FIELD PROJECT REPORTS

By

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CERTIFICATION

This is to certify that all the field projects submitted in this Bound Volume are original work carried out by Dr. A. Mohan during the two field postings of six months each under the guidance of faculty of National Institute of Epidemiology (ICMR), Chennai and the local supervisor specially nominated for this purpose. This is in partial fulfillment of the requirements for the degree of Master of Applied Epidemiology and has not been submitted earlier by him in part or whole for any other (Publication or degree) purpose.

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DIRECTOR

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SECTION 1:

FIRST FIELD POSTING

1.1 Description of health facilities, institutional linkages and laboratory facilities in the context of surveillance, epidemic preparedness and response, Tiruchirappalli District, Tamil Nadu

1. Introduction

Health status of any community/ country is assessed by availability of quality health care facilities and its utilization irrespective of place of living (rural or urban), caste, religion, economic status, both public and private services, quality & quantity of manpower. It also depends on the other health related systems like social welfare, education, agriculture, communication, animal husbandry, etc. Quality of health services in any community is assessed by the availability of laboratory facilities and its utilization by health professional for the welfare of the community. Laboratory services are one of the main functions of any hospitals. They play important role in confirming the diagnosis during epidemic and normal period. They also play very important role in disease reporting system and help to assess the trend of diseases in the community.

Tiruchirappalli District is located in the central part of Tamilnadu. The author is currently posted in this district as part of the two-year Field Epidemiology Training Programme (FETP). The purpose of this report is to given an account of the facilities one could count upon in the event of an outbreak including the laboratory support as well as for strengthening reporting system in this district.

2. Objectives

The following are the objectives of the report:

1. To describe the existing District health setup (both in rural &urban) with reference to physical health facilities (including laboratory), staffing, services offered and other institutional linkages
2. To identify any lacunae if present in the context of disease reporting system and epidemic preparedness

3. Methods

3.1 Data sources

This report is based on the secondary data collected from district health set up which includes

1. Data collected from the registers and records in Government health facilities including Tiruchirappalli Corporation. Interviews of Health /Medical Officers at the District, Corporation as well as Primary Health Centre (PHC) level and in Medical College
2. Interviews with laboratory personnel at the PHC level and at the medical college
3. Interviews of senior personnel in health related sectors like animal husbandry, social welfare
4. Discussion with District level officers for health and other health related departments

One health personnel each from each of the following health care institutions were interviewed: PHC, Community Health Centre (CHC), Health Subcentre (HSC), Health Posts at the Corporation level, Government hospital, the medical college hospital and district health office. The list of officers met for this purpose in health and health related sectors are given in Annexure 1.

Data were collected from the registers and records in Govt. health facilities like Tiruchirappalli Corporation, Medical college Hospital, PHC and HSC. Tiruchirappalli District has few public sector hospitals (affiliated to Central Government) catering to the needs of large-scale heavy industries workers and their families. The data were collected data from these hospitals also.

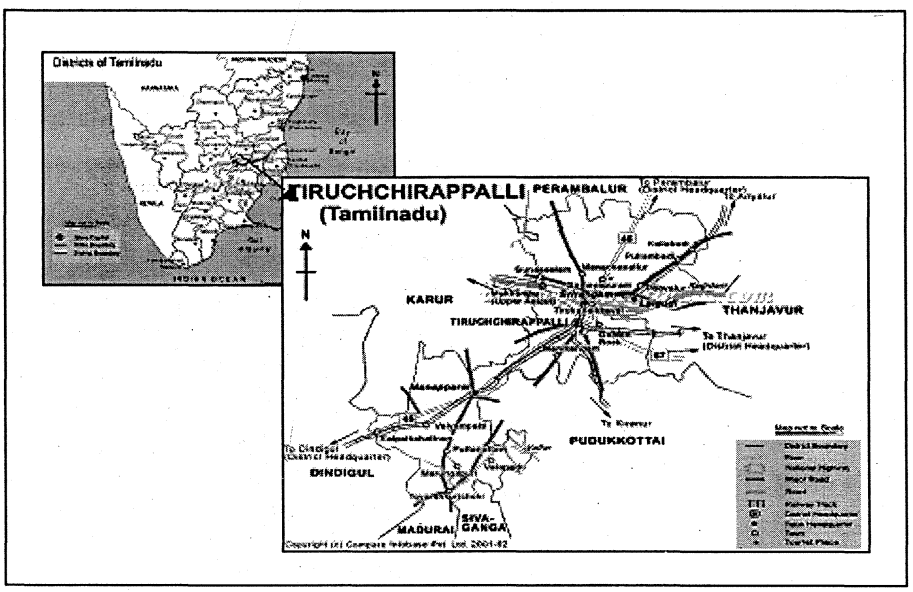
4. Background

4.1. Geographical location

Tiruchirappalli district is situated at the centre of Tamilnadu State India (Figure 1). Its boundaries are Thanjavur in the east, Karur in the west, and Namakkal in the north, and Pudukottai in the south. Tiruchirappalli is known as Rock City for the presence of hillock at the heart of the town. It is located 320 km to the southwest of

Chennai and 128 km north east of Madurai on the banks of the river Cauvery. The area is mostly plain and the river Cauvery flows through the city and is the source of water for domestic and irrigation purposes. It is one of the important industrial and pilgrimage centers. The rock fort that also houses super Pallava sculpture is the landmark of the town. The district has several famous churches, mosques, antiquities built by previous rulers. It connects the important centers of the state and nation by rail, road, and air. Its climate is tropical and Tamil is the locally spoken language. The economy of the district is essentially agrarian in nature. The setting up a public sector undertaking industry, Bharat Heavy Electricals Limited (BHEL) at Tiruverambur provided a base for industrial expansion. Weather wise, the maximum rainfall occurs in the month of October and November during Northeast Monsoon. The maximum Temperature is usually attained during hot simmer months of April, May, June that ranges between 34 - 43 Degree Celsius and the minimum temperature is recorded during the months of November, December, and January.

Figure 1. Location of Tiruchirappalli District, Tamilnadu



4.2. Socio-demographic characteristics

It is one of the industrially developed in Tamilnadu. The District, for administrative convenience is divided rural and urban areas (Figure 2). The rural areas again divided into number of Taluks. The Taluks are divided into number of blocks or unions. The bigger villages as per population size and financial position are called town panchayats. The urban areas are called Municipality or corporation as per

population size. At present, the district has one corporation, 2 Municipalities, 10 Taluks, 14 blocks, 408 village Panchayats and 18 town Panchayats (Table 1)

Its population is around 24 lakhs of which around 30% are living in the urban areas. Its birth rate, death Rate, and other demographic characters are higher than state level. The literacy rate is more than 80%. Work force constitutes 35% of the population of which 60% are dependent on agriculture. (Tables 1 and 2)

Figure 2. Administrative division of Tiruchirappalli District

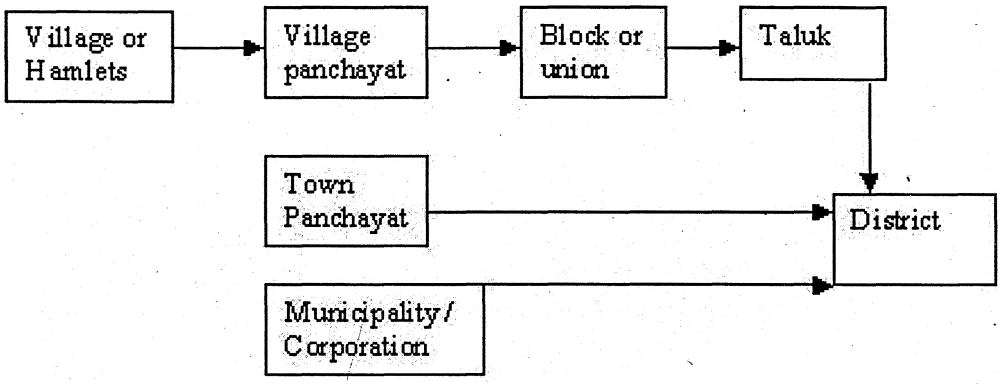


Table 1. Administrative divisions in Tiruchirappalli District

Division	Number
Corporation	1
Municipality	2
Town Panchayat	18
Village Panchayat	408
Block (Union)	14
Taluks	8
Villages	1886
Wards (Urban)	110

(Source: District Health office report, 2001)

Table 2. Demographic and vital statistics, Tiruchirappalli District, 2001-2002*

Demographic characteristics:

Midyear population (2002)	:	24,31,863
Rural Population	:	15,72,682
Urban Population	:	8,59,181
Population density	:	311 per km^2
Sex Ratio/1000 Female	:	1010/1000
Population growth Rate (91-2001)	:	8.76 %
Literacy Rate	:	Overall: 81% (Male 87%; Female 71 %)

Vital statistics:

Birth Rate	:	18.5 per 1000
Death Rate	:	6.3 per 1000
Infant mortality rate	:	39 per 1000 live births
Maternal mortality rate	:	1.1 per 1000 live births
Still Birth Rate	:	17.8 per 1000 live births
Age at Marriage	:	Male 26 years; Female 25 years
Complete Immunization	:	95%
Birth order of 3 & above	:	28.1%

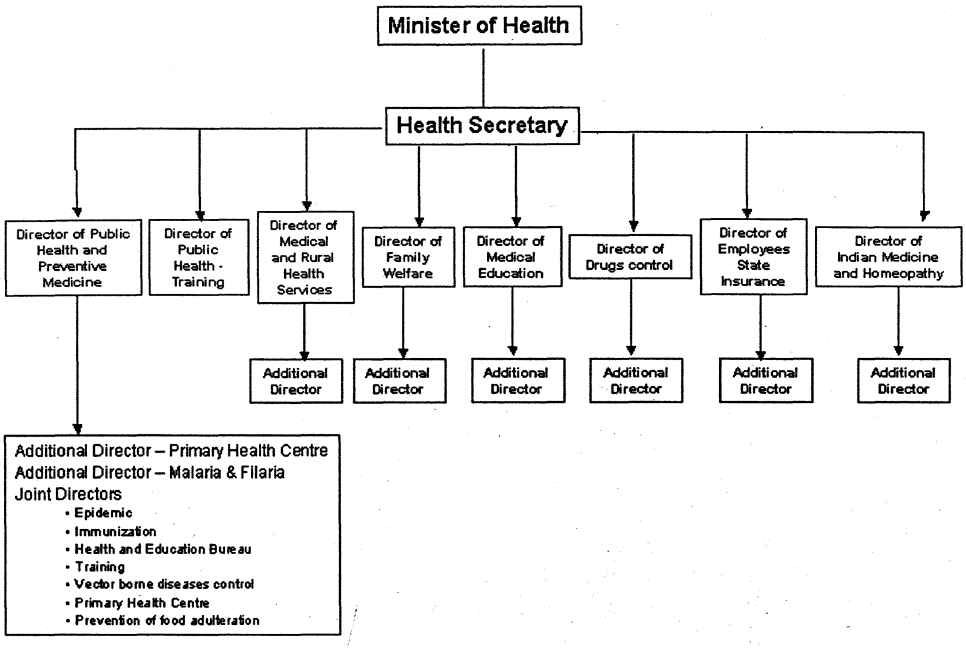
*(Source: Census of India, 2001 & District Health Office report)

5. Health department

5.1. Organisation at the State level

The organization set up of the health department at the State level is shown in Figure 3. The health department is compartmentalized into so many departments. They are described separately for its physical health facilities including laboratory, staffing and services offered.

Figure 3. Organization setup of health system in Tamilnadu (State level)



5.1.1. Directorate of Public Health and Preventive Medicine

The Director of Public Health and Preventive Medicine (DPH) is the Chief registrar for vital events for the State of Tamilnadu. DPH is the implementing authority for primary health care in rural and urban areas, Prevention of Food Adulteration (PFA) act, birth & death registration, prevention and control of epidemics, monitoring of water quality, disease reporting system. The directorate also implements all the national health programme except the Tuberculosis, blindness control and Family welfare through the primary health care units both in urban and rural areas.

5.1. 2. Directorate of Medical and Rural health Services (DMS)

Director of medical and rural health Services (DMS) implements curative services through the District, Taluk and sub taluk Government Hospitals. Their main activities are curative and referral services, curative service for prisoners and curative services for industrial health workers through the Employees' State Insurance (ESI) Hospital and dispensaries. They implement National programmes like the Tuberculosis, blindness control and Family welfare through the primary health care units and hospitals both in urban and rural areas

5.1.3. Directorate of Medical Education (DME)

The Director of Medical Education (DME) at the State level and dean of a medical college at a local level are responsible for training the medical professionals and providing tertiary care. They are implementing Re-Orientation of Medical Education (ROME) Programme and Family Planning. They are also having one post-partum centre.

5.2. District health organization

The organization set up of the health department at the district and PHCs level is shown in Figure 2.

5.2.1 Department of Medical and Rural Health

At the district level, Joint Director (JD) heads both health and medical department. The medical department's main activities are curative services. The other services are same as that of state level DMS.

The Medical section of the district organization implements the Curative services through 11 Government Hospitals. This district is not having district Head quarters Hospital. They associate themselves with Epidemic Response Team during the Outbreak.

The J.D also supervises the activities carried out by the health department headed by Deputy Director of Health Services (DDHS) through 48 PHC s, 14 block P.H.Cs.

5.2.2 Department of Public Health

This section of the health and medical department is directly responsible for epidemic preparedness and disease reporting system. As far as the provision of primary care is concerned, DDHS is directly responsible for implementing above activities in the district. Five sub-ordinate officers are helping the DDHS in carrying out the activities in the district. These officers are Assistant Director (A.D) for statistics, whose duty is collection and compilation of data;the District Public Health Nurse (DPHN) who is looking after the maternal and child health programme including reporting system activities of the Vaccine preventable diseases;the District

Malaria Officer (DMO) who is looking after the Vector borne diseases and its reporting system activities, Personnel Assistant to DDHS who is assisting the DDHS in monitoring all the epidemic prone diseases more emphasis on water borne diseases and one health educator (HE) who is undertaking information, education and communication (IEC) activities. The flow chart shows organization pattern at the district level and sub Taluk Level (Figures 3 and 4).

Figure 3. Organization structure of Health and Medical Department, Tiruchirappalli District

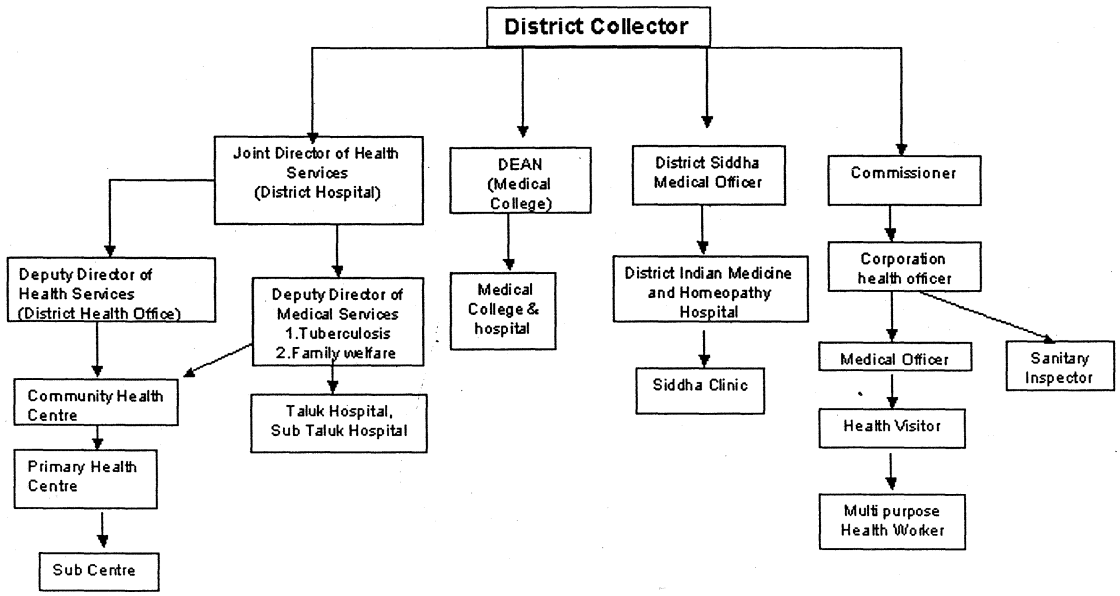
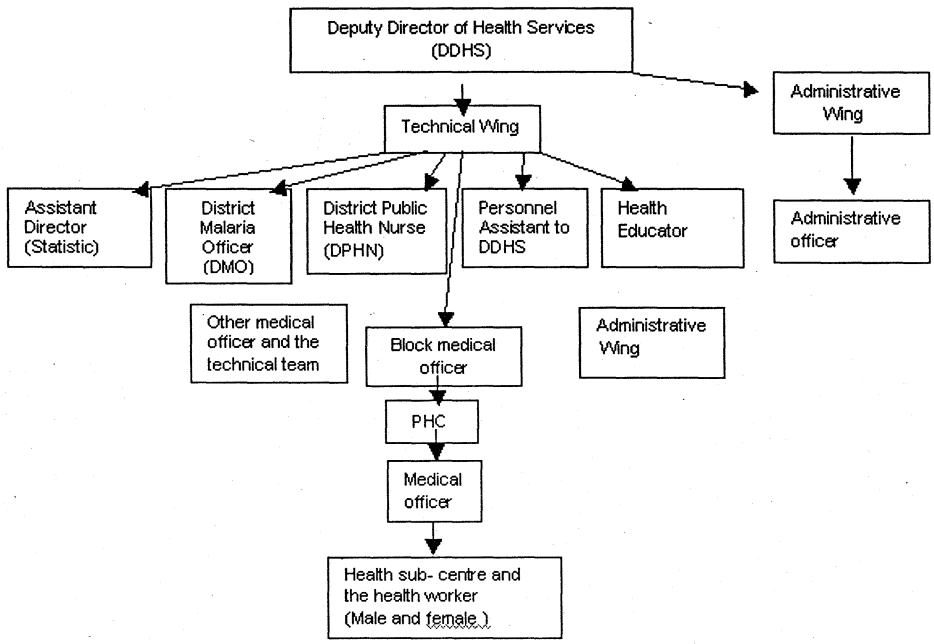


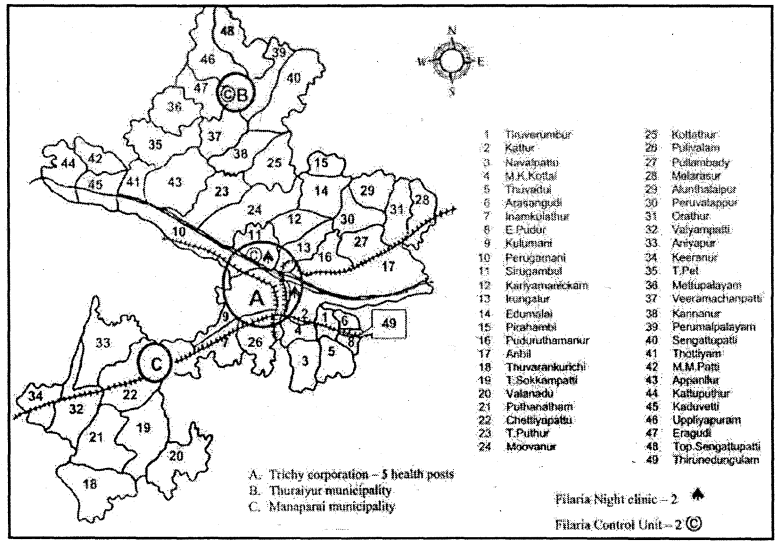
Figure 4. District Health office organization setup, Tiruchirappali District



This department is providing primary health care in rural and urban areas, implementing the Prevention of Food Adulteration act. And other activities like births & deaths registration, prevention and control of epidemics, monitoring of water quality, disease Reporting system and implementation of all National health Programme are carried out through the primary health care units of 34 PHC s, 14 block PHC, s, 304 HSCs, 15 Urban health post. The location of primary health centers and the available manpower are shown in table 3 and figure 5.

At the district level, there is an epidemic response team available, which consists of two health Inspectors, two Staff Nurses. Their main activities are to take control measures, collect specimens for laboratory investigation, along with the PHC team.

Figure 5. Location of PHCs, Corporation health post and Filaria clinic in Tiruchirappalli district



5.2.3 Staff position and health institutions

Staff position in the health department at the PHC and Corporation level who are directly responsible for epidemic preparedness and disease reporting system are shown in the table 3

Table 3. Health manpower in primary health care, Tiruchirappalli District, 2002

Type of personnel	Urban (n=15)	Rural (n=48)
Medical Officers	18	101
Multipurpose Health Workers (MPHW Female)	20	305
Health Visitors (HV)	8	57
Health Inspectors(HI)	24	197
Block Health Supervisors (BHS)	Nil	14
Block Health Statistician	4	48
Auxiliary Nurse Midwife	31	67
Laboratory Assistant	6	36

(Source: District Health office report)

5.2.4 Medical college Hospital

In this district there is a medical college with 800-bedded Hospital with 65 Doctors. The medical college has almost all the special departments including mental health and neurosurgery

5.2.5 Indigenous System of Medicine

In this District, under the leadership of District Siddha Medical Officer, one District Head quarters hospital with 25 beds, one Homeopathy clinic and one Ayurveda clinic are located at the District Head Quarters Tiruchirappalli. In addition, Siddha clinics are available in rural and urban areas as shown in the table 10. Their main activities are providing curative services both of in-patient and out patient nature.

5.2.6 Employees State Insurance (ESI) Hospital

In Tiruchirappalli District there is one ESI hospital and 5 dispensaries available. The hospital is provided with 50 beds, 20 doctors with all laboratory facilities .The hospital is providing both outpatient and in patient services for the employees who are employed in the minor factories in the private sectors. They are providing preventive services like immunization in addition to curative services.

6. Urban Health

The organization pattern in Tiruchirappalli Corporation is as shown in figure 3.

In Tiruchirappalli district, there is a corporation and 2 municipalities. In Tiruchirappalli Corporation, they have 1 Health Officer, 34 sanitary Inspectors 67 supervisors and 2012 sanitary workers in the public health wing and in the medical wing they have 15-health post with 20 medical officers, 34 Female health worker and 7 health visitors.

In the municipalities (Manapparai and Thuraiyur), even though they have sufficient sanitary workers, they have neither adequate field staff nor medical officers (MOs) for the public health activities like reporting system activities and immunization. In Manapparai, they do not even have a single Health worker or M.O. However, in Thuraiyur, one field Worker is available to carry out MCH activities.

7. The Health care institutions

The institutions, which are providing health services in the district, their location, type of services they are providing are shown in table 4.

Table 4. Government Institutions* providing Health care at various Levels, Tiruchirappalli District

Type of institution	Rural	Urban	Type of Service
Indigenous System of Medicine			
Siddha Hospital (District Head)	-	1	IP and OP
Siddha clinic	9	7	OP
Homeopathy	Nil	1	OP
Ayurveda	Nil	1	OP
Tiruchirappalli corporation Siddha clinic	Nil	5	OP
Govt. Allopathic Hospitals			
E.S.I Hospital	-	1	IP and OP
E.S.I Dispensaries	-	4	OP
Primary health centre	48	-	OP
Health HSCs	307	-	OP
Teaching Hospital	-	1	IP and OP
Taluk Hospital	-	7	IP and OP
Sub Taluk Hospital	-	2	IP and OP
Labs in the rural area	-	36	OP
Other public sector hospitals			
BHEL Hospital	-	1	IP and OP
OHS Hospital (BHEL)	-	1	Occupational health
OFT Hospital (Defense)	-	2	IP and OP
Railway Hospital	-	1	IP and OP
Railway Dispensaries	-	2	OP
Local Body Hospitals			
Tiruchirappalli corporation			
Maternity centers	-	2	IP and OP
Maternity homes	-	10	IP and OP
Urban family welfare centers	-	2	IP and OP
Dispensaries	-	14	OP
School health team	-	1	
Thuraiyur municipality			
Maternity centre (without M.O)	-	1	IP and OP
Manapparai municipality			
Maternity centre	-	Nil	

ESI: Employees State Insurance; BHEL: Bharat Heavy Electricals Limited; OHS: Occupational Health Services; OFT: Ordinance Factory, Tiruchirappalli; IP: Inpatient: OP: Outpatient
*(Source: District Health office report)

Table 5. Private institutions* providing health care, Tiruchirappalli District

Hospitals	Number
C.S.I Hospital	1
Speciality hospital	4
Private hospital	170
Private clinics	1097
Dental hospital	3
Dental clinics	56
Indigenous system practitioners	123
Microbiological laboratory	5

*(Source: District Health office report)
CSI : Church of South India

8. Existing laboratory facilities

Tiruchirappalli district is not having any public health laboratory facilities until 1997. It had to depend on the State Public Health Laboratory located in Chennai for laboratory support. A medical college was started in Tiruchirappalli five years ago. The tertiary care and laboratory facilities of the medical college were supposed to meet the needs of neighbouring districts. Recently the laboratory at the medical college has started analysing the specimens collected during diarrhoeal diseases outbreak in Tiruchirappalli and Perambalur district.

