOSAHALLI T.B.UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Hosahalli Referal Hospital	Dr.Susheelamma (Suptd.) 3300812 (R) 3350810 (O)	Sukanya G.	M.C.Layout, Near Jai Munirao Circle, Vijayanagar, B'lore.

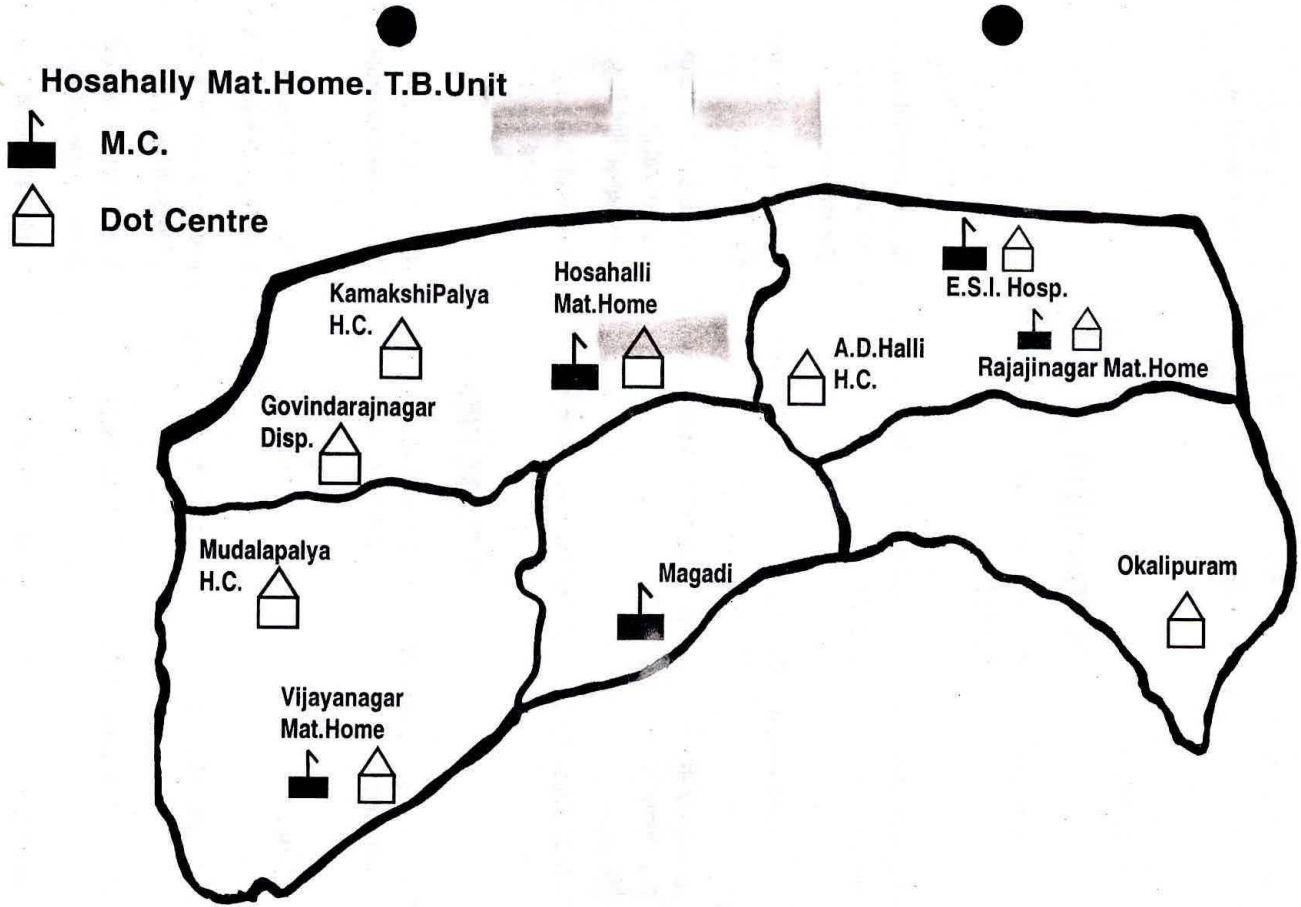
Stls : Santhosh Kumar D.
Sts : Ramesh H.C.