Table 6 shows the existing laboratory facilities and available manpower at these facilities

Table 6. Availability of laboratory facilities and manpower at various levels, Tiruchirappalli district

Type of Institution	Total	Number (%) with laboratory	Man Power
Govt. Institutions			
HSCs	307	0(0)	
PHC	34	22 (65)	22
Block PHC	14	14(100)	14
Govt., hospital	9	7(78)	11
Medical college Hospital	1	1(100)	6
National Filariasis Control Programme	4	4(100)	4
Zonal Entomological Team	1	1(100)	3
Local Body Institutions			
Tiruchirappalli Corporation	14	4(29)	7
Thuraiyur municipality	0	0	
Manapparai Municipality	0	0	
National Filariasis Control Programme	4	4(100)	4
Public Sector Undertaking Institutions			
BHEL Hospital	1	1(100)	10
OFT hospital (Defense)	1	1(100)	
Rail way hospital	1	1(100)	5
ESI Hospital	1	1(100)	4
Railway health post	2	0(0)	
Private Institutions			
Private Microbiological laboratory	4	NA	12
Mission Hospital	2	2(100)	10

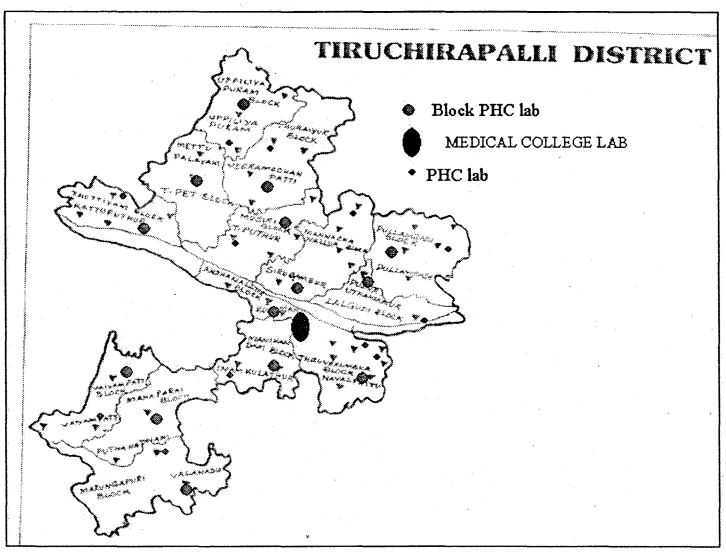
NA: Not applicable

Table 7. The facilities for the diseases of epidemic potential

Diseases of epidemic potential	Level of health facility	Laboratory	Facilities
Cholera & Acute diarrhoeal diseases	District Hospital (Medical College)	1.Stool culture 2. Hanging drop 3. Sub typing	Adequate Adequate Not Available
Polio	All Level*	Stool culture Sub-typing	Not available
Food Poisoning	District Hospital	Stool culture Vomitus culture Food Culture Chemical Analysis	Available
Malaria	All Level	Peripheral smear	Available
Leptospirosis	District Level	Blood Test Serological test	Not Available
Japanese Encephalitis	All Level	Serological test	Not Available
Dengue	All Level	Serological test	Not Available
Plague	All Level	Smears of Bubo, fluid & Blood culture	Not Available
Typhoid	District Level	Blood culture & Widal	Available

*District, taluk and PHC level

Figure 5. Location of laboratory facilities, Tiruchirappalli District



9. Health related sectors

Among the health-related sectors, the important departments are animal husbandry, social welfare, education, transport and highways departments. In Tiruchy district, all these departments are present.

10. Basic infrastucture facilities

As per the data available, almost every village is having electricity, water supply, roads, public transports etc (for details see annexure)

11. Local bodies

The district is divided to 10 Taluks, 14 blocks, 18 town Panchayats, 408 village panchayats, one corporation and two Municipalities. Their main functions are to provide safe water and maintenance and development of civic and other basic amenities. However, the most important basic amenities like latrine and sanitation are not available uniformly. As per the available data, these facilities are not present in corporation, municipalities and few town panchayat areas. It is almost non-existent in rural areas.

12. Water supplies and sanitation

12.1. Drinking water

As per the available data, almost all villages and urban areas are having the potable protected water supply. The district's main drinking water sources is the river Cauvery the table 8 show the water supply facilities available in rural areas.

Table 8. Water supplies facilities in rural area, Tiruchirappalli District

Type of water supply	Number
Over Head Tanks	932
Hand Pumps	1195
Well	1119

(Source: District statistical office annual report)

12.2. Sanitary services

No data on the availability of sanitary facilities in rural and urban areas exists. As per the information given by district health authorities, more than 50% of the urban households have latrine facilities in their homes, 20% of people are utilizing the available community latrines and remaining 30% are not using sanitary latrines (open defecation). In rural area, less than 10%, people have access to sanitary latrine facilities.

13. Animal husbandry department

It is one of the well-developed departments in this district. It is headed by a JD. Under him one D.D & two ADs are working. This department is equipped with 79 sub centers, two mobile units, one Animal Diseases Intelligence unit, 30 dispensaries, eight veterinary hospitals and one central laboratory (table 9).

Their main functions are treating diseases, preventing diseases by vaccination, disease surveillance, cattle breeding, fodder development, control and prevention of epizootics and zoonotic diseases and poultry forming. For the past three years, there have been no outbreaks among the animals. Their other functions are increasing the animal food and its hygienic production.

Table 9. Animal husbandry hospitals and clinics in Tiruchirappalli District

Type of institution	Number
Veterinary Hospitals	8
Dispensaries	51
Veterinary Clinic	1
Mobile Clinic	3
District Laboratory	1

(Source: JD Animal husbandry)

14. Social welfare department

In this department, there are 3 different divisions

1. Social welfare and prevention of Dowry system
2. District project nutrition office (DPNO)

3. District Rehabilitation office (DRO)

14.1. Social welfare

Under the head of district social welfare officer, this division, Implements social welfare activities like, free supply sewing machine, Moovaloor Ramaamirtham Ammal Thittam to provide monetary help to the poor educated girl during their marriage, adoption of orphaned children, widow's remarriage and prevention of dowry system etc.

14.2. District Project Nutrition Officer

Under the leadership of District Project Nutrition Officer this division carries out the nutrition supplementary Programme for under-six children and mothers, growth monitoring, immunization, non-formal education and care of adolescent girls. The details of noon meal centers are as given in table 10.

Table 10. Social welfare department particulars, Tiruchirappalli District

Type of centers/ organization	Total Centres	Beneficiaries
Women welfare Societies	1600	-
Training centre	40	-
Mahalir Mandram*	420	-
PTMGR noon-meal centres	1533	258621
ICDS centres	200	5230
TINP centres	777	45370

PTMGR- Puratchi Thalivar MGR; ICDS: Integrated Child Development Scheme; TINP: Tamil Nadu Integrated Nutrition Programme; * Women Association

(Source: District statistical office annual report)

14.3 District Rehabilitation Officer

Under the leadership of district rehabilitation officer, this office provides training and equipment to the handicapped persons.

15. Voluntary organizations

In this District numerous voluntary agencies are available of which the recognized are shown in table 11. Their main activities are awareness creation and disseminating health information.

Table 11 Volunteer Organization (rural) in Tiruchirappalli District

Name organization	Area of operation
SEVAI	Total Sanitation
Ramasamy Chella Babu trust	Generation of job
CARE	Awareness creation
Gramalaya	AIDS
CASA	Awareness & Generation of job
CROP	Awareness & Generation of job

(Source: District Health office report)

16. Discussion

16.1. Rural area

16.1.1. Block Primary Health Centres

There are 14 Block PHCs in the district and they are catering to the needs of approximately 100,000 population. The staff strength are similar to that of other PHCs except for one block medical officer, block health supervisor, community health nurse, block extension educator, Block health statistician and administrative staffs. The facilities available are laboratory, operation theatre (in nine block PHCs) and in-patient facilities. They are providing all the services expected from PHCs and in addition perform surgical sterilization as part of family planning programme and provide in-patient services. Although the block PHCs are expected to in-patient services, laboratory services, referral services and act as first referral unit (FRU), in practice, they are acting just as any another PHC because of lack of facilities and manpower.

The block PHCs are expected to act as referral hospital and cater the needs of 1 - 1.5 lakh Population. The facilities available are not sufficient for these to act as FRUs. The Block PHCs are not different from other PHC as far as manpower,

equipment and type of laboratory tests performed are concerned (Table 12). This indicates the failure of block PHC system. This is the one area where attention is needed for improvement for both physical facilities and manpower. In Tamilnadu there is a proposal to train the laboratory assistants at the block level PHCs and strengthen the laboratory facilities for performing hematological tests such as total leucocyte count, differential count, ESR and blood sugar.

Table 12. Different tests done in a Block PHC Laboratory, Tiruverambur, Tiruchirappalli District, 2001

Type of Specimen	No of Specimens	Number Positive
Blood Smear for Malaria		
Active	3001	Nil
Passive	1452	Nil
Sputum	370	22
Hb (for anaemia)	62	12
Microfilaria	341	NIL
Urine (sugar)	318	49

16.1.2 Primary Health centres

There are 48 PHCs with at least one Medical officer in the district. Each PHC caters to the needs of 30,000 population in plains and 20,000 in hilly and tribal areas. They are providing curative services, laboratory services to some extent, immunization, family health services including institutional delivery, referral services and disease surveillance activity at the institutional level.

16.1.3 Health sub-centres

There are 304 HSCs in the district. These HSCs together employ 301 female health workers and 156 male workers. Each female worker caters to the needs of 5,000 population in plains and 3,000 population in hilly and tribal areas. They are providing curative service for minor ailments and maternal and child health services including surveillance of vaccine preventable services and water and vector borne diseases.

There is sufficient number of female workers but the male workers are deficient up to 40% because the vacant posts are not filled up due to lack of trained workers after the Govt. of Tamilnadu stopped health inspector training.

Laboratory facilities are available in 22 out of 38 PHCs and in the entire 14 block PHCs in this District. The equipments available in PHC are the Hb test kits and the microscope. The tests commonly undertaken in PHC's, are peripheral smear for MP and MF, sputum examination for AFB, and the estimation of hemoglobin. Out of 48 PHCs, only 36 are having laboratory assistant (LA).

Table 12 shows the tests carried out in PHC in a year. The specimens were collected from 16,210 new OP cases who had attended the PHC during 2001. The data shows that more than 50% of the time is spent on blood smear collection and examination indicating the importance given to vector borne diseases. During discussions with MO and laboratory assistant at Tiruverambur PHC, they stressed the importance of providing more equipment at the PHCs, at least at the Block level to improve the services quantitatively and qualitatively. They also suggested that continuous and periodical training is essential to improve the efficiency of laboratory assistants. (This particular LA had under gone in-service training in 1995. After that, training for sputum examination was given during 2000 and no other training was given previously or after the sputum examination training.)

Table 13. Availability of lab equipment at various levels in rural area, Tiruchirappalli District

Level of services	**Equipment Available**	**Adequacy**
Health sub-centre	Hb testing Kid Urine testing Kid	Adequate
PHC	Above + Microscope	Adequate
C.H.C	Above All	Inadequate

Quality control for laboratory tests is ensured by cross-checking of slides (External), by supervision, and verification of records (Internal). Ten percent of the slides are sent for cross-checking, of which 5% is sent to zonal entomological team, Tiruchirappalli, 2.5% to Regional Deputy Director (Government of India located in Chennai) and the other 2.5% is sent to Institute for Vector Control and Zoonosis, Hosur.

M.O.s and Senior Grade Supervisors crosscheck quality of sputum examination both in urban and rural areas.

16.1.4 Taluk Level

There are about nine *taluk* and *sub-taluk* level hospitals (excluding teaching hospital) in the district. The taluk hospitals are supposed to act as referral hospital and cater the needs of at 2-3 lakhs Population. The facilities available are not up to the expectation of people to function as FRUs. The facilities available at this level are no way different from PHC level except some additional equipment for blood tests like T.C, D.C, E.S.R, and Blood sugar. The laboratory facilities are not available in 2 Taluk hospitals and the staff available are not adequate even for the available hospitals. The Taluk Hospitals are supposed to act as referral hospital and cater the needs of at 2-3 lakh population. The facilities available are not upto the expectation of people to function as FRUs. This is another area where attention is needed for improvement for both physical facilities and manpower.

17. Urban health

The organization pattern in Tiruchirappalli Corporation is as shown in figure 3. In Tiruchirappalli district, there is a corporation and 2 municipalities.

17.1. Tiruchirappalli Corporation

In Tiruchirappalli corporation, the public health department has two wings. One wing is the Medical wing that consists of health posts with medical officer and health workers. Their main activities are maternal and child health services including institutional delivery, immunization and reporting system of vaccine preventable diseases and acute diarrhoeal diseases in under five children. The health posts have sufficient Medical Officers (MO) but inadequate field workers.

The other wing is the Public health wing. Their main activities of the public health wing are registration of vital events (birth and death), implementation of National Programmes, monitoring the water quality and prevention and control of epidemics and reporting epidemic prone disease. Although one statistical assistant is available,

the data collection, compilations are not done regularly. They are not having adequate male health workers like in rural area for the reporting system activities.

17.2. Other Local Bodies

In Thuraiyur municipality, laboratory facilities are not available though the municipality has a maternity centre without M.O. In Manapparai municipality neither maternity centre nor laboratory facilities are available.

In Tiruchirappalli Corporation, there are totally 15 health care centers present but none of them has laboratory facilities. Under the urban malaria scheme (U.M.S,) the corporation has one laboratory exclusively for malaria, which is located within the corporation office complex. The DDHS has deputed 3 laboratory assistants to corporation .The laboratory assistants so deputed attend Government Hospitals at Tiruchirappalli, Srirangam and Golden rock railway hospital to collect passive smear, examine the slides after staining and report the result to corporation for treatment and preventive activities. Recently, under the RNTCP Programme, five laboratory facilities were provided to corporation to detect Tuberculosis bacilli.

17.3. Public sector Hospitals

17.3.1 B.H.E.L.hospital

This industrial Hospital has a well-equipped lab with blood bank staffed by, one MO and 12 laboratory assistants. They are doing all basic tests and in addition perform liver function tests, lipid profile, thyroid functions tests, culture and ELISA test. They are also doing biological analysis for water samples, which are periodically collected from the water supply system in their township area. Table 14 shows the tests under taken in this industrial hospital lab. This hospital caters to the needs of 20,000 families of present and retired employees. During 2002, they collected about 36 water samples and analyzed for biological contamination. The have internal and external quality control mechanism to maintain the quality of the tests done in the hospital.

Table 14. Available laboratory tests at BHEL and Railway hospital, Tiruchirappalli District

Available Tests
Urine culture
Stool culture
Sputum & Pus culture
ELISA Test for HIV
Test for HBV
Water culture (Biological)
All Bio chemical tests
Biopsy

17.3.2. Railway Hospital

The Railway hospital is another industrial hospital with lab facilities for doing all basic and other tests like B.H.E.L. hospital. This hospital to caters to the needs of 18,000 families. They are doing all tests as mentioned for the BHEL hospital list including water analysis.

17.3.3 Medical College Hospital

This is the reference laboratory to cater the needs of 3 Districts. As for as public health is concerned, they have facilities to identify all bacteria except anthrax, to do water analysis (only biological) and facilities to identify drug resistant bacilli. Athough, it was started five years back, the facilities available in this institution has improved so much that from the year 2003 onwards they have the facilities for diagnosis of Leptospirosis. All credit must go to microbiology professor who is having a keen interest to improve and provide quality services. He is also very much interested in epidemiology and reporting system.

He further said that even though they are having facilities; they are not getting adequate samples from clinicians and the facilities are under-utilized by the local bodies and public health departments. Because of his interest and the initiative taken by N.I.E and the FETP scholar, the health department is now utilizing the available facilities. For example, before starting the Medical College in Tiruchy, all the samples collected during outbreaks were being sent to the King Institute of Preventive Medicine located at Chennai. During his first Field posting, the MAE-FETP Scholar came across 3 Outbreaks of acute diarrhoeal diseases during 2002

and the author investigated the outbreak by sending the water and stool samples to the local medical college. Now the health department is sending the samples to Medical College for biological analysis. For the past two years, the laboratory has started doing stool culture for cholera and water analysis for its contamination. This year alone (2002), they have tested more than 30 stool samples and more than 40 water samples. Tables 15 and 16 show the different tests done at the medical college microbiology laboratory and staff available respectively. They do not have the facilities for chemical analysis of water and food and to identify viruses except H.I.V and HBV.

Table15. Different tests done at microbiological laboratory, Tiruchy medical college hospital in 2002 (up to September 2002), Tiruchirappalli District

Type of specimen	Specimens tested	Type of specimen	Specimens tested
Water Culture	50	Sputum for A.F.B	67
C.S.F Culture	44	H.B	93
Motion for Culture	36	V.D.R.L	587
Throat Swab culture	8	Blood Widal	793
Sputum For Culture	114	Theatre Sterility	38
Urine Culture	262	Theatre Swab	350
Pus Culture	559	A.F.B Fluorescent	57
Anaerobic	23	Fungal culture	2
Water Culture	50	Food analysis	4
Vaginal Swab	17	ELISA test	1204

Table16. Staff in microbiological &other laboratories in Tiruchy medical college and hospital, Tiruchirappalli District

Type of laboratory	Sanctioned Staff (Staff in position)	
	Doctors	Laboratory Assistant
Microbiological	8 (5)	6 (4)
Biochemical	6 (4)	8 (7)
Pathological	7(5)	7 (7)

Table17. Availability of lab equipment at various levels in urban areas

Level of services	Equipment Available	Adequacy
Taluk Hospitals	1) Microscope	Inadequate
	2) Culture Facilities	Not available
Medical College Hospital	1) Microscope	
	a) Monocular 54	
	b) Binocular 05	
	c) Dark ground 02	Adequate
	d) Fluorescent 01	
	2) Dissecting Microscopes	
	3) Bacteriology Loops	
	4) BOD incubator	
	5) Incubator	
	6) Centrifuge, ph meter, ELISA reader	

18. Referral system

Although well-organized health system is available in the rural and urban areas, there is no organized referral system functioning either for laboratory facilities or for the hospital services.

19. Private laboratories

Although data are not available about the physical availability of private laboratories, in Tiruchirappalli city alone there are five qualified microbiologists running well-equipped laboratories.

20. Health problems in the district

The main health problems in the district are both of communicable and non-communicable diseases. The types of diseases for which patients were admitted as in-patients (in the urban referral hospital) and for which patients had attended the out patients department (in rural primary health Centres) for the year 2001 are shown in figure 6. In the past 3 years, the district faced outbreak of acute diarrhoeal diseases, as shown in table 18.

Figure 6. Types of diseases for which patients were treated as inpatients or outpatients at urban referral and rural primary health centres respectively, Tiruchirappalli District, 2001

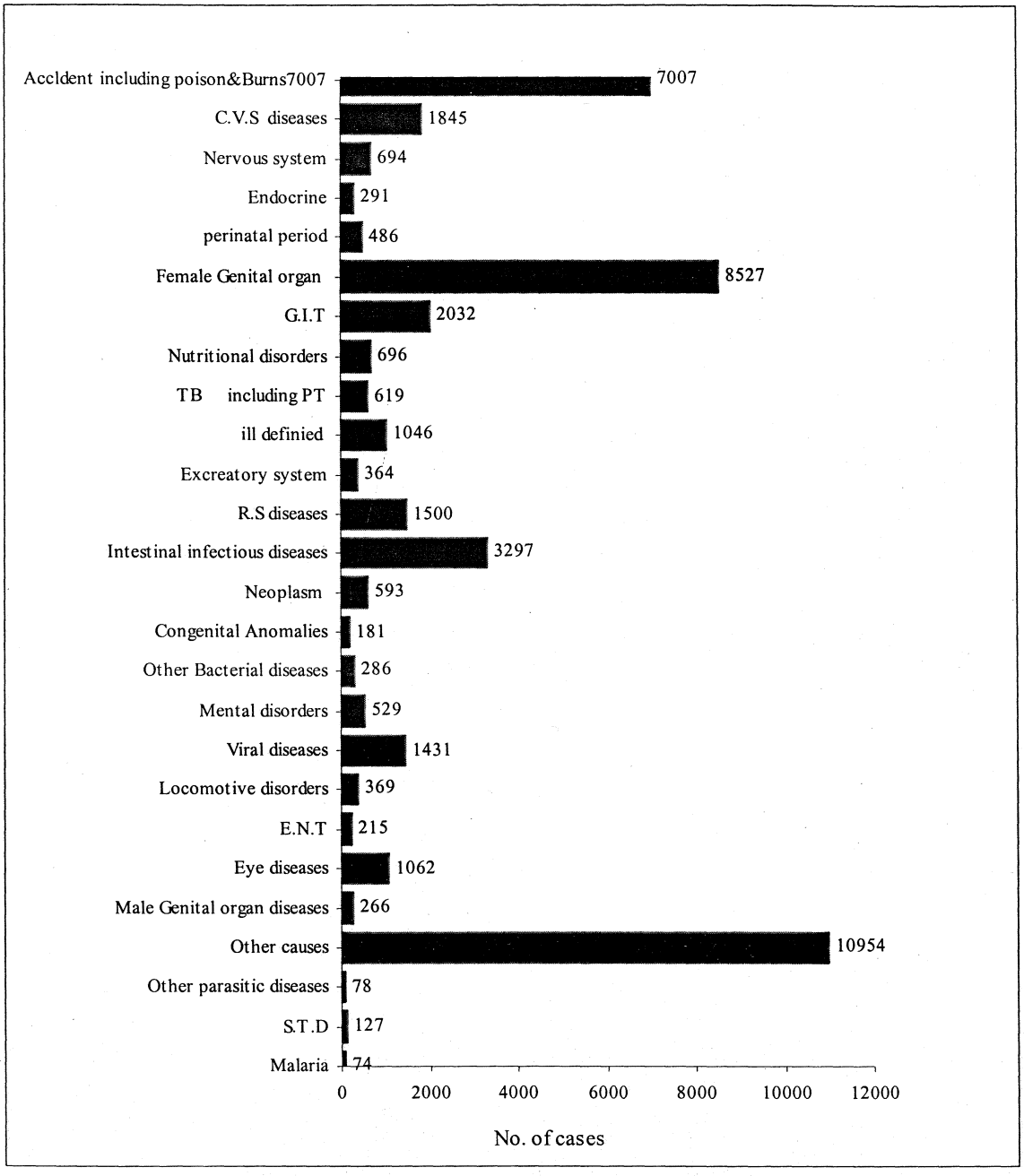


Table 18. Reported number of cases and deaths due to acute diarrhoeal diseases, 2000-2002, Tiruchirappalli, Tamilnadu.

Month / Year	2000		2001		2002	
	No. of cases	Death	No. of cases	Death	No. of cases	Death
Jan	10	-	10	-	8	-
Feb	96	-	35	1	24	-
Mar	26	-	27	1	14	1
April	153	8	18	-	44	-
May	20	1	39	-	68	-
June	66	-	22	-	167	5
July	13	-	29	-	211	1
Aug	10	-	14	-	83	-
Sep	25	-	24	-	57	-
Oct	3	-	15	-	21	-
Nov	14	-	26	-	29	-
Dec	3	1	14	-	-	-
TOTAL	440	10	273	2	726	7

21. Conclusions and recommendations

Although the facilities available are satisfactory, many areas need to be strengthened. The following recommendations are made to fill the gap.

1) Primary health care facilities in the urban area should be strengthened.
2) Laboratory facilities in the medical college hospital need to be improved to meet the local needs
3) Laboratory facilities in the block PHC and in Taluk hospitals need to be improved.
4) Duplication of work to be avoided by better inter and intra sectoral co-ordination
5) Services of the private sectors and other system of medicine need to be utilized in disease reporting system.
6) More stress on the quality control training with technical co- operation with NIE

Annexure-1

List of officers whom we have interviewed

1) Joint director of health services
2) D.D (H.S)
3) Dean, K.A.P.V.P.G.Medical College
4) Microbiology professor, K.A.P.V.P.G.Medical College,
5) D.D (T.B),
6) D.D (Leprosy)
7) D.D (F.P),
8) District social welfare officer,
9) District project nutrition officer,
10) District rehabilitation officer,
11) Deputy chief inspector of factories,
12) C.D.P.O. (I.C.D.S),
13) J.D animal husbandry
14) A.D statistics
15) Corporation health officer,
16) Chief medical officer, B.H.E.L; hospital,
17) Chief medical officer, Railway hospital
18) Senior entomologist, zonal entomological team,
19) District Siddha medical officer, (DSMO)

1.2 Description of existing surveillance system, Tiruchirappalli District, Tamil Nadu

1. Introduction

India is the largest developing country. Its population is more than one billion. In India, two transitions are taking place. The first one is demographic transition and the other one is the epidemiological transition. In India, though earlier success was made in controlling the communicable diseases, still communicable diseases are a burden for the community. In addition to the communicable diseases, morbidity and mortality due to non-communicable diseases are on the increasing trend adding double burden to this country. In order to monitor the disease trends and to assess the impact of national programme there must be some mechanism. One among them is the public health surveillance for communicable diseases. Epidemic occur very frequently but the system is not equipped to deal with these epidemic in a timely and efficient manner and this deficiency in the system necessitate for the communicable diseases surveillance system in this country.