MICROSCOPIC CENTRES

1. Hosahalli Referral Hosp.	Dr.Shivanandha 3350810	Sukanya	M.C.Layout, Near Jai Munirao Circle, Vijayanagar, B'lore.
2. Kamakshipalya H.C.	Dr. Shoba	Lokesh	Kamakshipalya, **Opp.Rudreshwara Takies** Magadi Road, B'lore.
3. Rajajinagar Mat. Home (Dr.H.Nagaraj Memorial Hospital)	Dr. Mangala 3352215	Suguna	Near Bashyam Circle, 3rd Block, Rajajinagar, Bangalore-10.
4. Magadi Road Mat.Home Mat. Home	Dr. Thriveni 3350282	Chandrakala	Magadi Main Road, 2nd Cross, B'lore.

DOT CENTRES

1. Govindaraj Nagar H.C.	Dr. Komala 3380546	Near Mahalakshmi Temple Govindaraj Nagar, B'lore.
2. Moodalpalya H.C.	Dr. Dhanalakshmi 3287465 (R)	Saraswathi Nagar, Near Kanaka Nagar Slum, Moodalapalya, B'lore.
3. A.D. Halli H.C	Dr. Poornima 3380004 (R)	Near RBI Colony, A.D. Halli, Basaveshwaranagar, B'lore.
5. Rajajinagar P.H.U	Dr. Yogiraj	Near ESI Hospital, IInd Block, Rajajinagar, Bangalore.
6. Police Colony P.H.U	Dr. Ramdev Naik	Police Quarters Compus, Magadi Road, Tollgate, B'lore.
7. N.P.K, P.H.U	Dr. Mahendra	Beggar's Colony, Magadi Road, Tollgate, Bangalore.
8. Nandini Layout H.C.	Dr. Bharathy	Slum Board Quarters Campus Nandini Layout, Bangalore.
9. Suraksha	Dr. Harinikakkeri	Near last Bus stop, Kamala Nagar, B'lore.
10. Geleyara Balaga H.C.	Dr. Shivananda	**Near Geleyara Balaga Bus Stand, Mahalakshmi Layout, Bangalore.**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M.C.
Dot Centre
KamakshiPalya
H.C.
Hosahalli
Mat.Home
E.S.I. Hosp.
A.D.Halli
H.C.
Rajajinagar Mat.Home
Govindarajnagar
Disp.
Mudalapalya
H.C.
Magadi
Okalipuram
Vijayanagar
Mat.Home

JAYANAGAR T.B.UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Jayanagar Dispensory	Dr. Mahadevaiah 6564172(R)	Bharathi	Ashoka Pillar, Kanakanapalya, Jayanagar, B'lore.