Surveillance is the process of systematic collection, collation and analysis of data with prompt dissemination to those who need to know, for relevant action to be taken. A well functioning disease reporting system provides information for planning, implementation, monitoring and evaluation of public health intervention programmes. Surveillance of communicable diseases is part of public health reporting system, which in turn is part of the wider health information system. The objective of surveillance and use of the information determines the data collected and the speed of information flow within the system. Early warning of epidemics is essential for effective and rapid control, while information on endemic communicable disease is essential for monitoring the disease. Either way, information on priority communicable diseases is critical for control. Many countries have developed surveillance capacities to monitor diseases with a high burden, to detect outbreaks of epidemic-prone disease and to monitor progress towards national or international control or eradication targets. In this sense, surveillance of communicable diseases is a national function In addition to planning, the most important use of surveillance is to assess the trend of disease in the community and to forecast any epidemic by analyzing the data to take preventive and control measures. In order to describe the existing disease surveillance system in

Tiruchirappalli district, this study is undertaken. In the opinion of the investigator, the term 'reporting system' probably reflects what is happening in the field situation more closely than the term 'surveillance system'. Hence, throughout this report, the term 'reporting system' is preferred.

2. Objectives

The following are the objectives of this report:

1. To describe the existing disease reporting system system (both in rural and urban areas)
2. To identify any lacuna if present in the contest of disease reporting system and epidemic preparedness

3. Methodology

3.1. Study setting and scope

3.1.1. Urban area

In Tiruchirappalli district in the urban area, one corporation and 2 municipalities are available with a population of 8.5 lakh and the remaining areas are included in the rural category with a population of 16 lakh. In the urban area (Tiruchirappalli corporation, Thuraiyur and Manapparai Municipality) 15 corporation dispensaries and health post in the Tiruchirappalli corporation area, a municipal dispensary at Thuraiyur, a medical college hospital, one ESI hospital and one public sector hospital (Government of India undertaking), are available. Corporation and municipalities (Local bodies) are concerned with primary care and maternal and child health (MCH) care in addition to other main activities like maintenance of sanitation and provision of basic amenities. The preventive and reporting system activities are also their responsibility. Local bodies are responsible for implementing all National programmes in their areas.

The public sector hospitals like BHEL Hospitals, Railway Hospitals, and OFT hospitals are catering the needs of their own employees and their families and are having their own set of activities. They are providing mostly curative service and to some extend preventive services like providing immunization, safe water and monitoring of water qualities.

The Medical college Hospital and other Government Hospitals are not having any defined geographical area. They cater the needs of people of the surrounding areas Mostly they are providing curative services and referral services.

The National filaria control Programme (NFCP) is functioning separately under the control of Filaria officer whose head office is located at Kumbakonam in Tanjore District. In the Tiruchirappalli district, two Filaria control units are located within the Tiruchirappalli corporation area to cover a population of 50000 each with one Entomological assistant, 4 health inspectors, 4 laboratory assistants, 2 field assistants, and 20 field workers. Their main activities are night blood survey, examination the blood smear and treatment of +ve cases and collection, dissection and control of vectors

3.1.2. Rural areas

In this district, the rural areas form >70% with the population of 15.5 lakhs. For the Health care, the rural people mostly depend on the 48 Primary health centers, some private hospitals, the nearest Taluk hospitals, and the medical college hospital for referral services. The PHCs are having a defined population of 30000 within their defined areas. In addition to curative services, they are providing preventive and promotive services through the 305 HSCss with multipurpose health worker male and female. PHCs are the sole implementors of all National health programmes and are responsible for disease reporting system and recognizing, treating, controlling and preventing future occurrence of any epidemics

To evaluate or develop new reporting system, the knowledge about the existing surveillance or reporting system is necessary. Hence, this description of existing reporting system or reporting system is under taken

3.2. Data collection

This report is based on the secondary data collected from district health set up which includes

1. Data collected from the registers and records in Government health facilities including Tiruchirappalli Corporation

2. Interview with Medical officers at the PHC, Medical College and the laboratory technician at the PHC level
3. Interview of Corporation Health officer,
4. Interview of senior personnel in health related sectors like Animal husbandry, social welfare,
5. Discussions with District level officer s at the district health office

To describe the available reporting system one from each category of Government health institution like, HSCs, P.H.C, C.H.C, corporation health post was selected. The medical college hospital was also selected.

The data was collected from the registers and records in the selected Government health facilities. Interviews were conducted with the corporation health officer, the Medical officers in medical college, PHC, BHEL hospital, the village health nurse, and the laboratory technicians. At the district level, District officials were interviewed to understand the existing disease reporting system in the district.

4. Results and discussion

The following are the types of existing reporting system present in Tiruchirappalli District.

1. Weekly epidemic-prone disease reporting system (for e.g., cholera)
2. Reporting system for vertical National programmes
3. Monthly institution-based reporting system for specific disease conditions
4. Sentinel reporting system programme for HIV and Poliomyelitis

4.1 Weekly epidemic prone diseases reporting system

4.1.1. Disease prioritization

The main objective of developing this reporting system is to detect outbreaks early enough so that they do not spread to become epidemics. Some of the common epidemic prone diseases that are kept under weekly reporting system are namely acute diarrhoea, cholera and dysentery. The prioritiy for these diseases is based on

the morbidity and mortality that these diseases cause, the potential for epidemic spread and the feasibility of interventions.

4.1.2. Reporting units

The existing reporting units are the Health sub-centres (HSCs), Primary Health Centres (PHCs), Community Health Centres (CHCs) and referral Hospitals.

4.1.3.Reporting system process

The existing reporting system system is a mixture of active and passive reporting system. Data for the above diseases are collected through the passive reporting system process; the staff will collect the data when patients visit the Outpatient and Inpatient departments of the health institutions. The staff collect the data during their visit to the respective areas weekly.

4.1.4. Data transmission

Specifically for epidemic prone diseases, data transmission is done on a weekly basis.

4.1.5. Registers and Reports

Preformed registers and forms are available. The PHC level male health worker collects, consolidates, and sends it to district. If there is any sign of impending outbreak, they have to inform it to the district authority through electronic media and send the detailed report through first information report (F.I.R) form.

At the district level, three workers are assigned to collect the data from hospitals present in urban areas like Medical College hospital, Railway Hospital and other Government hospitals.

4.1.6. Response Mechanisms

A response team is available in the District. This team consists of a health inspector and two staff nurses. The team is provided with the possible resources, including a vehicle so that they are able to respond in the event of an outbreak at the earliest.

4.2. Vertical national health programmes

As per the guidelines of the programme, the data are collected. Some of the diseases that are under vertical programme are given below (Table 1). They have the preformed reporting format, which are being sent monthly.

Table 1. Reportable diseases under the vertical national health programmes

1. Neonatal Tetanus
2. Acute Respiratory Infection
3. Malaria
4. Dengue
5. Leprosy
6. Pertussis
7. Pneumonia
8. Japanese Encephalitis
9. Filariasis
10. Diphtheria
11. Measles
12. Meningitis
13. Tuberculosis

Besides the above-mentioned diseases, the other programmes, which require reporting, include Reproductive and Child Health (RCH) and School Health Programmes.

4.3. Monthly institution-based reporting system for specific disease conditions

In this system, the information is collected from the patients, when they visit the institutions for the treatment. The diseases included in this list are 65 in number. This list includes, communicable and non-communicable diseases and the frequency of reporting is monthly. The emphasis will be on collecting information to understand the morbidity and mortality profile of these diseases and to assess the impact of the control programmes. Some non-communicable diseases like Road traffic accidents also included here. The list of the diseases included in the monthly institution based reporting system is given in the annexure 1.

4.4 Sentinel reporting system programme for HIV and Poliomyelitis

4.4.1. Poliomyelitis

Selected hospitals are included in this programme based on the type of services and number of cases attending and facilities for managing the diseases. At present, 10 hospitals are sending weekly report about poliomyelitiis cases identified in their respective institutions.

4.4.2. HIV

Unlinked anonymous blood testing is undertaken to assess diseases load concentrating only on the high-risk group of sexually transmitted diseases out patient Department. The Medical College hospital is currently acting as the reporting unit. The report is sent directly to State AIDS control society only. The report is not sent to any other organization including the district health office, which infact is acting as Nodal centre for AIDS control Programme.

Existing reporting system in urban areas

In this district one corporation and two municipalities are present with a population of >8 lakhs. One of their functions is to monitor the communicable disease

The diseases under reporting system

The diseases commonly under reporting system are A.D.D, Malaria, filaria, T.B, leprosy, vaccine preventable diseases, and other water borne diseases.

Type of reporting system

Mostly of passive in nature and during epidemic, it is of active in nature.

1. Weekly epidemic-prone disease reporting system (for e.g., cholera)
2. Reporting system for vertical National programmes
3. Sentinel reporting system programme for HIV and Poliomyelitis

Case Detection, and recording

In Tiruchirappalli Corporation, health worker female and Sanitary Inspectors carry out, reporting activities. The female workers collect information about vaccine preventable diseases (VPD) and acute diarrhoeal diseaes (ADD) in under 5 children during their daily visit to the area and record their finding in their diaries. After returning to their office they copy the findings in their respective registers. The male workers [Sanitary Inspector (S.I)] similarly collect details on ADD during their inspection in their respective areas and record the finding in their diaries.

Corporation Health Officer (C.H.O) also deputes one SI to each of the institutions like medical college hospital, Srirangam Government Hospital, Railway hospital. They collect particulars about communicable disease of epidemic potential [for e.g., ADD, acute flaccid paralysis (AFP) and fever]. The CHO also deputes one laboratory assistant each to the above 3 institutions to collect blood smears from fever cases in the out patient departments. Some selected private nursing homes are sending disease reports especially the AFP to the corporation directly or through the sanitary inspectors

Confirmation

Blood smears and sputum collected for malaria and tuberculosis are examined by laboratory technicians and reported to CHO for further action. For other diseases like ADD, only clinical confirmation is done by individual worker and the concerned Medical Officer. Only during epidemic, they collect stools and send it to King Institute of Preventive Medicine (KIPM) laboratory at Chennai or to the Medical College laboratory for analysis. For poliomyelitis, they collect stools within 48 hours from the AFP patients admitted in the Medical college hospital and other private hospitals and send it to KIPM.

Reporting

During the weekly review meeting at the Health post, the female workers submit the data collected by them to the M.O.s. The medical officer after going through the weekly report gives feedback to the respective workers and in turn, submit the consolidated report of the health post to CHO during the M.O.s monthly review meeting. The male workers submit the report to the CHO during the S.Is' weekly review meeting. Figure 1 shows the flow of reporting system information in corporation.

Data Analysis, Interpretation, Feedback and dissemination

In the corporation, there is a statistical assistant (S.A) post is available whose responsibility is to collect all data from health post & male workers and analysis and interpret the consolidated data. Since present S.A is on long leave for past 1 year no analysis and consolidation is done

During the review meeting, feedback is given to field level workers and same report is disseminated to higher authorities like commissioner and Mayors and district health Officer and DPH but in reality except during epidemic it is not done regularly.

Supervision

Since most their time is spent on sanitation little time is left for other health activities like monitoring and supervision of work done by the health workers on National health programmes

Training

Training is given very rarely for the female workers like RCH training and no training is given to male worker after their induction into service. The training is the most important neglected part in the urban Local bodies.

Resources

The laboratory facilities are available only for malaria, filaria and TB at the corporation. The other specimens like stools, are sent to King institute of public health laboratory at Chennai or to the local Medical College.Computer and telephone facilities are available only at the corporation head quarters.

Figure 1. The flow of reporting system information in urban area

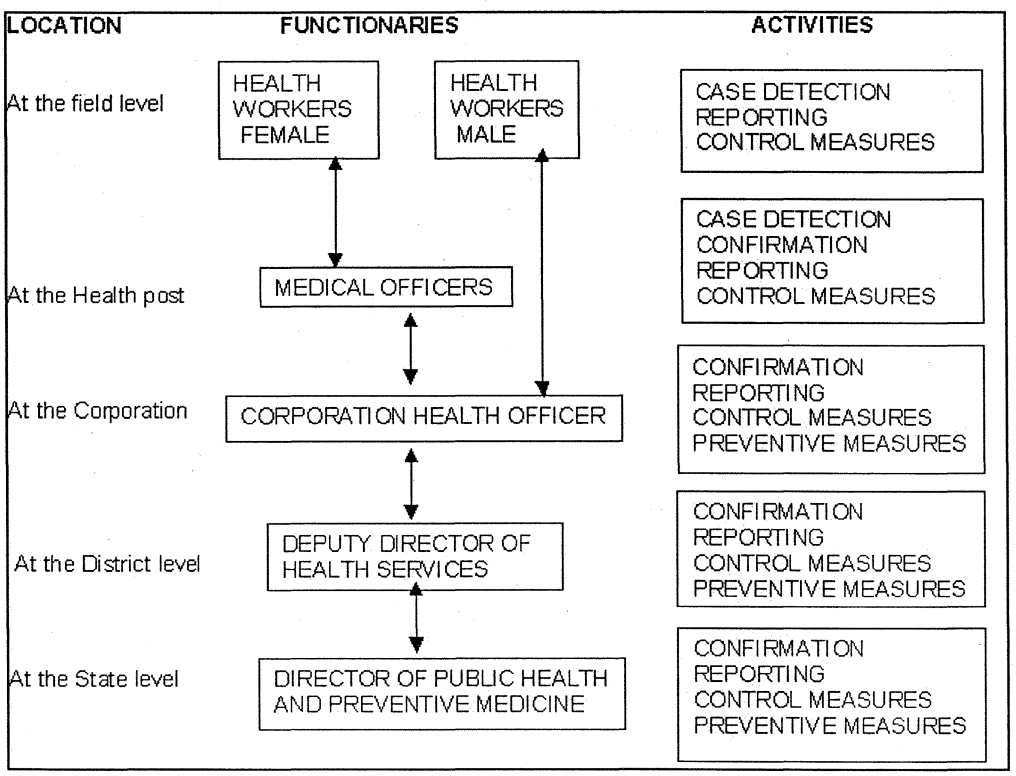


Table 2. Diseases and method of reporting system in Tiruchirappalli corporation area under vertical programmes

Disease	Periodicity of reporting system	Method of data Collection	Type of worker	Method of reporting	If any outbreak identified, Year
A.D.D.	Daily	Field visit & Hospital	SI & MPW	Written	Nil
V.P.D	Daily	Field visit & Hospital	SI & MPW	Form-9	Nil
Malaria	Daily	Blood smear	LA & MPW	Printed Form	Yes, 1999
Filariasis	Daily	Blood smear	LA in NFCP	Printed form	Nil
Food poisoning	As & when it occurs	Spot inspection	SI	Printed form	Yes, 2001
Other water-borne diseases	As & when it occurs	Spot inspection	SI	Written	Nil
Tuberculosis	Daily	Sputum Testing	L.A	Printed Form	Nil

(Source: Interview with corporation Health officer)

Shortcomings of reporting system activities in corporation areas

Tiruchirappalli is the newly created corporation (5 years old) by merging few municipalities and some panchayats. Although qualified public health officer and other qualified staff are available, reporting activities are not performing well. The staff strength is not enough to cover the entire population of the corporation. The staff is concentrating only on the old municipality areas of Tiruchirappalli and Srirangam and the remaining newly added areas are uncovered or under-covered.

In corporation area, instead of going for field level data collection, few male workers collect the data from the Government health institutions and then inform the same to CHO for further action. Others are not doing any reporting system activity, because most of their time is diverted to maintenance of sanitation; leaving little time for other

public health activities only if there is an outbreak, field level data is being collected. This is the status of the local bodies. Training is not given to male workers after their induction to the service.

Other municipality areas

Reporting system activities are not available in other municipal areas except for acute flaccid paralysis. Private and Taluk level hospitals are sending only the AFP reports and not any other report. Municipal commissioners usually do not have medical background. This is one of the limitations, since they are given responsibility to carry out public health activities including the implementation of National Health Programmes. Besides, the staff strength is rather inadeaute to carry out the assigned task of the local body. It would have been ideal to have a person with medical and preferably public health background as the chief of municipality health affairs with extra manpower.

Government hospitals

The hospitals directly send their reports to Directorate of Medical and Rural Health Services (DMS) since they are under the direct control of D.M.S. The Deputy Director of Health Services (DDHS), who is responsible for diseases reporting system system for the entire district do not receive any report from the hospitals. Hence, DDHS deputes one health inspector to each hospital on weekly or daily (as per the O.P size) basis to collect data on the communicable diseases and send the disease particular to the respective PHC's and the local bodies to take appropriate action.

As mentioned earlier, CHO, Tiruchirappalli deputes sanitary inspectors to Governmenthospitals and medical college hospital to collect data regarding communicable diseases, more particularly of water-borne diseases for taking control and preventive activities.

Medical college hospital

Medical College comes under the control of Director of Medical Education (DME). They collect data from their out and in patient departments but do not send any report to the district authority. Although it is the mandatory duty of the respective health

institution or hospital authority to notify the diseases to the district health authority as per T.N Public Health Act 1939, no institution is sending any report except the AFP report. The list of notifiable diseases included in the Act is given in the annexure 2). Hereagain, DDHS deputes one health inspector to Medical College hospital to collect data regarding communicable diseases and the same is reported to respective P.H.C. and the local bodies for taking appropriate action.

Private hospitals

As per the Tamil nadu Public Health Act 1939, it is the duty of every practicing medical practitioner to notify all the 21 noticeable diseases. Only after W.H.O. sponsored polio-surveillance Programme, many nursing homes started notifying for AFP cases. At present, 10 nursing homes are sending reports regularly.

Private laboratories

District health authority receives no reporting system report from any private laboratories. Even the laboratories attached to the Government hospitals are not sending any report. Except Government hospital laboratories, where data being collected by public health staff, no data is collected from any private hospitals and laboratories except for Polio.

SWOT Analysis of existing reporting system in urban area

Strength

- Organized setup
- Trained work force

Weakness

- Understaffing
- Inadequate and irregular, case finding, supervision
- Reporting system Analysis, Interpretation and Laboratory are inadequate
- Response mechanisms are inadequate
- Private Sector are not covered
- No Rapid response team
- Over burden with other activities like sanitation

- Inadequate training leading to non-understanding and haphazard approach to control of epidemic
- Poorly developed infrastructure for monitoring
- Poor record keeping leading to lack of analysis and interpretation of the collected data
- Lack of feedback system
- Number of vertical programs like NAMP/ RNTCP / NPEP/ HIV-AIDS are functioning independently leading to significant duplication of resources and poor interdepartmental coordination

Opportunities

- High literacy
- Private nursing homes
- Connectivity To All areas

Threats

- Poor perception by doctors
- Unorganized Private Sector
- Lack of inter and intra- sectoral co-ordination

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Existing reporting system in Rural areas

Types of existing reporting system in the rural area

1. Weekly epidemic-prone disease reporting system (for e.g., cholera)
2. Reporting system for vertical National programmes
3. Monthly institution-based reporting system for specific disease conditions
4. Sentinel reporting system programme for HIV and Poliomyelitis

Reporting system Activities for the Diseases of epidemic potential

Case detection

Vaccine Preventable Diseases and Acute diarrhoeal diseases

In the rural area, the female workers collect information regarding diseases during their daily visit to the areas; record their findings in their diaries. The female workers mostly concentrate on, vaccine preventable diseases (V.P.D.s) and ADD in under 5 children. The male worker, similarly, collects the information during their inspection.

They mostly concentrate on epidemic prone diseases like A.D.D, Malaria, and other vector borne diseases. The workers report their findings to the Medical officer during the review meeting, which is conducted weekly.

The Medical officers also depute one health inspector to nearby taluk and sub taluk hospitals to collect particulars like acute diarrhoeal and fever cases in the out patient/ in patient departments. Some selected private nursing homes are sending disease particular especially the AFP to the District health officer directly or through the sanitary inspectors. The P.H.C will send the consolidated report to the District office in the Medical Officers review meeting, which is conducted every month.

For Malaria

The male health worker collects blood smears (Active) from fever cases during their visit to the field and sends the specimen to PHC and to the Zonal Entomological team for analysis. In the PHCs, where the facilities are available, the laboratory technician collecta blood smears (Passive smear) from fever cases as per MOs advice. He analyses and report positive cases to M.O. The M.O in turn give instruction to the workers for providing radical treatment and preventive measures.

For Acute Flaccid Paralysis (AFP)

For AFP also, the workers collect stool specimens from the suspected patients after confirmation of AFP by the Medical officer or clinician or Reporting system medical officer within 48 hours and send it to KIPM at Chennai for analysis.

For other diseases of epidemic potential (Dengue, Leptospirosis and Japanese Encephalitis)

If the health workers during their field visit, come across any of the following features in their areas like clinical suspicion, increased number of fever cases or with clustering of patients or any death due to suspected fever or history of rat fall, they will inform the same to MO PHCs and to the district authority. Blood and other specimens will be collected from the suspected patients during the suspected outbreak (or) for any of the above diseases symptoms by laboratory technician and Medical officers. The collected samples will be sent to KIPM, Chennai, for analysis.

For the non-epidemic diseases (Tuberculosis, Filariasis, and Leprosy)

The health workers will collect blood smear for filarial disease once in a week and send the specimen to PHC and to the Zonal Entomological team for analysis. For leprosy, the PHCs will conduct a door-to-door survey once in a week and organize special camps once a year to identify leprosy and start the treatment at once. For tuberculosis, from the suspected patients who are attending the health institution sputum is collected, if the facility available, examination is doen by the laboratory technician within 1-2 days. Treatment is started if found positive, since the entire district is included in RNTCP.

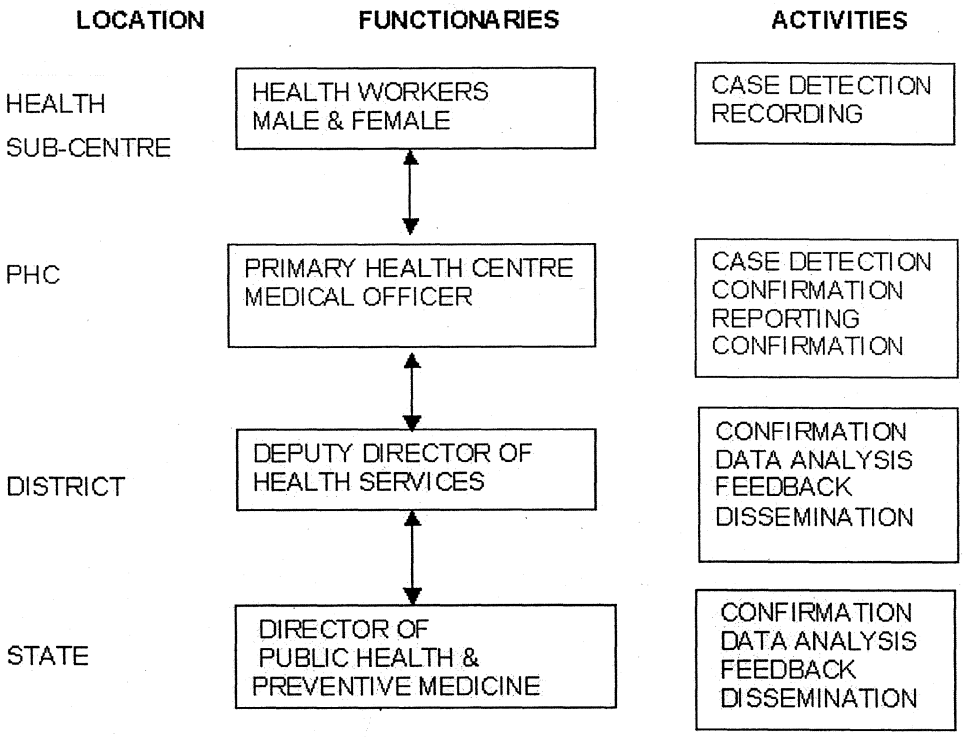
Confirmation

Blood smears and sputum collected from active and passive method, are examined by laboratory technicians and report to MO for further action. For other diseases like acute diarrhoeal diseases (ADD) only clinical confirmation is done by individual workers and Medical Officer concerned. Only during epidemic, they collect stools and send it to the local Medical College.

Reporting

During the weekly review meeting at the PHCs, the female and male workers submit their collected data to the M.O.s. The medical officer after going through the weekly report gives feedback to the respective workers and submit the consolidated report to the District health officer during the M.O.s monthly review meeting.

Figure 2. The flow of reporting system information in rural area



Data Analysis, Interpretation, Feedback and dissemination

In the district, an Assist director (Statistic), is available. He collects data from the primary health centre, private and other Taluk and district hospitals and urban areas and consolidates the district profile of disease and analysis and interprets the consolidated data at least once a month and prepares charts and graphs.

During the review meeting and during the district official's visit to the field, feedback is given to field level workers and to the Medical officers. Final district report is disseminated to higher authorities like DPH & PM and District collector, if asked.

Supervision

Unlike in urban area, there is no direct responsibility for the medical officers and other workers for sanitation. They have more time for health activities like preventive and promotive activities, monitoring and supervision, in addition to other activities like treating the out patients and referral services. Actually, the officers do little supervision and monitoring because of non-availability of vehicles and lack of motivation and supervision from their higher authorities.

Training

During the weekly PHC level review meeting at least one topic to be taught to the health workers by the medical officers and other supervisor as non-formal training. However, it is not done regularly. Except on special Programme, there is no definite formal and regular training programme available at the district level for the workers and to the medical officers.

Resources

The laboratory facilities are available only for malaria, filariasis and tuberculosis at all block and few primary heath center levels. For other diseases, the specimens like stools, and serum are sent to KIPM at Chennai.

Computer facilities are available at the district health office and telephone and vehicle facilities are available at the district head quarters and block PHC level and not in the Primary health centre.

Table 3. Disease reporting system activities at the HSCs and PHC level

Disease	Periodicity	Method	Type of worker	Method of reporting	Periodicity	Outbreak identified, Year
A.D.D	Daily	Field visit	M.P.W	Written Or oral	Weekly	Nil
V.P.D	Daily	Field visit	M.P.W	Form 9	Weekly	Nil
Malaria	Daily	Smear collection	M.P.W&LA	Proforma	Immediately	Yes, 1998
Filaria	Weekly	Field visit	M.P.W&LA	Proforma	Monthly	Nil
Leprosy	Weekly	Field visit	M.P.W	Proforma	Weekly	Nil
Tuberculosis	Daily	Sputum	L.A, M.O	Proforma	Weekly	Nil
Other water borne	When notified		MPW			
Dengue	Daily*	Field visit	M.P.W	Proforma	Daily	Nil
Japanese Encephalitis	Daily	Field visit	M.P.W	Proforma	Weekly	5 year back
Leptospirosis	Daily	Field visit	M.P.W	Proforma	Weekly	5year back

Outbreak Response functions in the district (both urban and rural)

The DDHS is fully responsible for outbreak response for the entire district including the urban areas, whereas, CHO is responsible for the Corporation area. Once outbreak is recognized, the response team along with PHC team inspects the affected area and takes control and preventive measures. Simultaneously, they start investigations. However, for past 3 years, except the investigation for two outbreaks during May and June 2002 by the MAE- FETP Scholar no other outbreak has been investigated systematically.

Short- comings

As for as staff strength is concern, it fulfills norms set for the rural areas except for male staff. Nevertheless, their reporting system performance is not upto the expectation. It needs much more improvement at least to identify the diseases of epidemic potential through routine reporting system. Table 4 shows the reporting system data of ADD for the last 3 year including epidemics but not a single epidemic is identified or recognized through reporting system system.

Table 4. Reported number of cases and deaths due to acute diarrhoeal diseases, 2000-2002, Tiruchirappalli, Tamilnadu.

Month / Year	2000		2001		2002	
	No. of cases	Death	No. of cases	Death	No. of cases	Death
Jan	10	-	10	-	8	-
Feb	96	-	35	1	24	-
Mar	26	-	27	1	14	1
April	153	8	18	-	44	-
May	20	1	39	-	68	-
June	66	-	22	-	167	5
July	13	-	29	-	211	1
Aug	10	-	14	-	83	-
Sep	25	-	24	-	57	-
Oct	3	-	15	-	21	-
Nov	14	-	26	-	29	-
Dec	3	1	14	-	-	-
TOTAL	440	10	273	2	726	7

SWOT analysis of reporting system system in rural area

Strength

- Sufficient female staff
- Organized setup,
- Trained Work force
- There is a Rapid response team
- Availability of an existing Disease reporting system system
- Availability of manpower/ infrastructure from periphery to centre.
- Reporting of communicable diseases on weekly/ monthly basis. Reporting channels are clearly established
- Outbreak reporting with the help of rumor register.
- Laboratory setup is available at district hospital.
- Ongoing vertical programs like NAMP/ RNTCP/ RCH/ NLEP/ HIV-AIDS are successfully implemented.
- Availability of training institutes at state & district level.

Weakness

- No case definition is available for all diseases
- Insufficient male staff
- Inadequate supervision and training
- Outbreaks are not recognized early due to lack of training and late reporting
- Analysis, Interpretation, and Laboratory are inadequate
- Private Sector are not covered
- Lack of co-ordination and linkages at various levels
- Too many reporting formats and records
- Duplication of work due to vertical Programme
- Record keeping and response mechanism are not followed in systematic way.
- Inadequate training leading to non-understanding and haphazard approach to control of epidemic situation

Opportunities

- Stabilizing population
- Increasing literacy and awareness
- Connectivity to ll areas by roads

- Information Technology revolution for easy communication

Threats

- High birth order
- Insufficient Employment opportunities
- Non-participation of community in planning Lack of co-ordination and linkages at various levels

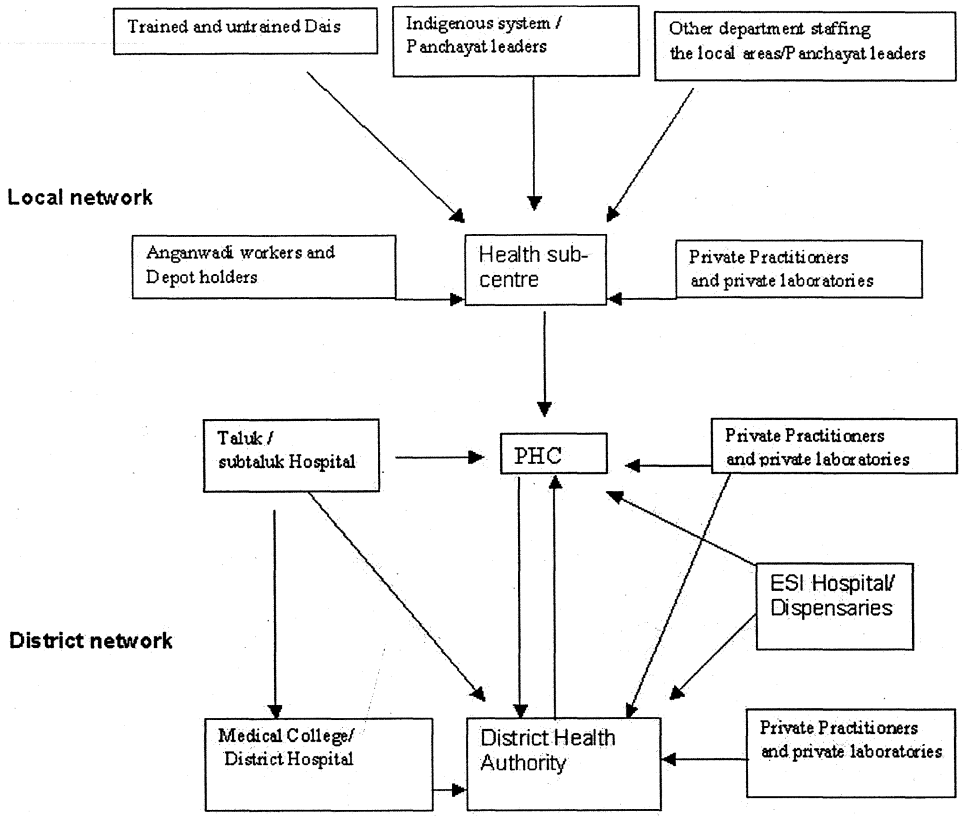
Other public sector hospitals

There are no reporting system activities in all the three public sector Hospitals like Railway, OFT, BHEL. They are not keeping any information or data for the disease of epidemic potential. They are not aware of reporting system activities except for AFP in railways and BHEL hospital and malaria for the railways hospital. Actually, the CHO sends a laboratory technician and health inspector to collect blood smear for Malaria and ADD particulars. The railway hospital and railway colony is located within the corporation area. Since corporation area is endemic for malaria, corporation health office is sending their staff to the railway hospital for reporting system of malaria and acute diarrhoeal diseases. However, there is no direct activity from the railway hospital except for the AFP like other Government hospitals.

Networking in the event of outbreaks

Net working is needed at the gross root level as well as at the district level not only at the time of epidemic but also for the control and prevention of epidemic prone diseases. The following network is recommended (Figure 3)

Figure 3. Networking at various levels for surveillance/reporting system



Level of integration and the challenges

Within the health department there are so many compartments are like directorates of public health, medical services, medical education, family welfare, ESI, Indigenous system of medicines. There is a Government order to integrate the DMS and DPH at the district level. The other problem in integration is the existing vertical programme. Though DDHS is practically implementing all health programmes in the district, he does not have the data for diseases like tuberculosis, since it is collected, & consolidated by another Deputy Director who comes directly under the control of DMS. This is the biggest challenge for integration. The other challenge is how to integrate & manage the existing programmes especially the programmes funded by international agencies like AIDS and RCH Programme. At what level integration to be done, is the problem i.e. is it at the district level or at the state level or at the gross root level.

The other challenge is in terms of dealing with public sector hospitals like BHEL, Railway and OFT Hospitals. So far, it is practically neglected and they are not maintaining any reporting system mechanism for themselves. Recent studies show

that >70% of the people are going to private hospitals and clinics both in urban and rural area for treatment. Without involving the private sector (including the indigenous system practitioners), the data collection will be an incomplete one. How to involve the unorganized and organized private sector is a biggest challenge for the reporting system system.

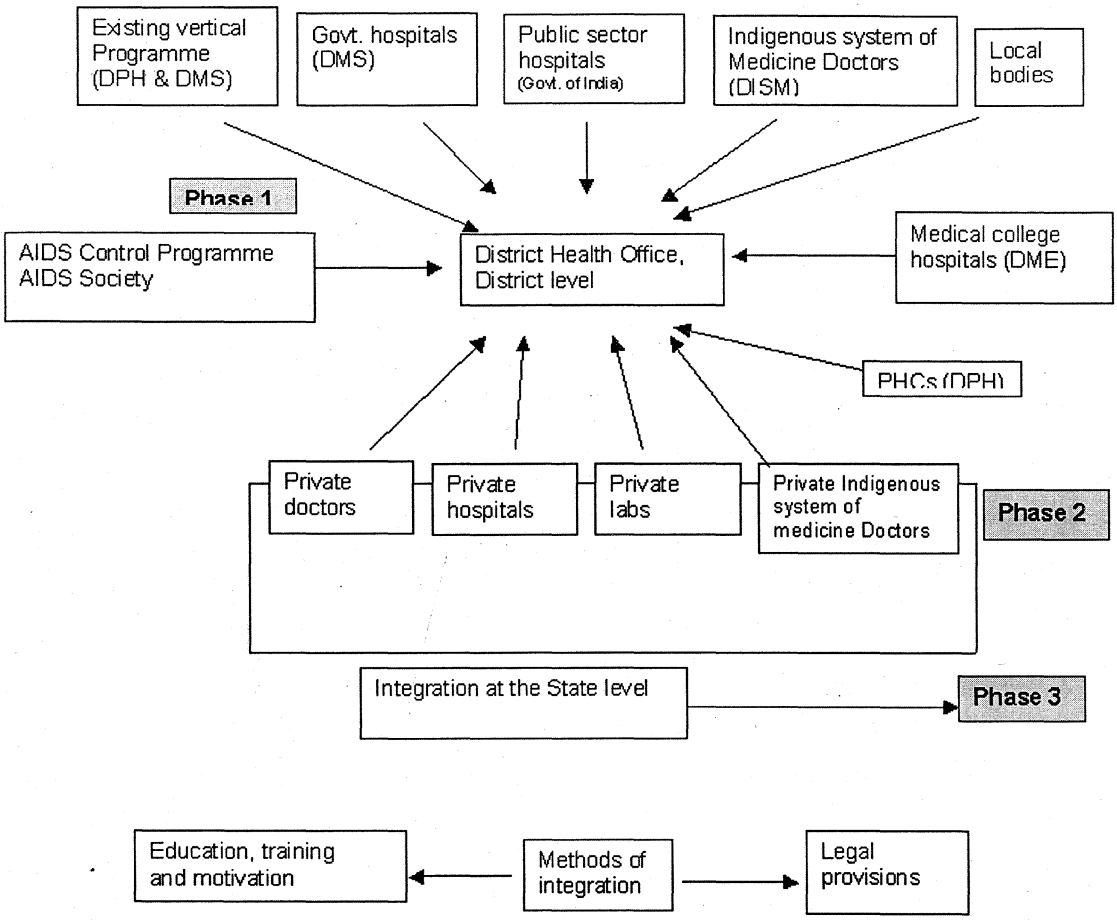
The recent trend of seeking alternative medicine for treatment like Ayurveda, Siddha, Unani, and Homeopathy system of medicines is ever increasing in both Government and the private sectors. Without involving, the indigenous system the data collection will be an incomplete one. How to involve the unorganized indigenous system is biggest challenge.

Another challenge is how to get the data from the private hospitals and laboratories. There are somany other issues like: Is it through the motivation or through legally and is it active one or a passive one.

A phased integration and methods of integration to overcome these challenges is recommended below (Figure 4):

1. At the district level integrating all the health compartments in phase1
2. Integration of all the private sectors in phase 2
3. Integration at the state level in phase 3

Figure 4.Recommended format for integration of governmental and non-govermental health related sectors for better reporting system



Existing deficiency/gap

To sum up the following gaps have been identified:

Manpower:

There is large vacancy as per the sanctioned norm for paramedical personnel (especially the male workers and laboratory technicians) leading to over burden of the work on limited available manpower.

Laboratory:

Laboratory services are inadequate in the rural area especially at the block level. Among the existing laboratories the infrastructure is poorly developed /utilized.

Communication facility

Telephone and vehicle facilities are not available below the district level in some of the health institutions. Even the computer facility is available only at District level

Training Facilities:

The training opportunities are inadequate and non-uniform. Inadequate training leads to non-understanding and haphazard approach to control of epidemic situation

Reporting system Mechanism:

The existing system is weak both in urban and rural areas and requires strengthening

Record keeping and response mechanism

At present record keeping and response mechanism are not followed in systematic way. There is little analysis and response. Lack of laboratory facility leads to delay in diagnosis of the disease condition. The reporting system of communicable diseases is somewhat fragmented along the lines of the National Programmes (targeting the control of Tuberculosis, malaria, polio and other vaccine preventable diseases). This results in unnecessary duplications and the loss of an opportunity for synergistic development of the reporting system system. The understanding of reporting format and of 65 disease conditions reported by PHC is inadequate in the reporting personnel. The proforma of reporting formats is frequently changed leading to confusion in reporting system. Unnecessary information leads to over burdening on the inadequate manpower.

Reporting system &Analysis

The weekly/Monthly report of communicable diseases mainly covers the PHC OPD data, hence cannot be considered as a useful data for establishing early warning signals in the field. Only limited analysis is apparently carried out. This consists primarily of tabulation of data from weekly reports in a ledger style register. The weekly trends of the diseases in individual district are not systematically examined by calculating the rates. It is not clear how epidemics situation are identified other than through direct verbal communications.

There is no coordination between government and non-government organizations. Poor information on epidemics, lack of laboratory infrastructure for water quality monitoring, irregular and inefficient reporting system has led to poor information on important health conditions. This in turn leads to increase in disease burden, mortality and wastage of resources.

At the Peripheral level (HSCs/ PHC/ CHC)

Data collection for more than 50 different conditions is done through passive reporting system leading to over burdening of the peripheral reporting system system. Furthermore, the following gaps have been identified:

- Lack of printed formats, case definition leads to poor quality of reporting
- Lack of electronic connectivity leads to delay in reporting
- Poor analysis and interpretation of the collected data
- Lack of pre-designed formats for epidemic reporting formats except cholera and ADD.
- Omission of private sector in data collection
- Inadequate laboratory infrastructure

At the District level

At the district level, the following gaps have been identified:

- Lack of analysis, interpretation and feedback on the collected data
- Separate data collection under vertical program implementation.
- Poor inter departmental coordination
- Lack of regular feedback
- Actions taken because of data collected by the reporting system are very rare

Conclusion and recommendations

Although a surveillance system exists, in practical it is only a reporting system. The methods of collection and its quality are not upto the expected level. The available case definitions are not applied in the field level because of inadequate training and equipment. Staff strength especially of male component is fast depleting resulting in inadequate reporting system. The head of the P.H.C. is a Medical graduate having little or no knowledge about the importance of reporting system. Their stay at P.H.C. is very short period. Whatever training they get, it is neither useful to them nor to the

community. Because once the training is over, they will either leave the P.H.C. for higher study or leave for urban hospital. In urban areas, though system is available; it is poorly implemented because of inadequate staff, in sufficient training and some administrative problems. It is clear that there is a data collection mechanism in place. However, there is scope for improvement in this. To be effective, the data collected needs to be analyzed and interpreted so that appropriate interventions can be taken. To strengthen the reporting system, laboratory support needs to be in place to confirm diagnosis. Finally, to improve the coverage of the reporting system, the private sector should be involved

Hence, the following suggestion is recommended

1) Staff strength to be improved both in urban and rural area.
2) Training on a continuous basis is to be strengthened.
3) Private hospitals, Public sector hospitals and laboratories should be included.
4) Supervision tobe improved.
5) Public health Act to be enforced in true spirit.
6) Decision makers to be motivated in such a way to understand the importance of reporting system.
7) Integration of all the existing Reporting system system and vertical programmes

Annexure

PHC MORBIDITY STATISTICSREPORT FOR THE MONTH OF

Name of the HUD/PHC:

Total OP Load	New Cases			Old Cases			Total Cses
	M	F	Total	M	F	Total	

S.No.	Diseases	New cases						Total New Cases	Death is any		
		Adults			Children						
		M	F	Total	M	F	Total		M	F	Total
1	Anaemia										
2	Vit 'A' Deficiency										
3	Vit ' B' Deficiency										
4	PEM / K Washiorkar / Marasmus										
5	**Eye**										
	a) Conjunctivitis										
	b) Cataract										
	c) Foreign body										
	d) Refractive error										
	e) Other Infections										
6	**Ear / Throat / Nose**										
	a) Foreign body I) Nose										
	ii) Ear										
	b) Hearing Defects										
	c) Middle Ear Infection										
	d) Tonsilitis										
	e) Sinusitis										
7	**Dental**										
	a) Caries										
	b) Gingivitis										
	c) Tooth Extraction										
8	**Skin**										
	a) Scabies										
	b) Exzema										
	c) Fungal Infection										
	d) Other Infections										
9	**Heart Diseases**										
	a) Congenital										
	b) Rheumatic										
	c) Congestive Failure										
	d) Ischaemic										
10	Hypertension										
11	Bronchial Asthma										
12	Pneumonia										
13	Other Respiratory Tract Infections										
14	Leprosy										
15	a) Rabies										
	b) Dog Bites										
	c) Other Animal Bites										
16	Snake Bites										
17	Scorping Sting										
18	Other Insect Bites										
19	Acute Diarrhoeal Diseases										

S.No.	Diseases	New cases						Total New Cases	Death is any		
		Adults			Children						
		M	F	Total	M	F	Total		M	F	Total
20	Reproductive Tract Infections										
21	Amoebiais										
22	Worm Infestation										
23	Typhoid Fever										
24	Viral Fever										
25	Other Fevers										
26	Japanese Encephalitis										
27	Accidents and Injuries including Burns										
28	Food Poisoning										
29	Chicken Pox										
30	Measles										
31	Whooping Couph										
32	Diphtheria										
33	Neonatal Tetanus										
34	Tetanus (Others)										
35	**Tuberculosis**										
	a) Children										
	b) Others										
36	POLIMYELITIS										
37	Other Neurological Complaints										
38	Diabets Mellitus										
39	Ulcers										
40	Jauneice										
41	Malaris										
42	Filaris										
43	Arthritis										
44	Asphyxia of New Born										
45	Cancer										
46	STD										
47	Urinary Tract Infection										
48	Pregnancy related disorders										
49	Goitre										
50	Dengue										
51	Menstrual Disorders										
52	Abdominal Colic										
53	Nephrotic syndrome										
54	Epilopsy										
55	Peptic ulcer										
56	All other causes										
	Total										

SURVEILLANCE REPORT ON NOTIFIED INFECTIOUS AND OTHER INFECTIOUS DISEASES

Details of reporting Units :

1. Name of the District :
2. Reporting for the Month:
3. Details of Reporting Units :

ANNEXURE - I

S.No.	Detsils of Instututions	No.Functioning	No.Reporting
3.1	Head Quarters Hospital		
3.2	Teaching Hospital		
3.3	Taluk Hospital		
3.4	Non Taluk Hospital		
3.5	ESI Hospital		
3.6	TB Hospital		
3.7	Leprosy Hospital		
3.8	Other Govt./Quasi Govt./Local body Hospital		
3.8.1.	Railway Hospital		
3.8.2.	Police Hospital		
3.9.	Other Private/Voluntary Hospital		
3.10	Primary Health Centre		
3.11	Health Sub Centre		
3.12	V.A.O.		
3.13	Others		

ANNEXURE – II **PROFORMA - II A**

DETAILS OF CASES AND DEATHS REPORTED DURING THE MONTH DUE TO OTHER THAN PREVENTABLE DISEASES

S.No.	Name of Diseases	During the month				Upto the Month			
		Case		Death		Case		Death	
		A	L	A	L	A	L	A	L
1.1	Polio								
1.2	Tetanus								
1.2.1	Neo-Natal								
1.2.2	0-28 days								
1.2.3	One Month to One year								
1.2.4	One year to 5 years								
1.2.5	Puerperal Mothers								
1.2.6	Other Age groups including								
1.3	Measles								
1.4	Whooping Cough								
1.5	Diphtheria								
1.6	T.B. including T.B. Meningitis								
1.6.1	T.B.within 15 years								
1.6.2	Other Age groups								

ANNEXURE - III **PROFORMA - II B**

S.No.	Name of Diseases	During the month				Upto the Month			
		Case		Death		Case		Death	
		A	L	A	L	A	L	A	L
2.1	Acute Diarrheal Diseases								
2.1.1	Less than one year								
2.1.2	One year to 5 years								
2.1.3	Other Age groups								
2.2.	Dysentery								
2.3	Cholera								
2.4	Enteric Fever Typhoid								
2.5	Infective Hepatitis								
2.5.1	Type – A								
2.5.2.	Type – B								
2.6	Influenza								
2.7	Dengue fever								
2.8	Leptospirosis								
2.9	Leprosy								
2.9.1	0-5 years								
2.9.2	5 - 15 years								
2.9.3	Other Age groups								
2.10	Chicken Pox								
2.11	Cerebro Spinal Fever								
2.12	AIDS								
2.13	Plague								
2.14	Rabies								
2.15	Encephalitis								
2.15.1	J.E.								
2.15.2	Others								
2.16	Malaria								

ANNEXURE - IV **PROFORMA - II C**

S.No.	Name of Diseases	During the month				Upto the Month			
		Case		Death		Case		Death	
		A	L	A	L	A	L	A	L
3.1	Acute Respiratory Infection								
3.1.1	Less than one year								
3.1.2	One year to 5 years								
3.2	Pneumonia								
3.3	Guinea Worm								
3.4	Kala Azhar								
3.5	Syphilis								
3.6	Gonorroea								
3.7	Filaria								

ANNEXURE - V **PROFORMA - II D**

S.No.	Name of Diseases	During the month				Upto the Month			
		Case		Death		Case		Death	
		A	L	A	L	A	L	A	L
4.1	Cancer								
4.2	Rheumatic Heart diseases								
4.2.1	Less than 5 years								
4.2.2	Other Age groups								
4.3	Diabetes								
4.4	Hypertension and CHD								
4.5	Congenital Malformation								
4.6	Snake Bites								
4.7	Drawning								
4.8	Accidents								
4.9	Poisoining								
4.9.1	Food								
4.9.2	Others								
4.1	Nutritional Deficiency								
4.11	Vit 'A' Deficiency								
4.12	PEM								
4.13	Endemic Goitre								
4.14	Catract								
4.15	Scabies								
4.15.1	Less than One year								
4.15.2	Other Age groups								

A.D.D./ Cholera Report Month

S.No	Particulars	During the Month	Upto the Month
1	No.of A.D.D. Cases Reported		
2	No.of Cholera Cases Reported		
3	No.of Stool specimen taken		
4	No.of Stool Potitive		
5	No.of Death		
	I) Male		
	II) Female		
6	No.of Water Source Chlorinated		
	I) O.H.T.		
	II) Well		
	III) Others		
7	No.of Anti-Cholera Inj.given		
8	No.of ORS Pocket issued		
9	No.of Houses disinfected		

Stock Position

S.No	Particulars	O.B.	Receipt	Used	C.B.
1	Bleaching Powder-in kg				
2	Phenyle - in Liter				
3	O.R.s. Pocket				
4	Anti - cholera Inj. In Doses				

TIRUCHIRAPPALLI HEALTH UNIT DISTRICT ADD CASES ATTACKS ADD DEATHS MONTHLY REPORT FOR

Name of PHC	Affected		Total No.of incident done				Stool Specimen				No.of water sources chlorinated						Fly control measures taken	No.of houses disinfected		No.of Anti Cholera Vaccine Done		No.of ORS Pockets issued	
	Village	Pop.	ADD Cases				Taken		Positive		During			Upto				During	Upto	During	Upto	During	Upto
			During		Upto																		
			Cases	Death	Cases	Death	During	Upto	During	Upto	OHT	Well	Others	OHT	Well	Others							
1	2	3	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

PROFORMA - II

Monthly Report on Rural Filariasis Night Blood Survey in Village Diseases & Filaria

Month:Januaryr-2002

Sl.No.	Name of PHC	Mid Year Population of PHC 2002	Name of Hsc	Name of Village	Village Population	No of Person Examined	No.of diseases manifestation cases treated	Diseases rate of village	No of B.S. Coll. & Examined	No of M.F. treated	M.F. Rate for village

State: Tamil Nadu **HUD:** **Dist.:**

Sl.No.	Name of PHC	Population	Active			Passive			Mass & Contact			Total			ABER	API
			BSC	BSE	Pos.	BSC	BSE	Pos.	BSC	BSE	Pos.	BSC	BSE	Pos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1																
2																
3																
4																
5																
Total																
QBC																
HUD Total																

Annexure2.