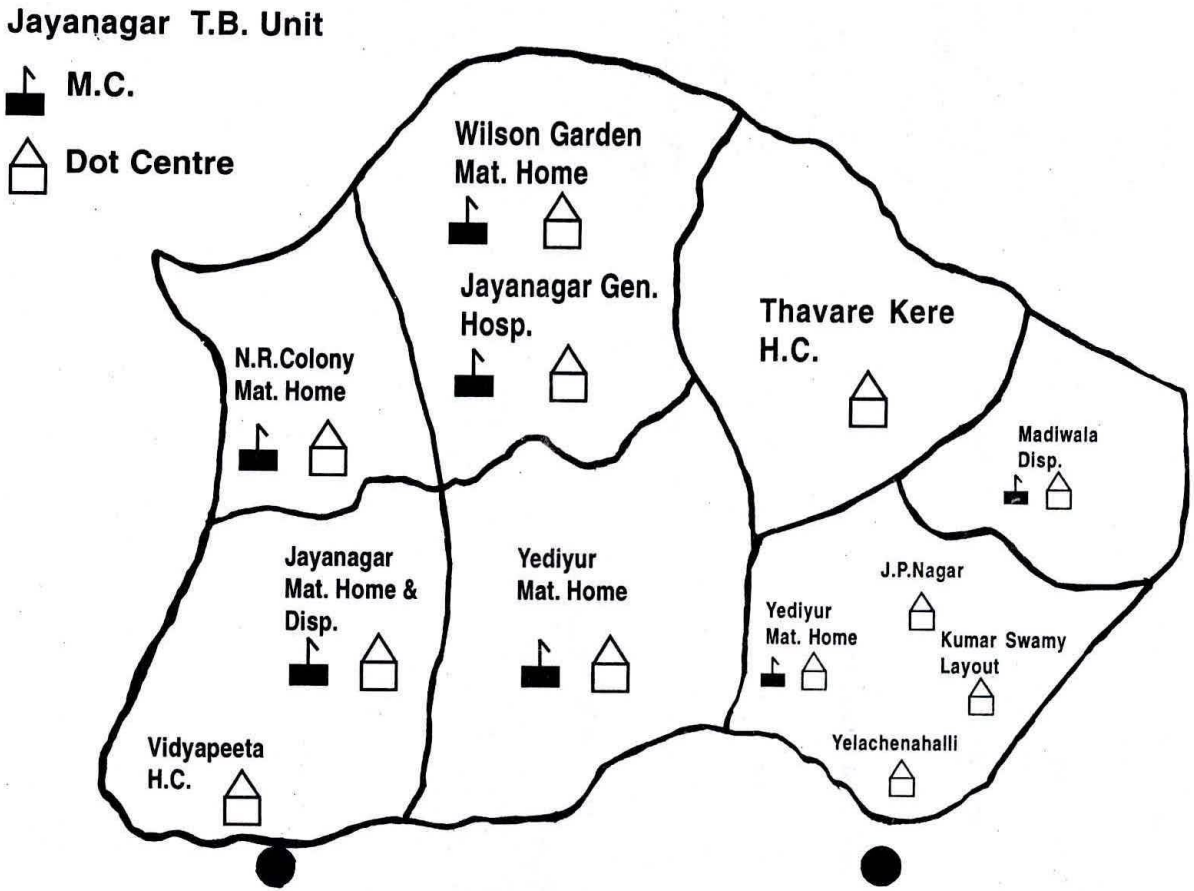
Stls : Ravi K.M.
Sts : Pundalika A.N.

MICROSCOPIC CENTRES

1. Jayanagar Disp.	Dr. Mahadevaiah 6586644 (R)	Bharathi	Ashoka Pillar, Kanakanapalya, Jayanagar, B'lore.
2. Wilson Garden Mat.Home	Dr. Parvathy 2236891	Jabeen Taj	Near Police Station Xth Cross, Wilson Garden, B'lore.
3. Yediyur Mat. Home	Dr. Prakash 6769886	Shashikala	**Near Deepak Nursing Home.** Yediyur, B'lore.
4. Banashankari Mat. Home	Dr. Prema (Suptd.) 6716596	Vijayalaxmi	Near B.D.A. Complex & Police Station, **Banashankari IInd Stage.**
5. Madiwala Disp	Dr. Ramadevi	Ramesh	Near Madivala, Hosur Road.

DOT CENTRES

1. Kumaraswamy Layout H.C. Health Centre	Dr. Anuradha 6667827	Near Bus Stop, Kumaraswamy Layout, Bangalore.
2. C.T. Bed H.C.	Dr. Prathiba	Near SSV School, **B.S.K. Thyagaraj Nagar, B'lore.**
3. J.P.Nagar H.C.	Dr. Radha	**Near KEB Office, 6th Phase, J.P.Nagar, B'lore.**
4. GandhiBazar Disp.	Dr. Saraswathi	Near Vegetable Market, Gandhi Bazar, B'lore.
5. Agara H.C	Dr. Nirmala	**Last Bus Stop Agara, Surjapura RoadBangalore.**
6. Thavarekere H.C.	Dr. Renuka Rani	**Last Bus Stop Thavarekere.**
7. Yelachanahalli H.C.	Dr. Anitha 6669717(R)	**Kanakapura Main Road,** Bangalore.
8. Uttarahalli H.C.	Dr. Latha	Uttarahalli Last Bus Stop, B'lore.
9. Yarab Nagar H.C.	Dr. Shobha	**Near Masjid & Monotype Bus Stop, Banashankari, II Stage, B'lore.**
10. Rupena Agrahara H.C	Dr. Sanmithra	Bommanahalli Main Road, B'lore.
11. Arakere	Dr. Viji	Near Belikalli, **Bannerghatt Road, B'lore.**
12. N.S. Palya	Dr. Veena	Bannerghatta Road, B'lore.


Jayanagar T.B. Unit
M.C.
Dot Centre
Wilson Garden
Mat. Home
Jayanagar Gen.
Hosp.
Thavare Kere
H.C.
N.R.Colony
Mat. Home
Madiwala
Disp.
Jayanagar
Mat. Home &
Disp.
Yediyur
Mat. Home
J.P.Nagar
Yediyur
Mat. Home
Kumar Swamy
Layout
Vidyapeeta
H.C.
Yelachenahalli

NEELASNDRA T.B. UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Neelasandra Disp.	Dr.Ragunath War Wattli 5296360(R)	Devika	Anepalya Road, Opp. Military Policegate, Neelasandra, B'lore.

Stls :- Usha R.

Sts :- Govindarajulu G.R.

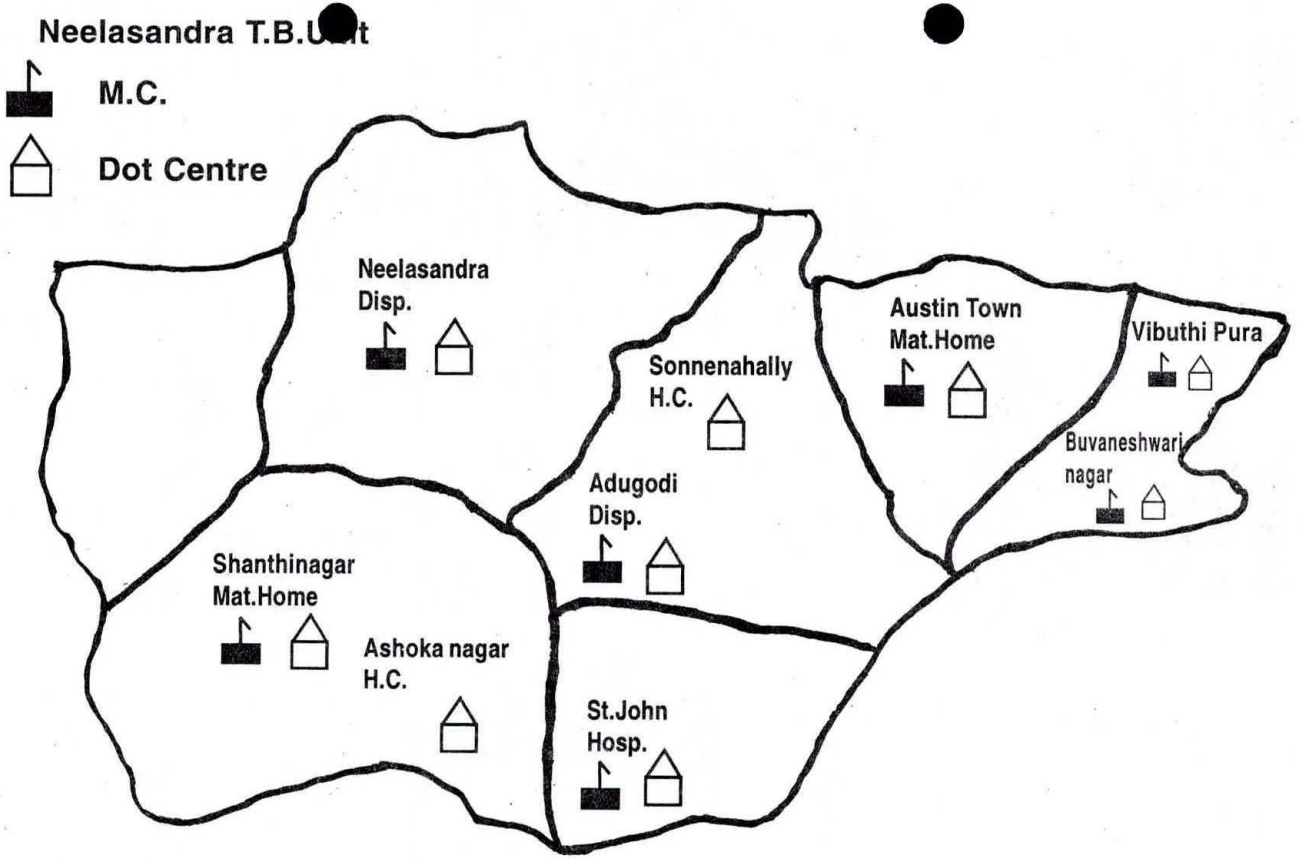
MICROSCOPIC CENTRES

1. Neelasndra Disp.	Dr.Ragunath War Wattli 5296360 (R)	Devika	Anepalya road, Bangalore.
2. Audugodi Disp.	Dr. Padmavathy 5531318 (R)	Ramakrishna	Hosur Road, Post Office Beside, Audugodi, Bangalore.
3. Shanthi Nagar Mat.Home	Dr. Shantha Kumari 2239534/2228904 (R)	Susheela	Near Nanjappa Circle, Shanti Nagar, B'lore.
4. Ulsoor Mat.Home	Dr. Lakshmamma 5551324/6521649 (R)	Shobha	Cambridge Road, Near Police Station, Ulsoor, Bangalore.
5. Austin Town Mat.Home	Dr. Sarojini 5514464/2273040 (R)	Annapoorna	Near Bus Stand & Ambedkar Statue, Austin Town, Bangalore.

DOT CENTRE

1. Kodihalli H.C.	Dr. Shobha	Kodihalli Bus Stop, Airport Road, Bangalore.
2. Vibhuthipura H.C.	Dr. Kalpana 5231968 (R)	Annasandra Palya, Vibuthipura, B'lore.

3. Byappanahalli H.C.	Dr. Lakshmi 5268526/5491260 (R)	Near Rly. Level Crossing Byappanahalli, B'lore.
4. L.R.Nagara H.C.	Dr. Manjula 5714460	Near National Game H/B Bangalore.
5. Sonnenahalli H.C.	Dr. Dhanalakshmi	Vivek Nagar Bus Stop, Bangalore.