Strengh of reporting system workers in Tiruchirappalli district:

Level	Staff sanctioned	In position
Rural	Male: 304	Male: 150
(>16lakhs population)	Female; 304	Female; 302
	S.H.N: 49	47
	B.H.S: 14	14
	C.H.N: 14	14
	L.A: 38	37
	M.O 74	
URBAN (>8lakhs population)	M.P.W;	21
	M.A:	3
A) Tiruchirappalli Corporation	S.I: 60	15
(7.47 lakhs)	L.A: 3	3
	(Under U.M.S)	
B) Thuraiyur municipality (46000)	M.P.W 1	1
	S.I: 4	3
C) Manapparai municipality (40000)	S.I 3	3
D) NFCP (1Lakh population) Urban areas only	E.A 1, H.I 4	No vacancy at present
	L.A 4, F.A2	
	Worker 20	

1.3. Analysis of secondary data

1.3.1. Pattern of diseases among out-patients at rural primary health care centres and in-patients at a referral hospital, Tiruchirappalli district

Introduction

The recent estimates of the global disease burden that have attracted the attention of epidemiological researchers and policy makers represent a quantum leap in both the sophistication and the coverage of earlier work on disease patterns. The newer estimates also have a different focus: the population of the world as a whole, rich as well as poor, rather than the global poor alone. This shift in focus has produced a lack of congruity between burden of disease estimates and the global health policy statements that they are intended to support. While the focus of epidemiological analysis is shifting toward the population of the world as a whole, most prominent global health policy statements continue to emphasize the importance of improving the health of the global poor. This lack of congruity is of much more than simply academic interest, because, as will be seen, disease patterns vary systematically across social class. The pattern of diseases prevalent among the global poor differs from that of the population of the world as a whole, and global averages are therefore unreliable guides for programs directed at this specific sector of the population. Instead of relying on global averages, policy makers wishing to undertake programs oriented toward the needs of the global poor need information specific to the poor. (The Burden of Disease between the Global Poor Davidson R. Gwatkin and Michel Guillot -The World Bank)

India is the most populous country. Like many developing countries, India faces difficult choices in allocating limited financial resources to its people's health needs. India is administratively divided into states, districts, and taluks. Within and in between the states, people divide themselves based on their religion, caste, language, and economic and educational status. Moreover, population distribution is more concentrated in urban area than rural area. Therefore, it is very difficult to allocate the scarce resource as per the health needs of the people. There are many ways to over come these problems. One among them is the analysis of secondary data to assess the disease load in the community. Based on the disease load, we

can prioritize the problem and allocate the resources as per the prioritization. In order to assess disease load in a district, this analysis of secondary data is undertaken.

Objectives

1. To interpret the morbidity, mortality pattern and the trend of diseases in a district by analyzing pre-existing data
2. To recommend meaningful public health actions based on the observation
3. To develop skill in analytical epidemiology by integrating epidemiologic, statistical and computer resources appropriately

Methods

Data sources:

This report is based on the secondary data collected from district health set up which includes

1. Data collected from the registers and records in Government health facilities including Tiruchirappalli Corporation
2. Interview with Medical Officers at the Primary Health Centre (PHC), Medical College and the laboratory technicians at the PHC level
3. Interview of Corporation Health Officer
4. Discussion with District level officers at the district health office

The data available in the office of the Deputy Director of Health services and the Medical College hospital was taken for analysis. For the first part of the report, the morbidity data for the year 2000 in rural areas and inpatients' data from Medical college Hospital for the year 2001 is considered. For the trend analysis, under five mortality for the years 1995 –2002 is considered.

Results and discussion

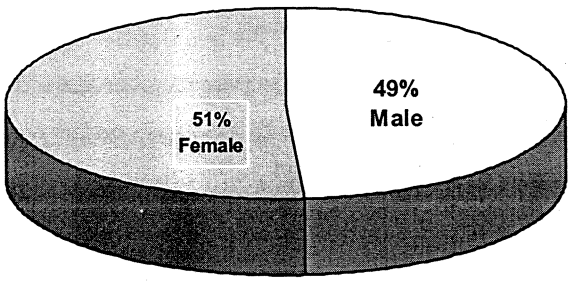
Analysis of morbitity pattern in rural area

Sex distribution of cases

For the year 2000, there were about 3,88,973 cases attended out-patient department (OPD) in PHCs. Fifty one percent were females (Figure 1). Among the

total cases, children alone formed 37%. Of which 18% were female children and 19% were male children. The above data indicated that more female cases were attending and utilizing the Govt. health facilities than male patients in rural areas.

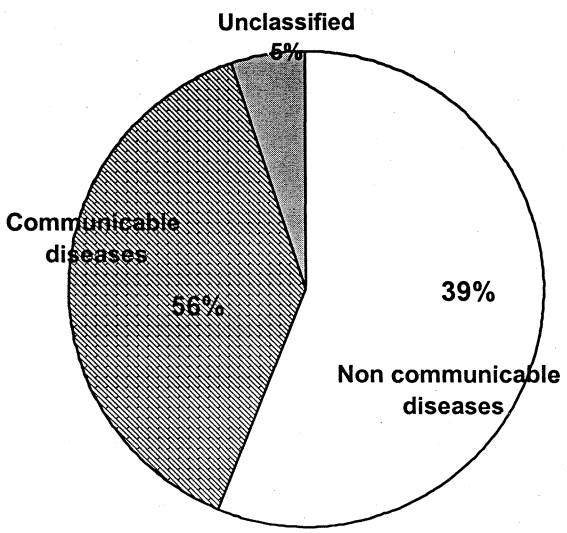
Fig.1 Distribution of out-patients attending rural PHCs by sex, Tiruchirappalli, 2000



Type of patients attending rural PHCs out-patient department

Among the total cases, 56% were communicable diseases, 39% were non-communicable and 5% were unclassified diseases (Figure 2) indicating communicable diseases were still dominating health problem of rural community.

Figure. 2 . Type of diseases in rural hospital out patient department, Tiruchirappalli, 2000.



Pattern of communicable and non-communicable among those attending OPD:

Among the communicable diseases, (Figure 3) Infectious diseases like viral fever, acute diarrhoeal diseases and skin diseases formed 70%. Among the non-

communicable diseases, (Figure 4) Nutritional Deficiency Disorder (33%) and Gastro Intestinal Disorder (19%) formed little over 50% of total non-communicable diseases. In general, infectious diseases, skin infections and nutritional deficiency disorders formed >50% of total out-patient in rural area.

Figure 3. Pattern of communicable diseases among out-patient attendees, rural PHCs, Tiruchirappalli district,2000

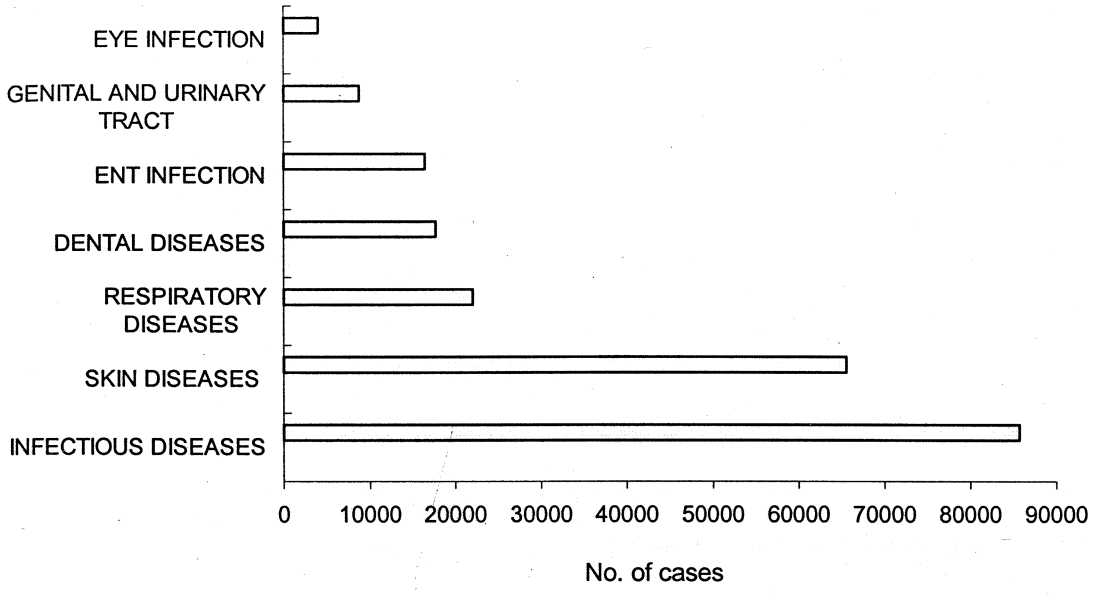
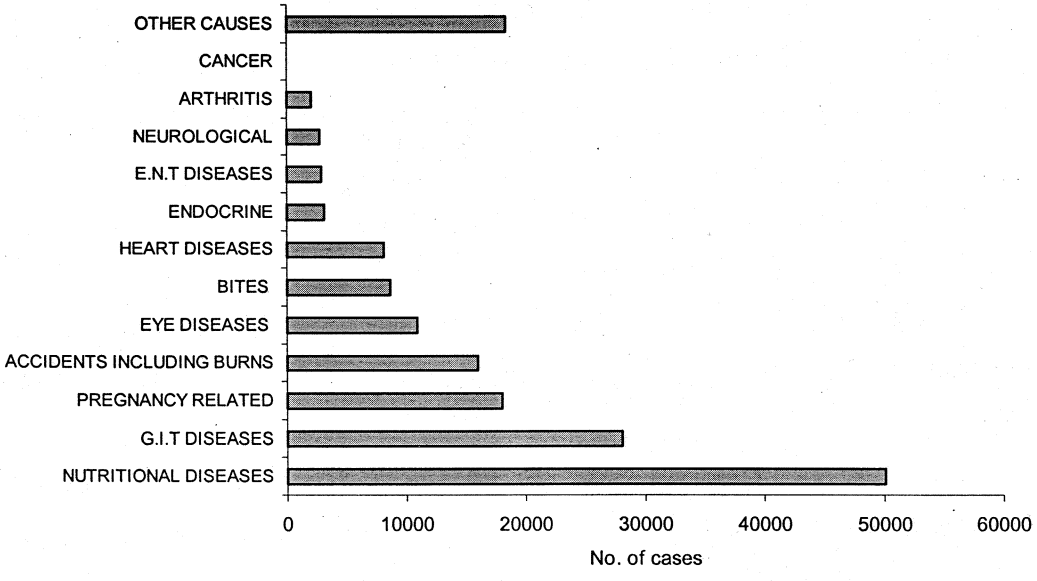


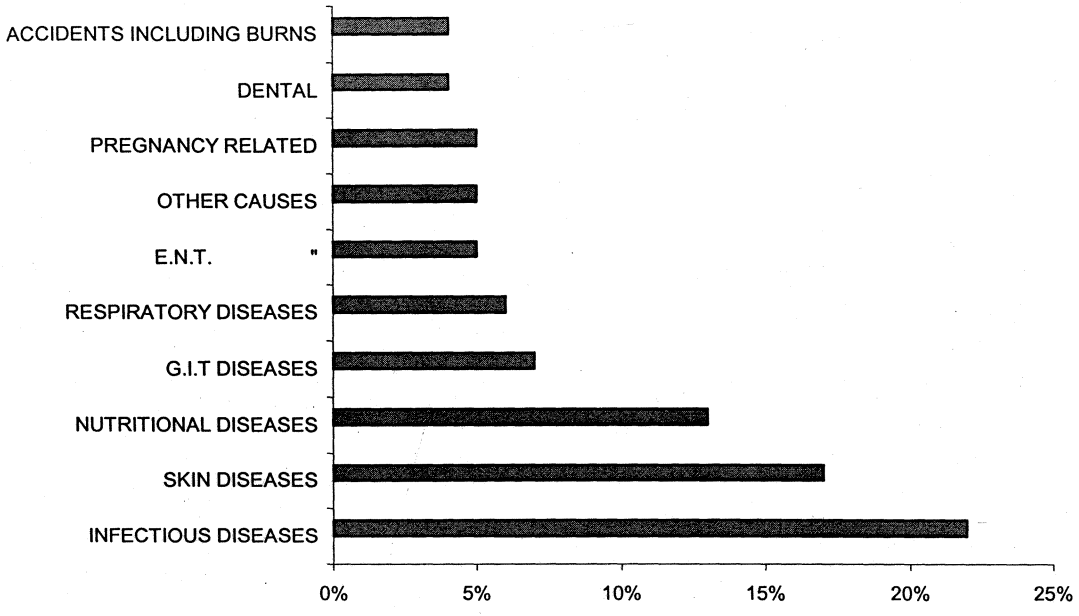
Figure 4. Pattern of non-communicable diseases among out-patient attendees, rural PHCs, Tiruchirappalli district,2000



Top ten diseases

Among the top ten diseases, infectious diseases topped first rank followed by skin diseases, nutritional and gastro-intestinal diseases (figure 5).

Figure 5. Top ten diseases among out-patient attendees, rural PHCs, Tiruchirappalli district,2000



Top ten diseases by sex

Among top ten diseases in male, infectious diseases topped the list followed by skin diseases and G.I.T diseases. Among females, again infectious topped the list, followed by skin diseases, nutritional diseases and 4th one was pregnancy related diseases. The above analysis indicated that in rural area or in P.H.C OPD, infection related diseases were still main health problem for which patients seek health care. It appears that for chronic diseases are less reported at OPD of rural PHCs. It may be that patients with chronic diseases are directly attending referral or private hospital. Among diseases pattern by gender, there was not much difference.

The infectious diseases topped first rank (25%) followed by skin diseases, (16%) and nutritional disorders (13%) among children. There was not much difference between male and female children either in the pattern of diseases.

Pattern of injuries in rural PHCs out-patient department

Among the injuries accident form the major portion of out patient department in rural area than any other injuries. The other type of injuries was animal and insect bites.

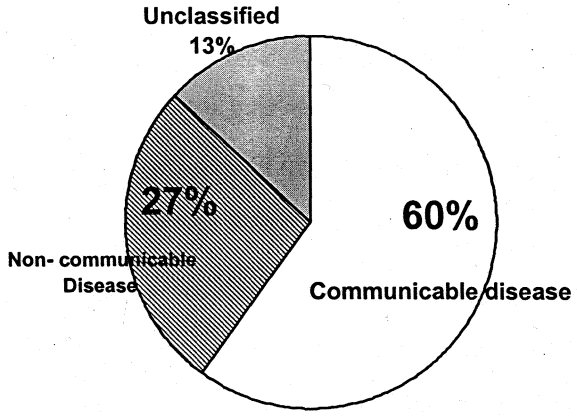
Analysis of pattern of admission and deaths in a referal hospital

This reference hospital caters the needs of three neighbouring districts for referral services. For the year 2001, there were about 44,569 cases admitted in the Tiruchirappalli Medical College Hospital and were about 486 deaths recorded.

Pattern of cases admitted in the medical college hospital

Among the total cases, 60% formed non-communicable diseases, 27% formed unclassified diseases and communicable diseases formed only 13% (Figure 6). This pattern of diseases indicated typical referral or tertiary care hospital pattern where more chronic and acute emergency cases were referred and admitted.

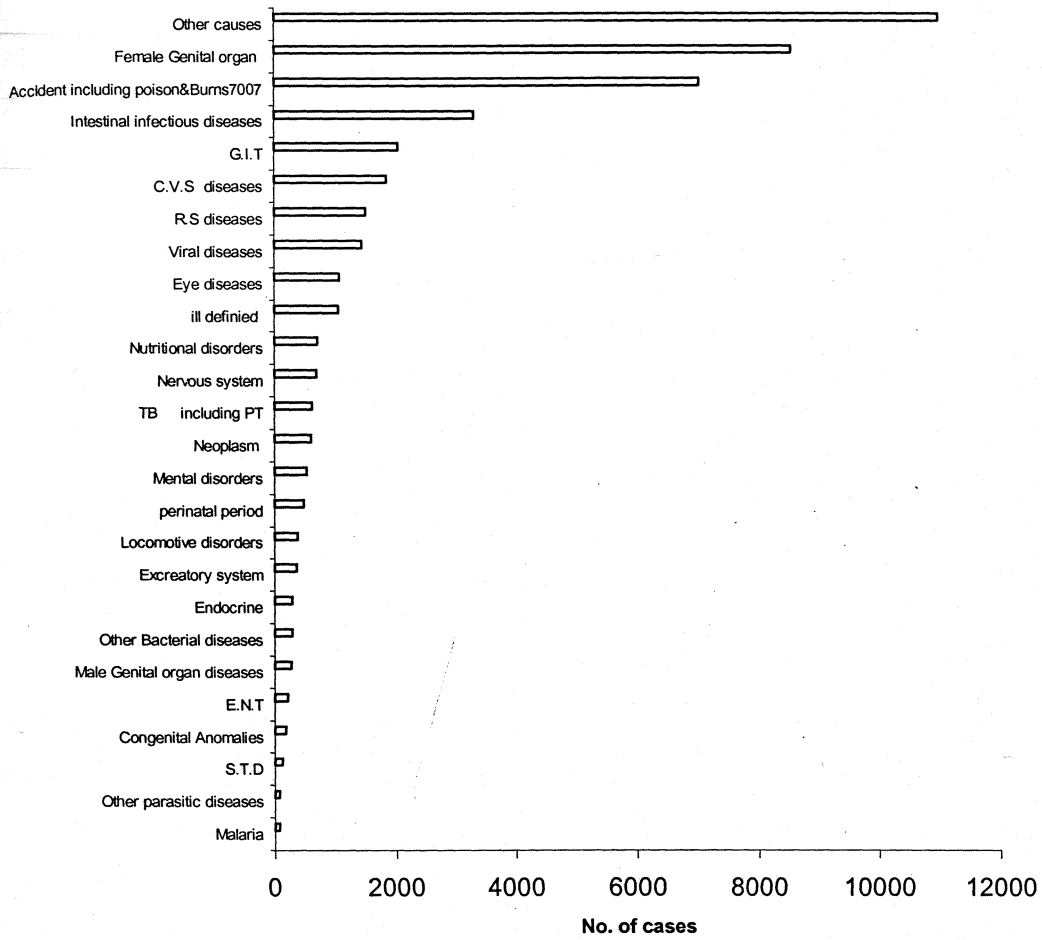
Figure 6. Type of cases admitted in referral hospital,Tiruchirappalli, 2001



General pattern of admission in a referral hospital

The common cases admitted in the medical college hospitals varied from unknown and other causes to infectious diseases like malaria (Figure 7). The other causes formed 1st rank in admission with 25%, pregnancy related admission formed 2nd rank with 19%, accident formed 16% followed by intestinal infectious diseases, GIT Disorder and Cardio-vascular disease 7%, 5% and 4% respectively. This pattern of admission indicates typical pattern of admission in a referral hospital.

Figure 7. Distribution of patients admitted in a referral hospital, Tiruchirappalli, 2001



Pattern among communicable and non- communicable diseases

Among the communicable diseases, admitted in the reference hospital during 2001, intestinal infection formed (54%) followed by viral diseases (23%), T.B (10%) and other bacterial infection (5%) of total communicable diseases. Among non-communicable diseases, normal vaginal deliveries and abortion formed 30%, followed by Accidents (25%), G.I.T (7%) and cardio-vascular diseases (6%) indicating typical referral hospital pattern.

Mortality in the referral hospital

The proportional mortality the inpatients was 1.8% in general. For the non-communicable diseases, it was 2.6% where as for the communicable it was 5%. Among the total deaths, 94% was due to non-communicable, 4% was due to communicable diseases, and the unclassified deaths formed only 2%.

Pattern of deaths in hospital in-patients.

Pattern of deaths in communicable diseases

Among the communicable diseases admitted in the hospital for treatment death due to tuberculosis formed 51% followed by intestinal infection 22% and other bacterial diseases 16% indicating the importance of early diagnosis and effective case holding and management of Tuberculosis.

Pattern of deaths in non-communicable diseases

In the non -communicable diseases 60% of the deaths was due to accidents. This was followed by Cardio-vascular diseases(11%), neurological diseases (8%), post-natal causes(9%), Pregnancy related causes (5%). In the non-communicable section, next to accidents, it was the pregnancy related deaths including post natal death forming 14% indicating more deaths in female which were preventable by using available simple cost effective methods.

Case fatality ratio

Among the all causes, it was the endocrine disorder having high case fatality ratio (CFR) (16%) followed by neurological diseases (9%), perinatal causes (8%), accidents including poisoning & burns (6%). This indicates that most case fatality was in the non-communicable diseases category. Among the communicable diseases, it was the T.B, which topped with 2% CFR indicating the importance of effective implementation of control programme.

Limitations of hospital based data

In government hospitals, data are available but for current and for the previous year only. The available data are not helpful for analysis except the data from Medical

College. Patients admitted in the medical college hospital are referred patients and represent patients with more serious nature of illness; hence, one cannot extrapolate these findings to the general population. Moreover, this is numerator analysis only.

Limitations of OPD data

1. The weekly / monthly report of communicable diseases mainly covers the PHC /district OPD data, hence cannot be considered as complete data. The data collected by health worker in the field is not included in the monthly morbidity report. Non-reporting / under-reporting units in any one-week may lead to serious problems in understanding the disease pattern in the non-reporting units.
2. Large vacancy of sanctioned norm for medical and paramedical personnel especially of male component leading to over burden of the work on limited available manpower, which may indirectly affect the quality of data collection
3. Laboratory services are inadequate in the rural area and it may affect the diagnosis and trend analysis of any diseases

Non-inclusion of data from private sector

Recent studies showed that more people are seeking health care from the private health sectors than the Govt. sectors and so without the data from the private sector it is not easy to assess the trend of diseases

More people are seeking health care in the health facilities available in urban areas including private, govt. and other system of medicines. So it is very difficult to analyse the trend in rural and urban area with the available data and the existing system of data collection methods. The private health sector is concentrated in the urban area and they are not covered for reporting system while the rural area is largely dependent on the public sector, which may affect the quality of data and the analysis

Patients' seeking health care from indigenous systems of medicine

Now a days more people are using alternative system of medicine for their health problem. At present, the data collected in the indigenous system of medicine section

in the Govt sector is not included in the allopathic system data collection and reporting system methods .So without the inclusion of this data the analysis will be incomplete both in rural and urban areas.

Non-inclusion of data from other public sector hospitals

Non inclusion of other public sector hospitals like B.H.E.L, O.F.T, E.S.I, Railway hospitals might not indicate the real picture of diseases problem/ pattern in the community since they are providing heath care to their well defined population i.e. their employees and their family members.