6. Murphy Town H.C.	Dr.Sunitha 5241930 / 5244551 (R)	Near Murphy Town Market, Bangalore.
7. Bhuvaneshwari Nagar H.C.	Dr. Vedavathi 2233600 / 5280458 (R)	Near Nagawara Palya C.V.Raman Nagar Bus Stop.
8. Audugodi H.C	Dr.Manjula 3372018(R)	Koramangala Road, Bangalore.
9. O.M.S. Hospital	Dr. Malikarianna (Supt.)	Old Madras Road, Bangalore.
10. St. John's Medical College	Dr.George Chest Clinic, Room No.5 5530724	Koramangala, Bangalore


Neelasandra T.B.Unit
M.C.
Dot Centre
Neelasandra
Disp.
Sonnenahally
H.C.
Austin Town
Mat.Home
Vibuthi Pura
Buvaneshwari
nagar
Adugodi
Disp.
Shanthinagar
Mat.Home
Ashoka nagar
H.C.
St.John
Hosp.

LWSTC - T.B. UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
LWSTC - TU	Dr. Vijayalakshmi 2267093	Mallannachar	K.G.Road, Opp.Sagar Takies, Bangalore.

Stls : B. Shashikumar
Sts : D. Lashmanarao

MICROSCOPIC CENTRES

1) Dasappa Mat. Home	Dr. Ambika 2220584	Ramakrishna,	S.J.P.Road, Near Town Hall, Bangalore.
2) Manavarthpet Mat.Home	Dr. Chandrakala 6700832	B.N.Premalatha	Near K.V.Temple & Balepet Circle, Bangalore.
3) Pobbathi Mat.Home	Dr. Geetha 6675277	Sowbhagya	Sajjan Rao Circle, V.V.Puram, B'lore.
4) H.Siddaiah Road Hospital	Dr. B.Sarojamma	Manjula	Near Lions Eye Hosp. Siddaiah Road, B'lore.
5) St. Marthas Hospital	Dr. Shashikala 2275081	Micro Biology Dr. Veena	Nrupathunga Road, B'lore.
6) Victoria Hospital	Dr.Ravindra Lect.Dept.of Medicine	Micro Biology Room No.15	Near City Market, Bangalore.
7) Kempegowda Institute of Medical Science	Dr.Neelakantachar Dept.of Medicine TB & Chest.	Micro Biology	Near Makkala koota Bangalore.