Duplication in the existing reporting system

The existing system is weak both in urban and rural areas. At present record keeping and response mechanism are not followed in systematic way. Lack of laboratory facility leads to delay in diagnosis of the disease condition. The reporting system of communicable diseases is somewhat fragmented along the lines of the National Programmes. This results in unnecessary duplications. The understanding of reporting format for 65 disease conditions reported by PHC is inadequate which may affect the quality of data and the analysis.

Conclusion

Despite knowing the importance of data collection and its analysis, it is still not given due importance not only at the administrative level but also at the technical level leading to poor quality of existing reporting system or monitoring system. It needs to be improved. Moreover, analysis ise not done regularly and monitoring and feed back are taken care at the P.H.C level or at the District level rarely. Hence, to have good quality data the above two activities need to be taken care of.

1.3.2 Trend analysis of under-five mortality,Tiruchirappalli district, 1995 - 2002

Background

The under-five mortality rate is the probability of dying between birth and exactly five years of age per 1,000 live births. Nearly 11 million under-five deaths occurred in 2000, most of them in sub-Saharan Africa and South Asia (Table 1). (UNICEF, 2001). For industrialized countries, the data come from vital registration systems; for many other countries, where the majority of under-five deaths occur, the data are derived from censuses and household surveys. (Source: UNICEF, 2001).

Table 1. Under-five deaths by region, 2000

WHO Region	%
Industrialized countries	1
CEE/CIS	2
Latin America/Caribbean	4
Middle East/North Africa	6
East Asia/Pacific	13
South Asia	34
Sub-Saharan Africa	40

Source: UNICEF, 2001.

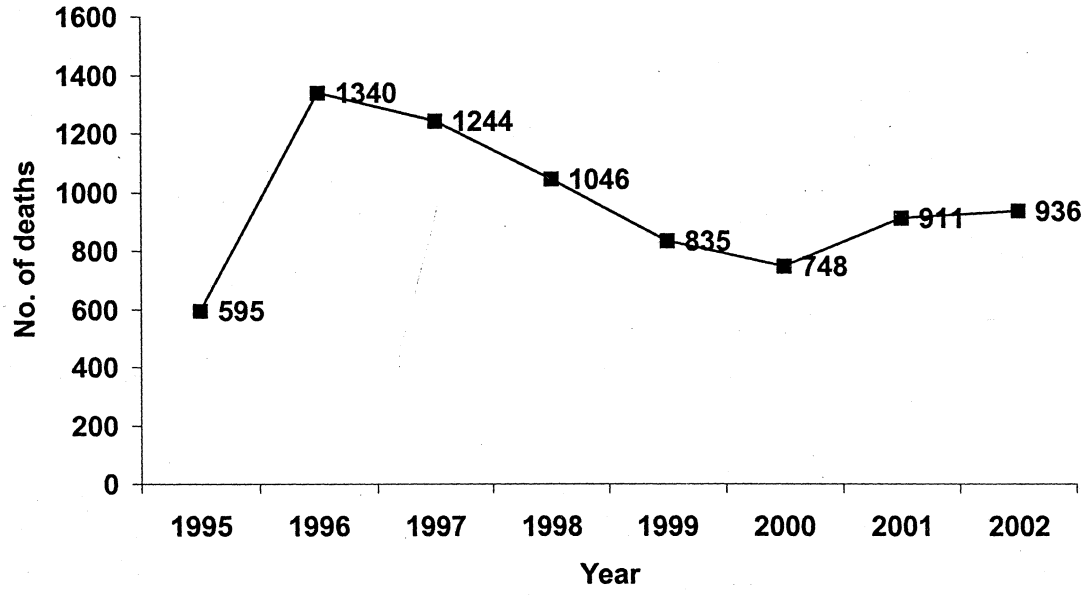
Estimates of under-five deaths by cause are important for targeting interventions to reduce child mortality and to monitor progress. Although the total of under-five deaths is relatively well known, the proportion related to each cause is much more uncertain and hence no numbers are used on the chart. There are several reasons for this. First, vital registration systems that provide cause-of-death data in industrialized countries do not exist in most developing countries. Second, children often die from multiple causes, and deciding which is the primary cause can be difficult. In addition, malnutrition is associated with half of all deaths. Third, small-scale studies must be used to estimate the cause for the majority of under-five deaths. Most of these studies refer to the first half of the 1990s and earlier and hence provide no data on changes in the last half of the decade. As an example of the uncertainty, estimates for measles deaths vary between 1 per cent and 8 per cent. (Source: WHO, 2000)

Common causes for under 5 death are perinatal conditions, Malnutrition, ARI, Diarrhoea Malaria, Measles, HIV/AIDS and Other causes.

Under five mortality by year

When compared to the mortality in less than five years, the mortality was highest in the year 1996 and lowest in the year 1995. The trend starts increasing from 95 to 96 then starts decline and from 2001 onwards there is an increasing trends. (Figure 1)

Figure 1.Trend of under 5 Mortality in Tiruchirappalli District, 1995-2002



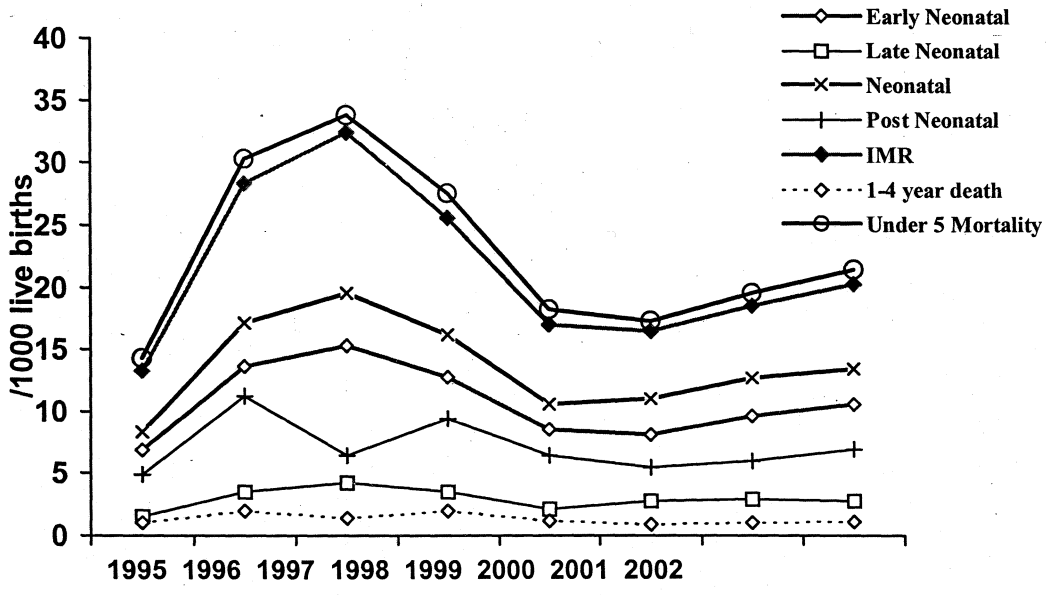
Under five mortality by age

The distribution of under 5 mortality by age is given in Table 2. (see annexure for computation method) The lowest in the year 1995 gradually it peaks at 1996 and a sharp decline in the next few years and the steadily going up. There is not much difference in the pattern of mortality among various age groups in 8-year reference period.

Table 2.Trend in under-five mortality by age, Tiruchirappalli district, 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
Early Neonatal	6.83	13.66	15.33	12.74	8.52	8.12	9.59	10.60
Late Neonatal	1.5	3.5	4.2	3.5	2.1	2.8	2.9	2.8
Neonatal	8.3	17.1	19.5	16.2	10.6	11	12.7	13.4
Post Neonatal	4.9	11.2	6.4	9.4	6.4	5.5	6.0	6.9
Infant mortality	13.27	28.34	32.43	25.59	16.99	16.43	18.49	20.29
1-4 year death	1.0	1.97	1.4	1.94	1.2	0.9	1.05	1.09
Under 5 Mortality	14.26	30.31	33.82	27.54	18.2	17.3	19.54	21.39
Child survival	98.5%	96.6%	96.6%	97.3%	98%	98%	98%	98%

Figure 2. Trend in under five mortality in Tiruchirappalli district



Under 5 mortality by gender

The distribution of under 5 years mortality by gender is shown in table 3. The pattern of mortality did not show much difference between the two sexes but difference among years. The death is high in 96ad decline from 97 onwards and again from it is going up from 2001 onwards. The reason might be due to awareness among people to report about the infant death and improve reporting.

Table 3. Trend of under 5 death by sex, Tiruchirappalli District, 1995-2002

Gender	1995	1996	1997	1998	1999	2000	2001	2002
Male	305	680	626	526	414	397	473	486
Female	284	656	608	514	413	349	434	447
Unknown	6	4	10	6	8	2	4	3
Total	595	1340	1244	1046	835	748	911	936

Under 5 year mortality by cause

The causes for the under 5 mortality are shown in table 4.Top three causes of under five death are namely asphyxia, secondly congenital heart diseases and thirdly 'other causes' category. Among the causes the asphyxia formed the highest cause for the under 5 years followed by the others causes, LBW and pre-term babies. Over the period, 1995-2002, the different causes did show much difference.

Table 4. Under 5 deaths by cause, Tiruchirappalli district, 1995-2002

Year	Cause of death																	
	Preterm	Low birth weight	Asthyxia	Meconium aspiration	Convulsions	Neo-Natal Sepsis	Birth Injury	Jaundice	Cord Infection	Congenital Heart Disease	Congenital Anomalies	Childhood Tuberculosis	Metabolic Problem	Renal Problem	Meningitis	Malaria	Accidents & Injuries	Others	Unknown
1995	65	82	210	3	6	20	15	6	6	30	15	0	2	1	1	0	20	108	5
1996	151	186	402	3	9	50	30	12	10	76	36	0	3	1	1	0	30	333	6
1997	156	172	442	2	7	40	25	5	3	45	33	0	4	2	2	0	30	267	8
1998	135	146	365	1	1	36	12	6	2	50	30	0	1	2	2	0	16	236	4
1999	104	112	306	0	0	22	10	7	1	41	27	0	1	0	0	0	14	178	8
2000	82	112	265	0	1	9	10	7	0	52	21	1	1	2	2	0	19	152	2
2001	80	129	320	1	8	12	6	20	1	74	31	0	4	3	3	0	21	187	6
2002	76	136	332	1	6	15	12	18	0	68	29	1	4	3	3	0	24	208	3

Infant deaths

The trend of infant deaths in the 8-year reference period indicated (as shown in fig) that the maximum death occurred in 96 and thereafter steady decline till 2000 and

that the trend is going upward direction. This trend of mortality among the various period of infant like neonatal, post neonatal and perinatal period showed the similar pattern like in total infant period of one year in all the 8 year reference period.(Fig.5). Even though death rate in the overall period in various stages of infant death not (like neonatal, post neonatal) showing any difference there some difference (Table4). In the year the 2002 the less than 24 hrs after birth was high when compared to others years. In the year 1998 it was the less 7 days death, and in the year 2000 the difference was high in 8-30 days period of death. In the year 1996 it was the post neonatal period showing the difference.

Figure 2.Infant deaths in Tiruchirappalli District, 1995-2002

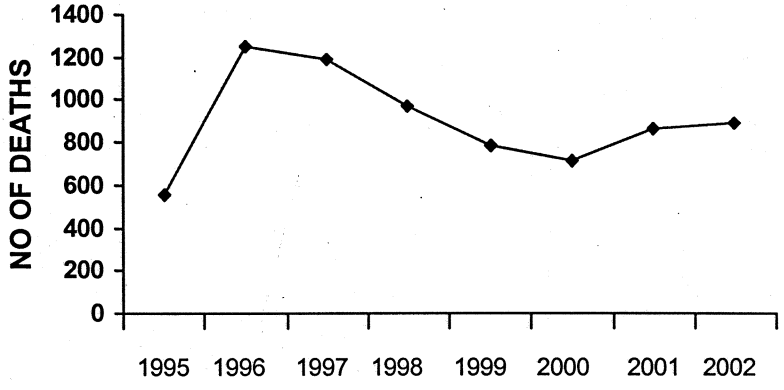


Figure 3. Infant mortality rate per 1000 live births, Tiruchirappalli District, 1995-2002

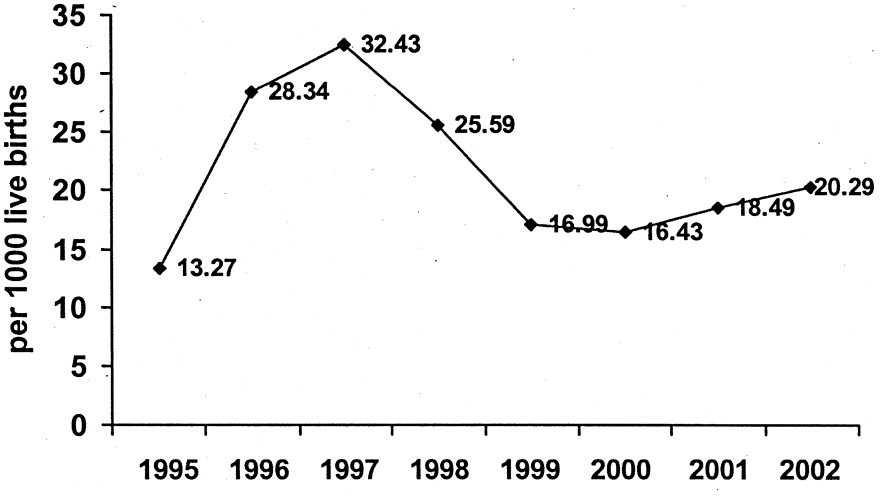


Table 5. Percentage distribution of mortality under 1 year by age,

Year	1995	1996	1997	1998	1999	2000	2001	2002
Death in 24 hrs	14	14	13	11	11	14	15	14
<7days	38	34	34	39	39	36	37	38
8-30 days	11	12	13	14	12	17	16	14
1-12 months	37	40	40	37	38	33	33	34
Total number of Infant deaths	554	1253	1193	972	780	710	862	888

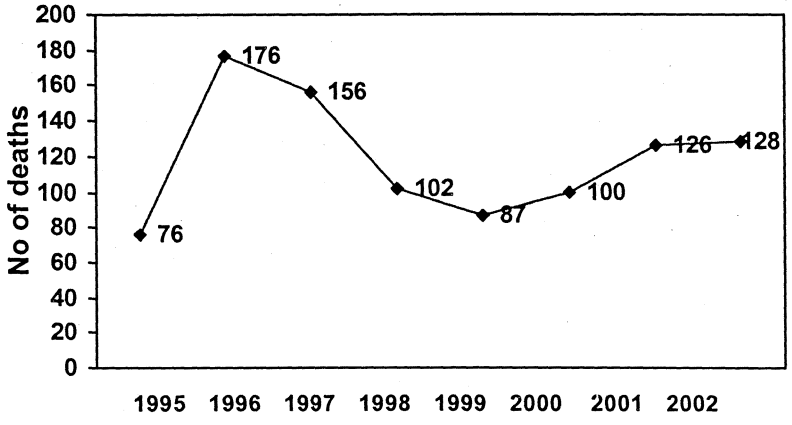
Proportion of death at various age groups in under 5 Mortality

The proportion of mortality at different age group is shown in figure .The distribution of mortality did not show much difference among the reference period. But within the same years the proportion was high in less than 7 days in all the reference years. This period along with perinatal period is very important in a child's life time before celebrating first birth day because only in this period the survival problems are more. The system needs to concentrate to this period to reduce the infant mortality rate.

Deaths within 24 hrs

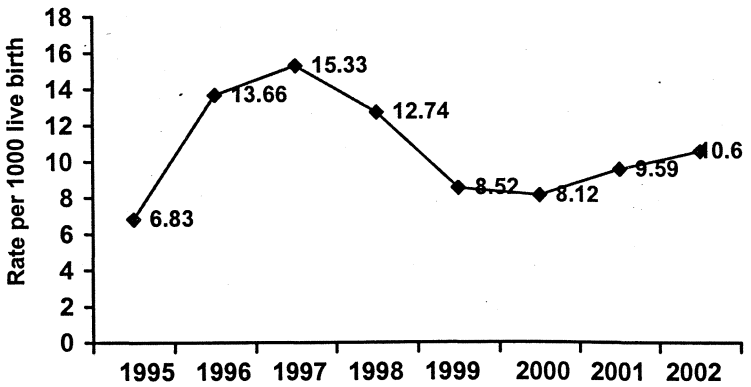
The trend shows a peak in the year 1996 and thereafter a steady decline followed by steady increase in deaths that occurred in less than 24hrs after birth. We have not enquired or analyzed the reason for the high death rate in the year 1996 because the detailed information were not available.

Figure 4. Trends in deaths with 24 hours after birth, Tiruchirappalli, 1995-2002



Deaths within 7 days (early neonatal)

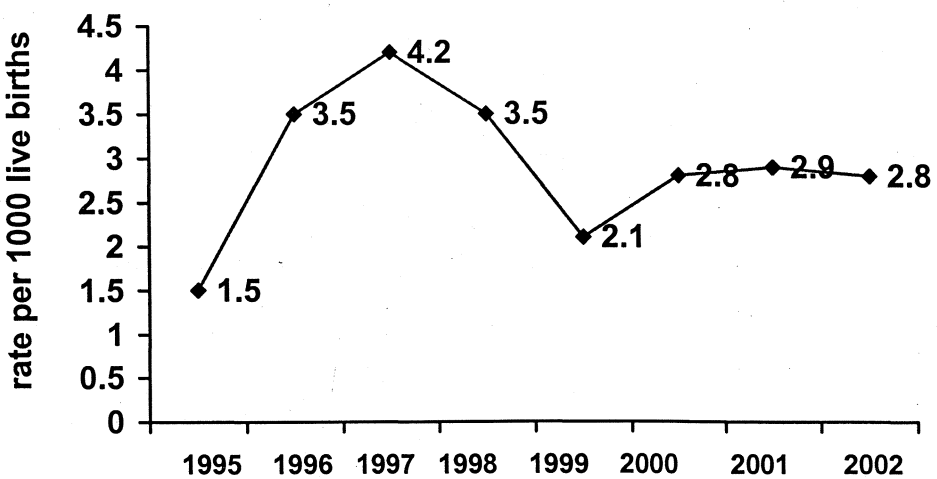
Figure 5..Trend in eary neonatal mortality Tiruchirappalli district, 1995-2002



Deaths within 7 –28 days (late neonatal)

The mortality trend in this age group is in the similar line like other age group in the reference period. (Figure 6)

Figure 6.Trend in late neonatal mortality Tiruchirappalli district, 1995-2002



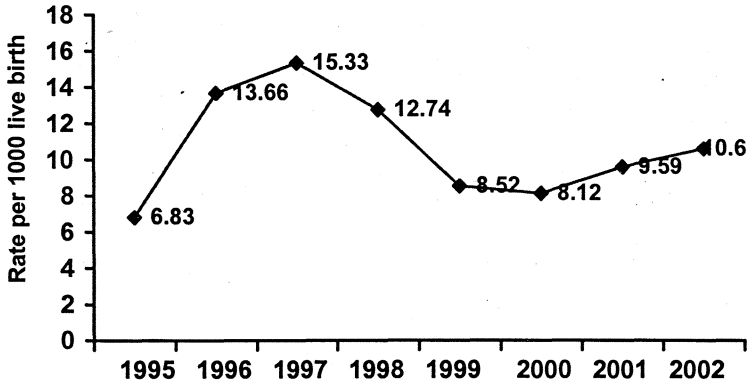
Child survival Rate

The child survival rate is almost similar in all the reference years (Table 2). The difference is lowest in the year 1996 and 1997 and in other it is more or less at the same level.

Observation

Deaths within 7 days (early neonatal)

Figure 5..Trend in eary neonatal mortality Tiruchirappalli district, 1995-2002



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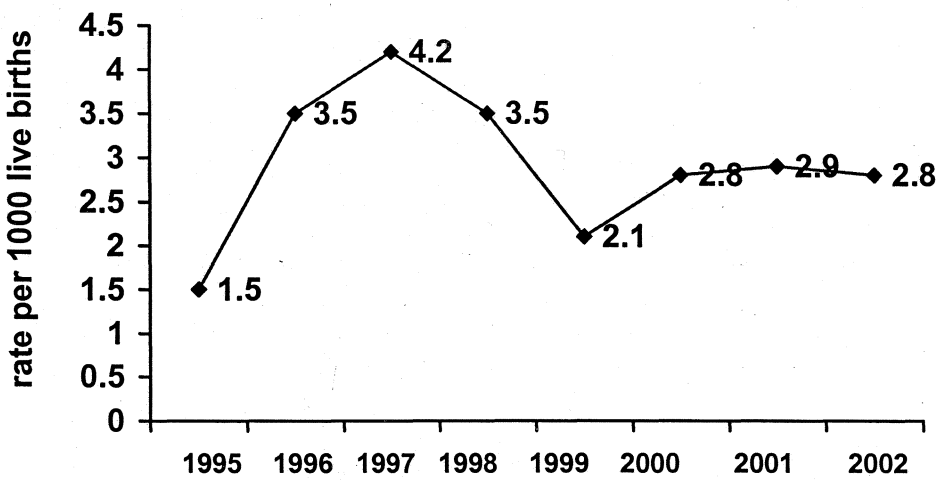


Child survival Rate

The child survival rate is almost similar in all the reference years (Table 2). The difference is lowest in the year 1996 and 1997 and in other it is more or less at the same level.

Observation

The reported number mortality for childhood in this district is below the national as well as state level. The reason might be due to under reporting. There is a gap between the reported rates by the Directorate of Public Health and Preventive Medicine and that of Danish International Development Agency (DANIDA). This might be due to under-reporting and needs to be verified before making recommendation. The death in the age group of 1-4 was very low.

Limitation

1. The data included both urban and rural area but we have not analyzed separately for want of detailed data.
2. It is not clear as to who has investigated the infant deaths and whether all deaths had been investigated or not
3. It is unclear as to whether there exists a mechanism for investigating deaths in case of under five children, particularly deaths occurring among children aged one year or more.
4. The data does not include deaths that occurred in public sector and private hospitals located in this distrct.

Conclusion and recommendation

Under 5 mortality is one of the sensitive indicators of MCH programme next only to the Infant mortality rate. To really assess the impact of the health programme the quality of data collection need to be improved. Health system alone cannot bring down the IMR and under five-mortality rate. It needs multi departmental coordination and co-operation.

The following recommendations are made for reducing under 5 mortality and improving data quality

1. Data collection including mortality need to be improved.
2. A system need to be planned to include all the private hospitals, other public sector hospitals and other indigenous system medicines for a better quality data and analysis and for taking any policy decision.
3. Facilities at the peripheral level system need to be improved especially at the Taluk and sub Taluk level to manage the cause of infant death like asphyxia, convulsion and other infections.

Annexure:

$$\text{Child mortality rate} = \frac{\text{Number of deaths of children less than 5 years of age in a given year}}{\text{Number of live births in the same year}} X1000$$

$$\text{Child survival Rate} = \frac{1000 - \text{under 5 mortality rate}}{10}$$

$$\text{Neonatal mortality rate} = \frac{\text{Number of deaths of children under 28 days of age in a year}}{\text{Total live births in the same year}} \times 1000$$

$$\text{Post - neonatal mortality rate} = \frac{\text{Number of deaths of children between 28 days and one year of age in a given year}}{\text{Total live births in the same year}} \times 1000$$

$$\text{Infant mortality rate} = \frac{\text{Number of deaths of children less than 1 year of age in a year}}{\text{Number of live births in the same year}} \times 1000$$

$$\text{1 - 4 year mortality rate} = \frac{\text{Number of deaths of children aged 1 - 4 years during a year}}{\text{Total number of children aged 1 - 4 years at the middle of the year}} \times 1000$$

SECTION 2:

SECOND FIELD POSTING

2.1. Evaluation of existing reporting system for diarrheal diseases in Tiruchirappalli district, Tamil Nadu

1.Background

Surveillance is the ongoing systemic collection, collation and interpretation of data in the process of describing and monitoring health events. A well-functioning surveillance system is essential if a country is to respond rapidly and effectively to any threat of disease outbreaks[5]. Public health cannot progress without disease surveillance system. Detecting cases of infectious diseases and their distribution in time and place offers clues to the salient background phenomena of amplification and transmission of infectious agents, knowledge of which is essential for disease control. The need for early recognition of new or resurgent infectious diseases has been illustrated by several outbreaks in India and other countries.[1] Data disseminated by public health surveillance can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses.