DOT CENTRES

1) Mavally P.H.U	Dr.Rajanna	J.C.Road, Near Minerva Circle, Bangalore.
2) Ganigarapet P.H.U		Opp. Cauvery Bhavan, Bangalore.
3) Kalasipalyam P.H.U	Dr.Veerashetty	Kalasipalyam Bus Stand, Bangalore.

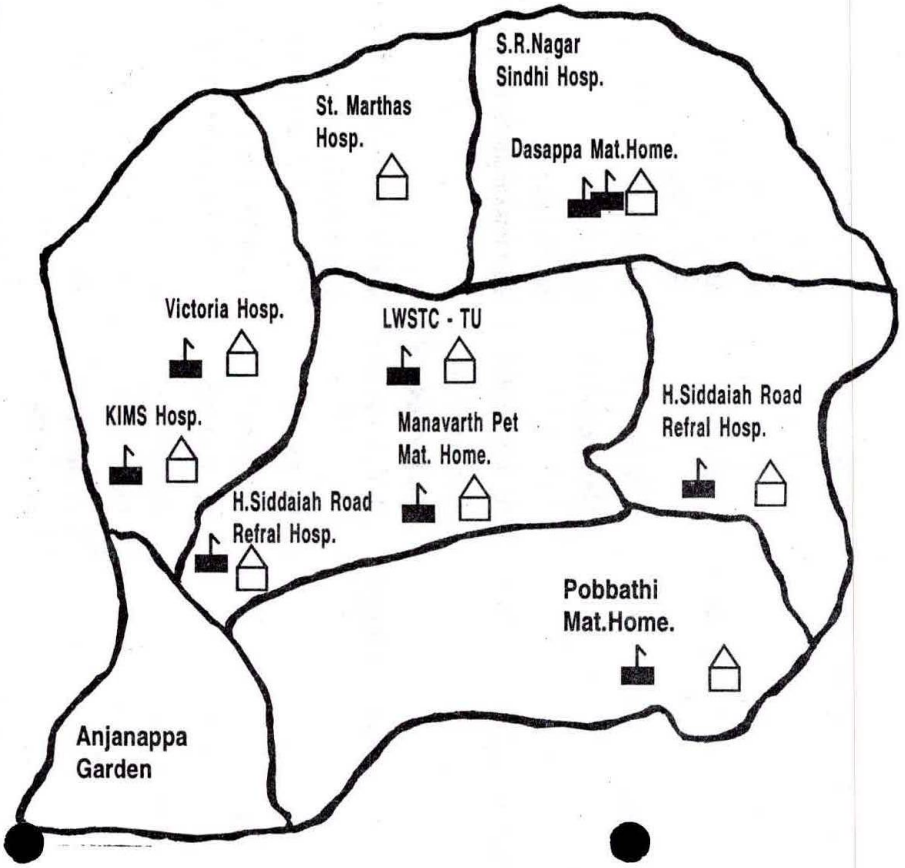
DOT CENTRES

4) Cottonpet Mat.Home	Dr.Chandrakala 6699832	Adinarayana gudi Street, Cottonpet Main Road, Bangalore.
5) Director of Health Services Campus Disp.	Dr.Prabhudev	Anand Rao circle. Directory of Health Services Campus, Bangalore.
6) **Anjanappa Garden Health Centre**	Dr. Jalaja	Near Banana Mandi, Binnypet, Bangalore.
7) ctoria Hospital	Dr.Ravindra **(Lect.Dept.of Medicene)**	Room No.15 Micro Biology Dept. Victoria Hospital.
8) Kims	Dr. Neelakantachar **(Dept. of Medicine** **TB & Chest desease)**	Near Makkalakoota, Bangalore .
9) **H. Siddiah Road Refral Hospital**	Dr. B. Sarojamma Ph : 2235037	Near Lions Hospital, Siddiah Road, Bangalore.
11) Pobbathi Mat.Home	Dr.Geetha Ph : 6675277	Sajjan Rao Circle, V.V.Puram.
12) Dasappa Mat.Home	Dr.Ambika Ph: 2220584	S.J.P.Road, Near Town Hall,
13) St.Marthas Hospital	Dr.Shashikala Ph: 2275081	Nrupathunga Road,Bangalore.
14) Gangigarpet P.H.U		Opp. Cauvery Bhavan Bangalore.
15) Mavally P.H.U	Dr. Rajanna	Near Minerva Circle, Bangalore.
16) Kalasipalyam P.H.U	Dr.Veera Shetty	Near Kalasipalya Bus Stand.
17) Cottonpet Mat.Home	Dr. Chandrakala Ph: 6699832	Adinarayana Gudi Street, Cottanpet Main Road, B'lore.
18) Directory of Health Services	Dr.Prabhudev	Campus Dispensory

L.W.S.T.C. T.B. Unit

M.C.