2. Rationale

Cholera is one of the oldest and best understood of the epidemic prone diseases. Historically, epidemic and pandemics were strongly linked to poor sanitation, crowed living conditions and unprotected water supply. This list persists today. Conditions conductive to epidemic are readily met in many developing countries including India.[6]

Cholera and other acute diarrheal diseases (ADD) are a public health problem in India and other developing countries.[2] Mortality due to infectious diseases including ADD was the second leading cause in South Asian countries.[3]. The mortality and morbidity due to cholera in developing countries is underreported.[6] WHO estimates that officially reported cases represent only around 5-10% of actual cases. It is the first disease in our country to have routine reporting system because of its high mortality and morbidity in olden days. Still the occurrence of outbreak continues throughout the country. Currently the nationally proposed Integrated Disease Reporting system programme (IDSP) will be implemented in phases all over the country. It is proposed to be introduced in Tamil Nadu also.

Not many of the outbreaks occurring in our country are either investigated or identified by the existing reporting system systems. The currently available reporting system neither meets its objective nor helps to improve surveillance gap because of so many independent vertical programmes, limited experts in the field of epidemiology, laboratory diagnostic techniques and insufficient response mechanism. A well-functioning reporting system[5] is therefore essential if a country is to respond rapidly and effectively to any threat of disease outbreak. However, in most countries in the South East Asia Region, [5] the disease reporting system system for the most part needs considerable strengthening. Most of the notifications are based on clinical diagnosis, and there is considerable under-reporting of cases.

One of the important steps to improve the system is to assess what is happening and what went wrong in the existing reporting system by means of evaluating the whole system.

Although many countries have diarrhoeal diseases control programme their impact has only been evaluated by few.[2] This is a system that has not been evaluated before. It is believed that by this study, one would identify the strengths and weaknesses of this system and corrective measures could be suggested. To the best of investigators' knowledge, no study was undertaken in Tiruchirappalli district This study is being done at a point of time when the state is in the process of implementing the IDSP throughout the state.

The objectives of evaluation of ADD reporting system are as follows:

- To assess the performance of the core and support functions of the existing routine reporting system
- To assess the existing resources (human, financial, material) for existing routine reporting system
- Identify gaps and contributing factors
- Suggest appropriate measures to narrow down the existing gaps

3. Methodology

3.1 Study team

An evaluation team was formed which consisted of MAE- FETP scholar (NIE, Chennai) as principal investigator, and a health worker. (for helping the investigator)

3.2 Study Design

A Cross-sectional study was designed to evaluate the existing reporting system in Tiruverambur block of Tiruchirappalli District

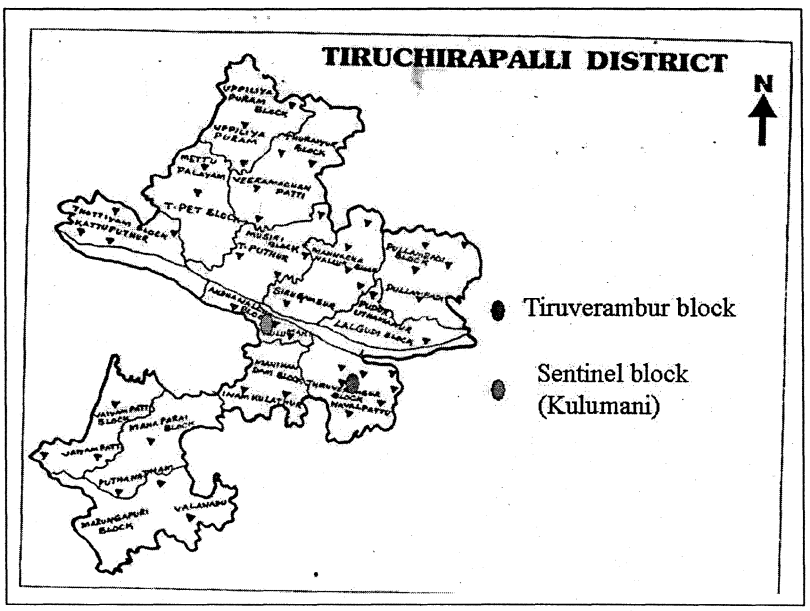
3.3 Study setting

Tiruchirappalli district is situated at the centre of Tamil Nadu State India (Figure 1 in section 1- 1.1). Its boundaries are Thanjavur in the east, Karur in the west, and Namakkal in the north, and Pudukottai in the south. Tiruchirappalli is known as Rock City due to the presence of hillock at heart of the city. The district is well connected with the state and district capitals by road and rails.

3.4 Study area

Study area is Tiruverambur block in Tiruchirappalli district (Figure 1).

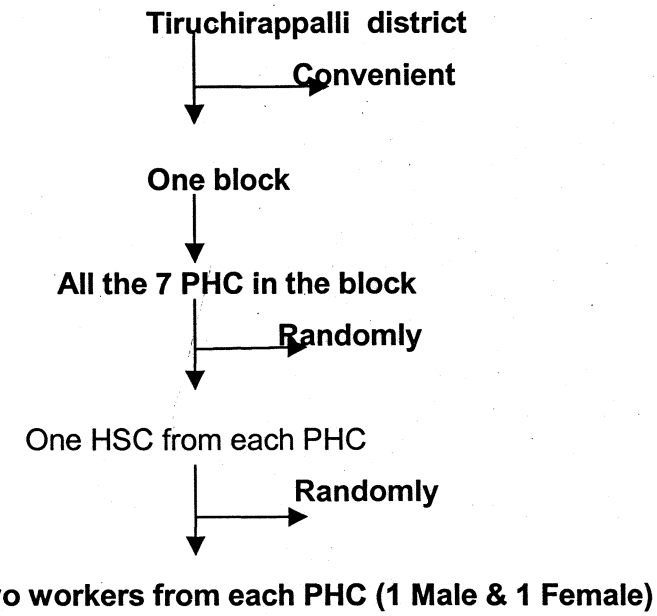
Figure 1.Location of study area in Tiruchirappalli district, Tamil Nadu



3.5 Sampling

Tiruverambur block (with a population of 2,33,708) with 7 Primary Health Centres (PHC) and 28 Health Sub Centres (HSC), one sentinel block with a population of 1,03,708 with 3 PHCs and thirty HSCs and one urban health post with a population of 50000 in an urban area (which has a population of 7,33,708 with 9 urban Health Centres) were selected. From the selected, the PHCs one HSC was selected randomly (Figure 2).

Figure 2. Selection of study areas, Tiruchirappalli district



3.6 Data collection procedure

Both quantitative and qualitative methods have been used

1.Survey

Community level rapid survey was conducted to compare the case detection efficiency of reporting system.

2. Interviews

Separate checklists were developed for different types of health personnel like doctors, Para-medical workers and field staff for interview to understand their

perception and views towards reporting system and its implications. From the selected HSC, both male and female health workers were interviewed. All the medical officers in charge were interviewed. At the district level, the district officials responsible for the ADD programme were interviewed.

3. Observation

Different levels of health institutions likes HSC, PHC, Block PHC, and District ADD control (epidemic cell) Cell have been visited to study the way they maintain the registers and prepare the reports. Besides this, PHC and district level review meetings have been attended to understand the usefulness of system.

4. Review of secondary data:

Besides the above methods, secondary data containing various reports and registers were reviewed to find out the quality and quantity of data collection and processing, transmission and storing, time spent to maintain information system, and the usefulness of system in decision making and taking public health action.

4. Results and discussion

4.1 Description of the existing reporting system

4.1.1Objective of routine reporting system

The following are the objectives of routine reporting system.-

1. Identification of the acute diarrhoeal diseases (ADD) and dysentery
2. Forecasting outbreaks
3. Detection and intervention of epidemic
4. Preventive activities for future

4.1.2 Existing methods of data collection

At the peripheral level, both in village and urban areas the health workers male and female collect the data regarding acute diarrhoeal diseases and record in their diaries, report to the P.H.C during their weekly review meeting, The female worker mostly concentrate on Vaccine Preventive Diseases and ADD cases in general and under five children in particular. The male worker, similarly, collects the information

regarding ADD particulars and other diseases like A.D., Malaria, and other vector borne diseases, leprosy T.B

The P.H.C sends the consolidated report to the District office in the first week of every month. For ADD cases, the report is sent to district weekly in the prescribed form. In the event of any outbreak or threat of outbreak, the report is sent daily. Data on ADD patients collected from out-patient department of PHC is sent to the district monthly along with the list of other diseases. At the district level, they consolidate the data, and sent the district report to state every week usually and daily during any outbreak. At the district level, analysis will be carried out to assess the diseases load and to find any threat of outbreak.

Table1. Persons responsible for data collection at District, Block, and PHC levels, Tiruchirappalli district

Reporting units	**Person responsible**
Health sub centres	Health Workers (Male and female)
Out Patient Department (OPD) of PHC	Pharmacist/Health worker
OPD of block PHC	Pharmacist/health worker
In-patient department of District Head Quarter Hospital and other hospitals	Male worker/staff nurse

4.1.3.Data transmission

Normally the data transported to higher level is as mentioned in table 1. From the Health subcentre, the data were transmitted to PHC every Tuesday. During the review meetings, feedback is given and if necessary training will be imparted. From the PHC, data will be transmitted to District level the next day or in the review meeting of block health supervisor to be held at the district health office on every Monday through the prescribed form. From the district, the report will be sent to State office the next day in the prescribed form. (See Annexure)

Table 2. Data transmission at various levels for ADD routine reporting system

From	To	Person(s) responsible	Mode of transfer	Periodicity
HSCs	PHC	Health Worker (M/F)	Manual	Weekly
PHC	Block PHC or CHC	Health Supervisor (M/F)	Manual	Weekly
Block PHC	District Level	Block Health Supervisor (M/F)	Manual	Weekly
Hospitals	District Level	Health Supervisor (M/F)	Manual	Daily
District Level	State Level	Data entry Operator/ Statistical Assistant	Electronic	Weekly

4.1.4.Flow of information

The information collected at field level is transferred to PHC from PHC to Bock PHC from block to district, from district to state authority as shown in figure 2 section 1: 1.2.

4.1.5.Data Compilation

Data compilation is carried out at PHC, Block and at District level by respective medical officers. At the district level, the Assistant Director (Statistics) is doing the compilation work. During compilation, they look for incompleteness in the reporting forms and inconsistencies in data and other errors before data is compiled.

4.1.6.Analysis

At the district level, the data collected are entered into computer, and after cleaning analysis is carried out. The compilation reports and necessary break-up reports are transmitted to the next higher level. Rapid mode of communication systems like, telephone, telegraph, fax, e-mail, police wireless or special messenger are used to transmit the report immediately during emergencies. When the reporting is verbal, (telephonically) it is usually followed by a written report.

The data entry operator and statistical assistant assigned for the disease reporting system at district level play an important role in data compilation, computerization, analysis and generation of report at the district level. They also have a crucial role to play in the generation of analytical reports from the data collected during outbreaks investigation (Table 3).

Table 3. Staff responsible for data analysis at various levels, Tiruchirappalli, Tamilnadu

Level of health system	Staff responsible
District	Assistant Director (Statistics)
Block	Medical Officer in charge
PHC Level	Medical Officer

4.1.7.Outbreak investigation and response mechanism:

At the PHC/Block level, the Medical officer is the nodal officer to respond to an outbreak. They form an *adhoc* team comprising the Health Supervisors, Health workers, the Pharmacist/Lab technician and Attendant for taking control measures and preventive measures.

At the district, the District response team (consists of one health inspector and two staff nurses) is responsible for investigating any reported/suspected outbreaks. Together with the PHC team, they undertake investigation.

4.1.8. At the state level

Joint director of epidemic is responsible for supervising and giving technical input to district to control of epidemic prone water borne diseases. A team of statisticians work under him for data compilation and analysis.

4.1.9.Case Definitions

WHO recommended case definition for cholera and dysentery is used to collect information from the field area. All the staff have been explained regarding the importance of the case definitions during Reproductive and Child Health (RCH) training .The case definition for acute diarrhoeal and dysentery is given in annexure.

Routinely clinical case definitions are used, but during any outbreak, investigation will be undertaken to confirm the causative agent.

5. Description the disease under reporting system

5.1. Morbidity and severity of diseases

As per the report of Directorate of Public Health and Preventive Medicine (DPH),[4] Tamil nadu, the number of deaths due to Cholera and Dysentery was 2370 (0.64% of total death in Tamilnadu in1999) of which 65 cases were due to cholera. Similarly, in Tiruchirappalli district the number of cases and deaths due to ADD cases including cholera are shown in the table 4. During the last three years, the number of reported cases of ADD was fluctuating with clear outbreaks in few months especially during April to August with few deaths. These data confirm the public priority and importance of ADD and other diarrhoeal diseases to have a reporting system.

Table 4. Reported number of cases and deaths due to acute diarrhoeal diseases, 2000-2002, Tiruchirappalli, Tamilnadu.

Month / Year	2000		2001		2002	
	No. of cases	Death	No. of cases	Death	No. of cases	Death
Jan	10	-	10	-	8	-
Feb	96	-	35	1	24	-
Mar	26	-	27	1	14	1
April	153	8	18	-	44	-
May	20	1	39	-	68	-
June	66	-	22	-	167	5
July	13	-	29	-	211	1
Aug	10	-	14	-	83	-
Sep	25	-	24	-	57	-
Oct	3	-	15	-	21	-
Nov	14	-	26	-	29	-
Dec	3	1	14	-	-	-
TOTAL	440	10	273	2	726	7

5.2.Epidemic potential, preventable nature

Cholera is an acute bacterial infection of the intestine caused by ingestion of food or water contaminated with Vibrio cholerae, serogroups O1 or O139. Symptoms include acute watery diarrhoea and vomiting which can result in severe dehydration. When left untreated, death can occur rapidly. It has a short incubation period, from less than one day to five days, and produces an enterotoxin that

causes copious, painless, watery diarrhoea that can quickly lead to severe dehydration. It leads sometimes to death if treatment is not promptly given. Most persons infected with *V. cholerae* do not become ill, although the bacterium is present in their faeces for 7-14 days. When illness does occur, more than 90% of episodes are of mild or moderate severity and are difficult to distinguish clinically from other types of acute diarrhoea. Less than 10% of ill persons develop typical cholera with signs of moderate or severe dehydration. It is one of the potentially preventable diseases simply rectifying the risk factors as mentioned. In many developed countries morbidity and mortality has been reduced considerably simply by providing potable water and improving the environment. It can be prevented at primary level by improving the sanitation and potable water. At the secondary level, it could be controlled by early recognizing the diseases and managing with Oral rehydration therapy (ORT) and at tertiary level treating with appropriate management can prevent the death.

6. Stakeholders

The stakeholders responsible for financing, data utilization, and service provider and their activities at the state and district level are shown in figures 4 and 5 in section 1-1.1.

7. Description of the resources

In this study block, seven (7 PHCs) reporting units are available with the sufficient female staff in all categories and few male workers at the peripheral level as shown in table 5. The other physical facilities like buildings, registers, reporting formats are available at all levels. The telephone and ambulance facilities are available at block PHC level and other communication facilities such as computer and e-mail facilities are not available at block level but available at the district level. Laboratory facilities are not available for ADD and cholera at the PHC and block level and available at the Medical college hospital at the district capital, Tiruchirappalli.

Table 5. Status of staff available and training received, Tiruverambur block, Tiruchirappalli, Tamilnadu

Category	Sanctioned	Number in position	Trained
Doctors	16	13	8
Village Health Nurse	28	28	28
Sector Health Nurse	7	7	7
Health Inspector	28	13	13

Source: DDHS Tiruchirappalli

8. Core activities of reporting system

8.1. Data collection and Transmission

8.1.1. At HSC level

HSC is the back bone of reporting system. The male and female heath workers are the prime contributors for reporting system activities. The success and failure of the system depend on the nature and type of the field staff who directly deal with the data collection. In Tamil nadu the working pattern for filed level workers are planned in such a way that they will cover the entire area within two weeks time so that they can visit the village at least twice in a month. This pattern of activities is routinely called as fixed tour programme (FTP). As per FTP, they will visit the village in the fixed date and do their routine works like collecting information regarding the diseases, other health problem.

8.1.2. Female workers

She is mostly concentrating in maternal and child activities in her allotted area. In addition, she is collecting information on diseases on epidemic prone diseases including acute diarrhoeal diseases and dysentery in children. During the visit, she enquires the people especially young children and female about watery diarrhoea with or without vomiting (During maternal and child health (MCH) services) and if positive, she will look for dehydration and if present, gives treatment as per the dehydration and same is recorded in her dairy. She reports the same to the medical officer in the weekly review meeting in oral and record her finding in the review registers maintained at the PHCs.

8.1.3. Male health worker

Similarly, the male worker visit the allotted area as per his FTP and collect the information regarding the ADD and dysentery cases and give treatment if necessary and if the number of cases is more he will inform the PHC medical officer who will in turn visit the area and confirm the diagnosis and take action as per his observation. The male worker also normally record their finding in their daily dairy and report the finding to PHC in the Tuesday review meeting. He is the prime activity member for ADD and cholera reporting system. Unlike female worker, he is specially appointed to monitor the ADD and other water borne diseases and take preventive and educational activities.

8.2.Observation

In our survey, we have contacted 10 female health workers and 10 male workers, interviewed them, and observed the performance while doing duty in their field. Their ability to identify the diarrhoeal diseases were in appreciable manner and their knowledge about the etiological agent, differential diagnosis need to be improved. Although the interviewed workers had undergone RCH training, many of them failed to understand importance of data collection for reporting and its importance. Most of them maintain a diary but did not record or update regularly. The female worker mainly concentrates on MCH activities and only few workers have information regarding ADD and dysentery. All the workers were provided with registers but only few were carrying it to the field. The male workers knew more about ADD and 40% male workers we have interviewed managed to respond to the reporting system. Most of them were not aware about case definitions and standard case management. They were using only the clinical symptoms to pick up the cases and report the same to PHC. The daily diary, the prime source for reporting system activities, was not properly maintained and only few male workers maintain the diary routinely.

8.2.1. Reporting

Since field level workers were not provided with printed form, they are reporting their finding to M.O PHC orally during weekly review meeting, which do not have any validity. Their supervisors did not verify the diaries frequently.

8.2.2. Supervision

As per their interview, almost all the workers were supervised by their supervisors regularly and were getting feedback. This is a good sign of improvement in reporting system. However, they failed to mention the number of visit to their field/area by medical officers. Their reporting system activities were supervised by medical officer during the review meeting and were getting feed back regularly in the form of training as per their interviews

8.3. Primary health centre level

The main activities at the PHC level is to monitor the activities carried at the peripheral level workers and get the report in time and send the consolidated report to district in time. We have visited all 7 PHCs in Tiruverambur bock and one PHC at Kulumani block. All the medical officers (n=7) were interviewed. We also attended two review meetings conducted by medical officer in their PHCS. As per the interview, the knowledge about the diseases were very good but the knowledge about the reporting system was not appreciable level since 80%of the doctors we interviewed were fresh candidates and had put up 1-2 year of service. They have not given any training regarding the epidemiology and reporting system activities. Routinely they sign the report prepared by the PHC level health supervisor and send it to district as a report. As per the interview and the observation during the review meeting most of them were not doing the analysis and sending the reporting system report to fulfill the statutory duty and they were never asked by their superior about the failure to do analysis.

As per the interview, their knowledge about outbreak investigation not in an appreciable manner and they were getting regular feedback from higher authorities during their visit to PHC and during monthly review meeting.

During 2002, three outbreaks of ADD and diarrhoeal diseases were reported but only one was investigated that too by the principal investigator during his field posting and other two were not investigated.

8.3. Report

As per the registers maintained by P.H.Cs, they were sending regularly the reports in time and in complete shape by 2 PHCs only. The remaining PHCs have not sent the report for a long period (of 6 month) because the vacancy post of health inspectors and block health supervisor who regularly collect the data from each PHC and the send the consolidated report of block to district. However, for a long period the report was not sent from this block.

Table 6. Reports sent from PHC level to district, Tiruchirappalli

Name of the report	Frequency of reporting
First Information Report	Immediately
Outbreak report	Immediately
Hospital (ADD) Disease reporting system	Nil
ADD report	Weekly (Every Mondays)
Form 9 (Including ADD & Cholera under 5 year Children)	Monthly (Last week of every month)
Morbidity (Including ADD & cholera in OP Department)	Monthly (Last week of every month)

8.4.Analysis and supervision

As per the interview and observation, all (n=8) PHCs that we have visited were not doing any analysis. They were not visiting regularly HSCs. The reasons reported by doctors were that in PHCS only one doctor was available and there was no time to visit any area. Further they stated that vehicle was not provided in all PHCs. We have observed that the report form and other register required for reporting system for ADD and other diarrhoeal diseases were available but their utilization were not at appreciable level.

8.5.Passive reporting system activity

The other main function of the P.H.Cs and the medical officers were to provide curative service to their defined area population. Through their curative service, they were supposed to monitor ADD and other diarrhoeal diseases and report the same to district. But, during our visit to the P.H.Cs we have observed that all Medical officers were writing the provisional diagnosis with the out patient (O.P) register number in OP register but their place ,age, sex were not mentioned. These epidemiological features were important to identify the high-risk area and high-risk groups to forecast any threatening outbreak based on the out patient registers. However, these factors were not properly taken care off by medical officers. These OP data were sent to district every month as morbidity data.

8.6. Activity at the District level

The main activity at the district level is to receive monthly, weekly and daily reports in time and in complete shape without any omission and ensure the supply of logistic required fro ADD reporting system including reporting forms and registers.

The other main activities at the district level were analysis and sending the analyzed report to state authority and lower level officers including medical officers for taking necessary action and for further reference.

The following registers are maintained at district level

- ADD & Cholera Reporting system register
- ADD Report watching register
- Hospital ADD Reporting system Register
- Form 9 ADD under5 year register
- Outbreak register

It was observed the district level authorities were having all the necessary logistics support for reporting system and were sending the report including zero case report to state authorities. However, the analysis part was very weak. They were doing only little analysis like disease load at district level and PHC level. If analysis were done regularly the impact of few outbreaks due to ADD and other waterborne diseases might have been reduced. During 2002, ten outbreaks of ADD were

reported to district and except two, others were not investigated and none were identified by the system by analyzing the data. Another weakness is that the district was not getting the report in time from all reporting units. The ADD report watching register maintained by district health office is a good activity in right direction but the register indicated that for a long period the report of ADD cases not received. After discussing with the officers concerned we came to know that because of vacant position of technical assistant to District officer, the register and the report were not properly maintained.

8.7.Observation about reporting system for ADD and dysentery

There are five different reporting systems available for acute diarroheal diseases (ADD) in Tiruchirappalli district. They are as follows:

1. *Report sent by PHC on weekly basis:* This is the consolidated report of field staff's reporting system daily activities. Field staff report their collected data to PHC during weekly review meeting and consolidated report will be sent to district weekly (See annexure)
2. *The other system is the hospital reporting system.* (Active reporting system). Here the staff from the district office collected from the Government hospitals and report the same to ADD cell (which monitor the reporting system activities of ADD).
3. The third one is the *Morbidity disease reports sent by PHC* every month that includes ADD and dysentery.
4. The fourth report is the *Form –9* reports sent by PHC every month. The form –9 mostly deals with MCH activities and it includes ADD reporting system in children (<5years)
5. Another report is the report sent by sentinel block. This block sends the ADD report along with other report specified to other blocks except the weekly ADD report.

Of the five reports, three reports are collected by PHC and the fourth one by the district office and the fifth one by the sentinel block. We did not find any consolidation of these reports either at PHC or at district level. There is no clear-cut picture or instruction about these reports to assess the real burden of ADD cases in

this district. This needs to be taken care to rectify the anomalies or duplication of work.

9. System Attributes

9.1.Simplicity

It refers to both structure and ease of operation. The quality of simplicity includes a) amount and type of data necessary b) amount and type of data c) amount of follow up d) method of managing data e) staff training f) time spent for maintaining the system.[7]

With respect to simplicity, ADD reporting system is well accepted by the health personnel at all levels of PHC set up due to its simple methodology. All the health personnel (those who were interviewed) expressed that the system is very simple than any other health programmes in operation in the district and reporting form is very simple. The reporting form is given in annexure. It requires the number of persons suffering from ADD and the Oral rehydration given, number of cases referred to other institution including PHC. The other activities in respect to data collection, information flow, structure also simple to follow. The only difficulty they found in the system was the WHO case definition. They were using the simple clinical symptoms to identify and report ADD cases. They argued that in outbreak situation WHO case definition is useful but in normal time it is very difficult to apply the definition in field condition.

Simplicity is measured by laboratory investigation and outbreak investigation. During 2002, the number of outbreaks due to ADD was 14. Of these, only two were investigated.

Table 7. Number of reported outbreak due to ADD in 2002, Tiruchirappalli Tamilnadu.