Dot Centre



YESHWANTHPUR T.B.UNIT

CENTERS	DR.NAME	LAB-TECH	ADDRESS
Yeshwanthpura Mat.Home Stls : Mohan Shankar D. Sts : Surendra Naik	Dr.Usha Javali 3372940	Thara	Yeshwanthapura, Near Railway Station.

MICROSCOPIC CENTERS

1)	Yeshwanthapura Mat.Home	Dr.Usha Javali 3590333 (R) 3372940 (Hosp.)	Thara	Yeshwanthpura, Near Railway Station.
2)	P.G.Halli Mat.Home	Dr.Najrath Banu 3447672	Vijaiya	**Near N.T.I, Ballari Road,**
3)	Sri Ramapura Mat.Home	Dr.Fathima **3128447 / 3631906 (R)**	Mohan	Near Police Station, Sri Rampura, B'lore.
4)	Ganganagar Mat.Home	Dr. Jayanthi **3338373 / 3314883 (R)**	Srivas Kashyap	Near Bus Stop Ganganagar, B'lore.
5)	M.R. Palya Mat.Home	Dr.Sarojini **3332891/3436242 (R)**	Vijayalaxmi	Near Ganesh Temple, M.R.Palya, B'lore.
6)	K.C.General Hospital	Dr. Jagadish (supt.)		Near Police Station, Malleshwaram, B'lore.
7)	M.S.Ramaiah Hospital	Dr.Mohan Rao		**Mathikere, Gokula, B'lore.**

DOT CENTRE

1)	Kodandaramapura H.C.	Dr. Sadhana 98450 12015	Malleshwaram, B'lore.
2)	Nelmaheshwari H.C.	Dr. Manjula	T.Dasarahalli Temple, Bangalore.
3)	Mallasandra H.C.	Dr. Shobha 3305345 (R)	Hesarghatta Road, Bangalore.
4)	Shankar Pura H.C.	Dr. Sumithra 3323611 (R)	Mahalakshmi Layout, Bangalore.

5) Laggere H.C.	Dr. Annapoorna	Laggere, Bangalore.
6) Peenya H.C.	Dr. Mamatha 6529253 (R)	Peenya Entrance, Bangalore.
7) M.R.Palya P.H.C	Dr.Nirmala Buggi 6715596	M.R.Palya Bangalore.
8) Attur H.C.	Dr.Uma 3492039 (R)	**Yalahanka Upanagara,** Bangalore.
9) Tavidla H.C.	Dr.Usha Rani 3417779 (R)	Vidhyaranyapura, Bangalore.
10) M.S.Palya H.C.	Dr. Mala 3535030 (R)	Vidhyaranyapura, Bangalore.
11) Kodige Halli H.C.	Dr.Amitha 5483248 (R)	Yelahanka.
12) Cholanayakanahalli H.C.	Dr. Pramila 5522228 (R)	Cholanayakanahalli, Bangalore.
13) Ashokapura Disp.	Dr.Sumithra 3323611 (R)	Shankar Nagar, Bangalore.
14) Nagappa Block Disp.	Dr.Fathima 3631906	Gayathri Nagara, Bangalore.
15) Sulthanpalya H.C.	Dr.Sandhay 3535326	Dinnur Main Road, Bangalore.
16) Amruthahalli H.C.	Dr.Sujatha 3341245	Byatarayanapura, Bangalore.
17) Okalipura H.C. (Lions)	Dr.Mangala	Sriramapura, B'lore.
18) Mariyappanapalya H.C	Dr.Sapna Revadi 6722221	Devaiah Park, Sri Ramapura, B'lore.
19) Mathikere H.C.	Dr.Savitha 3386573	**Near Keshava Theatre,** **Mathikere, Bangalore.**

Yeshavanthapura Mat.Home. T.B. Unit