Total outbreak due to ADD	Total cases	Deaths	Number investigated	Number identified by system
14	726	7	2	Nil

9.2. Usefulness of the system

A public health system is useful if it contributes to the prevention and control of adverse health related events, including an improved understanding of the public health implications of such events. [7] Public health surveillance /reporting system can also be useful if it helps to determine that an adverse health related event previously thought to be unimportant is actually important. In addition, data from a reporting system can be useful in contributing to performance measures including health indicators that are used in need assessments and accountability system [7]

In Tiruchirappalli district as discussed above not a single ADD out break was identified by the system by utilizing and analyzing the data.

9.3.Data quality

Data quality means completeness and validity of data. The acceptability and representative ness are also related to data quality. In Tamil Nadu, ADD reporting system means only case count. Data commonly required for its quality like demographic details of the affected persons, details about the clinical features of cholera and ADD and presence and absence of risk factors are not normally reported. Without the features of quality the data so collected will be doubtful for its completeness and validity.

9.4.Timeliness

Timeliness depends on the type of diseases under reporting system. Its characters[7] are:

1) The amount of time taken from onset of diseases to the reporting of events.
2) Time taken to identify the trend, outbreak and the effect of preventive measures

The most reliable time might vary with type of diseases. For cholera and other water borne diseases the will be very short.

Timeliness of Reporting. There are 24 HSCs, 8 PHCs and 2 Block PHCs which were assessed for its completeness and timeliness of reporting for one-year period. We found that both the timeliness and completeness of reporting is lacking in all 7

PHCs in Tiruverambur block and no report was sent from corporation for the entire reference period and only 1 PHC was sending weekly report in time.(Table 8)

Table 8. Timeliness of sending ADD reports, from PHCs (n=48) to District, Tiruchirappalli, Tamil Nadu, 2002

No units reporting	Jan	Feb.	Mar	April	May	June	July	August	Sep	Oct	Nov	Dec
In time	26	24	27	36	31	32	42	30	0	0	0	0
Completeness	26	24	27	36	31	32	42	30	0	0	0	0
Not received	22	24	21	12	17	16	6	18	0	0	0	0

(Source: DDHS office Watching register)

Timeliness of Reporting of outbreak: Similarly, the time taken by the system to report the outbreak was very long when compared to acuteness of its onset. ; For example in one outbreak the date of onset was on 1.7.02 and date of reporting was on 6.7.02 that too after death of two patients. In Tiruchirappalli, these attributes are very weak. It needs to be improved.

9.5.Stability

It refers[7] to reliability and availability. Reliability means ability to collect data and availability means ability to be operational when it is needed. Work force shortage can threaten the reliability and availability. In Tiruverambur block, the shortage of male health worker is at the verge of threatening the system for its stability.

9.6.Sensitivity

The ability of the system to identify the diseases under reporting system and ability to detect outbreak. [7] In the study area, one one outbreak was identified by the system out of 14 outbreaks of ADD reported in the year 2002 (Table 7).

9.7.Validation Studies

Focused studies to validate the performance of limited aspects of systems (e.g., data sources, case definitions, statistical methods, timeliness of reporting) can provide indirect evidence of system performance [7]

In the study area the overall performance about ADD reporting system is not in good form because the indirect evidence for its validation likes timeliness, use of case definition, analysis of data and data sources were lacking.

10.Reporting system activities at sentinel block

This block selected as a model centre for the district as sentinel centre for acute diarroheal diseases for better reporting systems. Our observation is that except sending the report in different form, this block was in any way different from other blocks. They sent the report weekly along with some more information like number of oral rehydration pockets used and the stock position of the same. The reporting form is enclosed in annexure.

11.Response and follow-up

The actions/ interventions that are initiated based on the interpretation of the analyzed disease reporting system data constitute the responses of the system. The level, speed and scope of response depend on the urgency of the situation, the transmission and availability of relevant additional information, connectivity and communication. Since the district is having a response team the speed and response to the outbreak was one of the best activities in this district. The follow- up during outbreak needs to be improved.

Table 9. Knowledge, awareness and practice regarding core functions of ADD reporting system, Tiruchirappalli Tamilnadu.

Core function	% response*
Case detection	
Health personnel who gave correct standard case definitions	46%
Health personnel who gave correct standard case management	56%
Confirmation	20%
Reporting: Availability of standard reporting forms at all times	20%
Reporting Units	
PHC to District level	100%
Timely monthly reports	40-60%
District to State	100%
Data analysis Intermediate level (PHC) & District level	50%
Feedback	100%
Supervision	
HSC level	0%
PHC level	100%
District level	0%
At all levels	90%
Training RCH	70%
Medical officer	70%
MPHW	100%

12.Existing deficiency/gap

Manpower:

There is a large vacancy of sanctioned norm for paramedical personnel especially the Male workers and laboratory technicians leading to over burden of the work on limited available manpower.

Laboratory:

Laboratory services are inadequate in the rural area especially at the block level. In the existing laboratories the infrastructure is poorly developed / utilized.

Communication facility:

Telephone and vehicle facilities are not available below the district level in some of the health institutions. Even the computer facility is available only at District level

Training Facilities:

The training opportunities are inadequate and not-uniform. Inadequate training leads to non-understanding and haphazard approach to control of epidemic situation

Reporting system Mechanism:

The existing system is weak both in urban and rural areas and requires strengthening

Record keeping

At present record keeping and response mechanism are not followed in systematic way. There is little analysis and response. The Proforma of reporting formats is not available at HSC level. They simply enter their findings and tell orally the number of cases seen during the past one weens in the review meetings and the same number is rarely verified for its quality and quantity.

Reporting system &Analysis

The monthly report morbidity report mainly covers the PHC OPD data, hence cannot be considered as a useful data for establishing early warning signals in the field. Only limited analysis is apparently carried out, which includes, primarily of tabulation of data from weekly reports in a ledger style register. The weekly trends of the diseases in individual district are not systematically examined by calculating the rates. It is not clear how epidemics situation are identified other than through direct verbal communications.

There is no coordination between government and Non-government organizations.

At the Peripheral level (HSCs/ PHC/ CHC)

- Data collection for the reporting system disease is not done regularly.

- The district and other hospital data through passive reporting system leading to ove-burdening of the peripheral reporting system system.
- Lack of printed formats, case definition leads to poor quality of reporting
- Lack of electronic connectivity leads to delay in reporting
- No analysis and interpretation of the collected data at the PHC/Block level
- Omission of private sector in data collection
- Inadequate laboratory infrastructure

At District level

- Lack of analysis, interpretation and feedback on the collected data
- Separate data collection under vertical program implementation.
- Poor inter-departmental coordination
- Lack of regular feedback
- Actions taken as a result of data collected by the reporting system system are very rare

Identified gaps

- Deficient structural inputs are present (Vehicle, communication facilities)
- No written guidelines are present with the field level workers
- Standard reporting forms and registers not available especially at the field level.
- Timely reporting of outbreaks not present
- Data analysis were not being done regularly except for tabulation
- Feedback - mainly oral during review meetings
- Reporting system training to all cadres of the health system not adequate

13.Reporting system activities in corporation areas

Tiruchirappalli is the newly created corporation (5 years back) by merging few municipalities and some Panchayats. Here even though qualified Medical public health officer and other qualified staffs are available, reporting system activities are not performing well. The staff strength is not enough to cover the entire population of the Corporations. The staff is concentrating only on the old municipality areas of Tiruchirappalli and Srirangam and the remaining newly added areas are uncovered or under covered.

In corporation area instead of going for field level data collection, few male workers collect the data from the Govt. Health institution and then inform the same to health officer for further action. Others are really not doing any reporting system activity, because Most of their time is diverted to maintenance of sanitation leaving little time for other public health activities Only if there is an outbreak, field level data is being collected. This is the status of the local bodies like Tiruchirappalli Corporation. Training is not given to male workers after their induction to the service. The only available data in Tiruchirappalli Corporation is given in table 12.

Table12. Corporation data in 2003(Hospital reporting system) Tiruchirappalli, Tamilnadu

Months	ADD Cases
Jan	14
Feb	21
Mar	20
April	18
May	23

Analysis of existing reporting system in urban area

SWOT Analysis of existing reporting system in urban area

Strength

- Organized setup
- Trained work force

Weakness

- Understaffing
- Inadequate and irregular, case finding, supervision
- Reporting system Analysis, Interpretation and Laboratory are inadequate
- Response mechanisms are inadequate
- Private Sector are not covered
- No Rapid response team
- Over burden with other activities like sanitation
- Inadequate training leading to non-understanding and haphazard approach to control of epidemic
- Poorly developed infrastructure for monitoring

- Poor record keeping leading to lack of analysis and interpretation of the collected data
- Lack of feedback system
- Number of vertical programs like NAMP/ RNTCP / NPEP/ HIV-AIDS are functioning independently leading to significant duplication of resources and poor interdepartmental coordination

Opportunities

- High literacy
- Private nursing homes
- Connectivity To All areas

Threats

- Poor perception by doctors
- Unorganized Private Sector
- Lack of inter and intra- sectoral co-ordination

14.Shortcomings

As for as staff strength is concern, it fulfills norms for the rural setup but insufficient male staff. But their reporting system performance is not upto the expectation. It needs much more improvement at least to identify the diseases of epidemics potential through their reporting system.

SWOT analysis of reporting system in rural area

Strength

- Sufficient female staff
- Organized setup,
- Trained Work force
- There is a Rapid response team
- Availability of an existing Disease reporting system system
- Availability of manpower/ infrastructure from periphery to centre.
- Reporting of communicable diseases on weekly/ monthly basis. Reporting channels are clearly established
- Outbreak reporting with the help of rumor register.
- Laboratory setup is available at district hospital.

- Ongoing vertical programs like NAMP/ RNTCP/ RCH/ NLEP/ HIV-AIDS are successfully implemented.
- Availability of training institutes at state & district level.

Weakness

- No case definition is available for all diseases
- Insufficient male staff
- Inadequate supervision and training
- Outbreaks are not recognized early due to lack of training and late reporting
- Analysis, Interpretation, and Laboratory are inadequate
- Private Sector are not covered
- Lack of co-ordination and linkages at various levels
- Too many reporting formats and records
- Duplication of work due to vertical Programme
- Record keeping and response mechanism are not followed in systematic way.
- Inadequate training leading to non-understanding and haphazard approach to control of epidemic situation

Opportunities

- Stabilizing population
- Increasing literacy and awareness
- Connectivity to ll areas by roads
- Information Technology revolution for easy communication

Threats

- High birth order
- Insufficient Employment opportunities
- Non-participation of community in planning Lack of co-ordination and linkages at various levels

14.Other public sector hospitals

There are no reporting system activities available in the public sector Hospitals like, OFT BHEL, hospital, which are located in this block. They cater the needs of their employees and their families. They are not keeping any information or data for the

disease of epidemic potential (ADD) except the in patient information if they are admitted in the hospital. They are not aware of reporting system activities. Most of the employees are staying outside the township area and may be potential risk factors for ADD cases. They must be included in the reporting system.

15.Networking in the event of outbreaks

Net working is needed at the gross root level as well as at the district level not only at the time of epidemic but also for the control and prevention of epidemic prone diseases. We recommend the networking at various level and department to be included in the networking as shown in the chapter 1.2 (Figures 3 and 4).

16.Level of integration and the challenges

Within the health department there are so many compartments are available like directorates of public health, medical services, medical education, family welfare, ESI, Indigenous system of medicines. There is a Govt. rule to integrate the DMS AND DPH at the district level and we don't see any improvement after the integration

The other problem in integration is the existing vertical Programme. Though DDHS is practically implementing all health Programmes in the district, his office is not having the data for the diseases like TB, because it is collected, & consolidated by another DD who is under the control of DMS. This is the biggest challenge for integration

The another challenge is How to integrate & manage the existing programmes especially the international agencies funded Programme like AIDS, and RCH Programme

At What level integration to be done, is another problem i.e. is it at the district level or at the state level or at the gross root level.

How to deal with the other public sector hospitals like BHEL, Railway and OFT Hospitals. This is another challenge. So far it is practically neglected and they are not maintaining any reporting system mechanism for themselves

Recent studies show that >70% of the people are going to private hospitals and clinics both in urban and rural area for treatment Without involving the private sector including the indigenous system the data collection will be an incomplete one. How to get involve the unorganized and organized private sector is a biggest challenge for the reporting system.

The recent trend of seeking alternative medicine for treatment like Ayurveda, Siddha, Unani, and Homeo system of medicines is ever increasing both in Govt. and the private sectors. Without involving the indigenous system the data collection will be an incomplete one .How to get involve the unorganized indigenous system is biggest challenge.

Another challenge is how to get the data from the private hospitals and laboratories? Is it through the motivation or through legally and is it active one or a passive one.

We recommend 3 phase of integration and methods of integration to overcome these challenges

1. At the district level integrating all the health compartments in phase1
2. Integration of all the private sectors in phase 2
3. Integration at the state level in phase3

17.Conclusions and recommendations

Even though reporting system exists, in practical it is only a reporting system. The methods of collection and its quality are not up to the expected level. The available case definitions are not applied in the field level because of inadequate training and equipment. Staff strength especially of male component is fast depleting resulting in inadequate reporting system. The head of the P.H.C. is a Medical graduate having little or no knowledge about the importance of reporting system. Their stay at P.H.C. is very short period. Whatever training they get, it is neither useful to them or to the community because once the training is over, they will leave the P.H.C. either for higher study or leave for urban hospital .In urban areas, even though system is available; it is poorly implemented because of inadequate staff, in sufficient training and some administrative problems. It is clear that there is a data collection mechanism in place. However, there is scope for improvement in this. To strengthen the reporting system, laboratory support needs to be in place to confirm diagnosis. Finally, to improve the coverage of the reporting system, the private sector should be involved

- Written guidelines to be made available to all field level workers and adherence to the manual all times to be insisted upon
- Standard forms and registers to be made available field level workers.

- Manpower to be increased keeping in view of the population under reporting system
- "Reporting system and Epidemic Preparedness and Response" training to be imparted to all District Health Officials and Medical officers
- Staff Strength to be improved both in urban and rural area.
- Pre service and in service training, and on the job training to be strengthened.
- Private hospitals, Public sector hospitals and laboratories should be included.
- Supervision by the medical officers to the field to monitor and give training to be improved.
- Public health Act to be enforced in true spirit. in order to make private sector hospitals and institutes to notify the epidemic prone diseases
- Decision makers to be motivated in such a way to understand the importance of reporting system.
- Integration of all the existing Reporting system system and vertical programmes

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Annexure1.

Table 1. Health Sub-centre level Core activity (n=19), Tiruchirappalli Tamilnadu

Core activity	Yes	No
Detection and registration		
Knowledge about the disease	19	
Knowledge about the case definition		19
Knowledge about the reporting system		19
Had an outpatient register/diary	19	
Had adequate supply of outpatient registers in previous 6 months		19
Reporting		
Had adequate supply of reporting forms in previous 6 months		19
Reporting regularly	19	
Sending./reporting Zero report	19	
Feedback		
Received feedback from higher levels	19	
Support activity	19	
Supervision (by PHC level)		
Reporting system activities supervised in 6 months before the assessment	19	
Reporting system activities reviewed during three prior visits	19	
Reporting system data reviewed during past year	19	
Feedback provided on reporting system during past year	19	
Training		
Received post-basic training in general epidemiology		19
Received post-basic training in reporting system	19	

Table 2.Activity at the PHC (N=8) level, Tiruchirappalli Tamilnadu.

Knowledge and practice about reporting system by M.O	Good	Fair	Not fair
Knowledge about the disease	8		
Knowledge about the reporting system		1	7
Knowledge about the case definition		2	6
Knowledge about the data analysis			8
Knowledge about the disease Outbreak investigation		3	5
Activity at the PHC	YES	NO	
Reporting			
Had adequate supply of reporting forms in previous 6 months	8		
Found reporting forms easy to use	8		
Found reporting forms too time consuming	8		
Submitted all previously required reports	8		
Had zero reporting	8		
Analysis			
Analyzed data by person	8		

Analyzed data by place	8		
Analyzed data by time	8		
Prepared trend data	8		
Had population denominator data	8		
Calculated case fatality rates	8		
Calculated incidence or prevalence values	8		
Outbreak investigation			
Conducted or been involved in an outbreak investigation	8		
Community prevention and control			
Conducted at least one meeting with community in past year	8		
Feedback			
Received feedback from a higher level	8		
Updated health staff on outbreaks or local data		8	
Support activity			
Supervision			
Supervision (by district level)	8		
Reporting system activities supervised in 6 months	8		
Reporting system activities reviewed during three	8		
Reporting system data reviewed during past year	8		
Feedback provided on reporting system during past year	8		
Training			
Received post-basic training in general epidemiology			
Received post-basic training in reporting system (RCH)	8		

Table 3.Activity at the District level, Tiruchirappalli Tamilnadu

Core activity	
Reporting	
Had adequate supply of reporting forms in previous 6 months	YES
Found reporting forms easy to use	YES
Found reporting forms too time consuming	No
Submitted all previously required reports	YES
Had zero reporting	YES
Analysis	YES
Analyzed data by person	NO
Analyzed data by place	NO
Analyzed data by time	NO
Prepared trend data	NO
Had population denominator data	YES
Calculated case fatality rates	NO
Calculated incidence or prevalence values	NO
Outbreak investigation	
Conducted or been involved in an outbreak investigation	2

community educational activities after outbreak	10
Community prevention and control	10
Conducted community survey within past 2 years	10
Conducted at least one meeting with community in past year	10
Feedback	
Received feedback from a higher level	YES
Updated health staff on outbreaks or local data	YES
Support activity	YES
Supervision	
Supervision (by district level)	YES
Reporting system activities supervised in 6 months	YES
Reporting system activities reviewed during three	YES
Reporting system data reviewed during past year	YES
Feedback provided on reporting system during past year	YES
Training	
Received post-basic training in general epidemiology	NO
Received post-basic training in reporting system	YES

Table 8. Number of ADD cases reported to district from PHC Tiruchirappalli, Tamilnadu, 2003.

Year	No of cases	Deaths
1996	340	9
1997	415	4
1998	1101	7
1999	517	4
2000	440	3
2001	273	2
2002	726	7

Table 4. ADD cases through Morbidity report (Monthly -Passive Reporting system) Tiruchirappalli Tamilnadu.

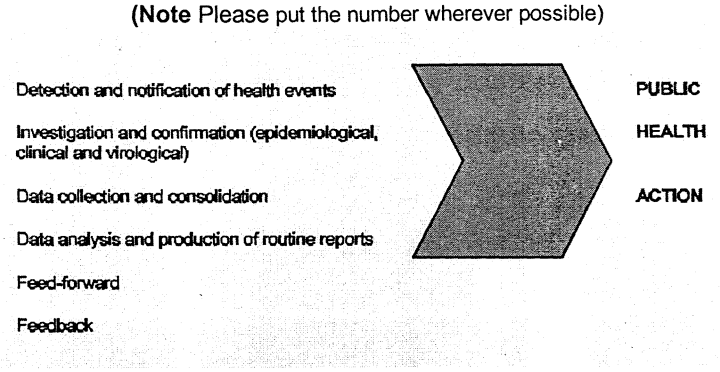
Category	Jan 2003			Feb.			Mar			April			May			June		
	M	F	Total	F	M	F	M	F	M	F	M	F	M	F	M	F		
District	550	581	1131	493	512	1008	533	541	1074	577	660	1237	566	589	1155	575	590	1165
Corporation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Block			130			89			123			87			119			143
Sentinel block																		

Annexure 2

Questionnaires used in this survey

Questionnaire for The Medical officers

(Note Please put the number wherever possible)



What does the above picture mention?

1.IDENTIDIFICATION DATA

Name Age S .Male2. Female

Address

Designation

Duration of services

Duration of services in the present position

2.General information

1.Did you undertake any survey or enumeration this year? IYES 2NO

2.What is the population size?

3.Age wise

4.Sex wise

5.What are the common health problems in our area?

1. 2. 3.

6.What are the district s/country's priority diseases?

1. 2. 3.

4 5 6

7.What are the criteria to identify country's priority diseases?

1. 2. 3.

4 5 6

3.**INFORMATION FOR THE DISEASE SURVEILLANCE**

A. Routine surveillance policies/practices

1.Is there any ***mandatory Routine health information/surveillance for any diseases?*** IYES 2NO 3 DON'T KNOW

List diseases, *if yes*:

1. 2. 3.

4 5 6

2.Is there any national manual for Routine health information/ surveillance? IYES 2NO 3 DON'T KNOW

3. *If yes*, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease

---

4.Is there any ***Routine surveillance policies/practices at various level like central, state, district /, PHC AND SUB -Center level? IYES 2NO 3 DON'T KNOW***

☐

5.Is there any written guideline as how data should be collected, recorded and reported at each level? IYES 2NO 3 DON'T KNOW ☐

6.Are the surveillance policies, strategies and procedures clearly defined?
In a standardized manner? IYES 2NO 3 DON'T KNOW ☐

Disease surveillance system

Do you know what is Routine health information/ Disease Surveillance system? IYES 2.DON'T KNOW ☐

If yes define surveillance?

What is the Population under surveillance in our area? ☐

What are the Events under Routine reporting/ surveillance?

1._____ 2._____ 3._____

4_____ 5_____ 6_____

Where the events are detected? 1.at the field level 2.at the sub centre3. PHC level 4.All ☐

What are the principles of surveillance?

1._____ 2._____ 3._____

4_____ 5_____ 6_____

What are the objectives of surveillance? Put (tick mark) where you agree.

1	Detecting and monitoring outbreaks/ epidemics	7	Identify disease risk factors
2	Monitoring disease trend	8	Lead to improved Health planning
3	Identifying contacts and administering prophylaxis	9	Helps in Research
4	Generating Hypothesis about aetiology of the disease	10	Influencing policy makers
5	Estimate morbidity and mortality	11	Any other (Specify) _____
6	Contribute to the prevention and control of disease condition	12	All the above

Are the objectives for surveillance of each disease clearly defined? IYES 2NO 3 DON'T KNOW

Is the system meeting these objectives efficiently? IYES 2NO 3 DON'T KNOW

Describe the Routine health information/ surveillance system, including the reporting system in your area

---

Do you know the different Disease Surveillance system available in your area? I.YES 2. DON'T KNOW

If yes what are the different surveillance systems?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

What are the components of surveillance? Put (Tick mark) where you agree.

1	Data Collection	5	Feed back
2	Data compilation	6	Action taken
3	Data Transmission	7	Any Other (mention)
4	Data analysis	8	All the above
		9	No component

In which of the above components are you involved?

Which components are functioning satisfactory?

Data collection methods, data flow and reporting procedures

Data collection methods,

Describe of data collection methods?

Describe the Designated personnel for the surveillance at each level.

Do you have standard case definitions/criteria for reporting the country's priority diseases?

1. Yes 2. No 3. Unknown

Observe the standard case definition / criteria for reporting of each priority disease

Are you following the case definition/ criteria for Disease Surveillance Systems /while detecting cases? Yes (1), No (2)

If yes, do you follow only lay case definition or WHO recommended case definitions like probable, suspected, or confirmed Yes (1), No (2) ☐

Do you have any guidelines other than case definition to identify diseases Yes (1), No (2)?

Which case definitions do you think are difficult to understand? ☐

What is the time gap between notification and the actual onset of outbreak during past 2 years?

What is the time gap between n☐h and the actual onset of Illness during past 1 Month/2 years? ☐

Recording Procedure

Describe the recording procedure?

What are the registers and records maintained for the diseases surveillance?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

Data flow procedures

Describe the *data flow procedure sat each level?*

Reporting procedures

Describe the *reporting procedures*?

What is the reporting time interval in Surveillance? Weekly (1), BI- weekly (2), Monthly (3)

☐

Do you have standardized reporting formed for the diseases under surveillance? Yes (1), No (2)

☐

Is it easy or difficulty to follow? 1.easy 2. Difficult to follow ☐

The information required in the reporting format is sufficient or too much unnecessary information is included? ***1.*** Sufficient 2 too much ☐

Is the central level responsible for providing surveillance forms to the health facilities? 1 yes 2 no 3 don't know ☐

If yes, have you lacked appropriate surveillance forms at any time during the last 6 months. Yes (1), No (2) ☐

Percent of reports (either directly or through an intermediate level) received each reporting period during the past 3 months ☐

Number of reports in the last 3 months compared to expected number ☐

On time

Number of reporting units in your areas ☐

Number of weekly reports received on time: ☐

Number of monthly reports received on time ☐

Number of reports received on time with full information ☐

(Complete shape)

Number of monthly reports sent on time to the high level ☐

Number of weekly reports sent on time to the high level ☐

Is zero reporting compulsory Yes (1), No (2) ☐

How many zero reporting have you received/sent this year? ☐

INFORMATION FOR THE PRIORITY DISEASE

What are the diseases included in the ADD Category?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

What is diarrhea?

_____

_____

How it spreads?

_____

_____

What are the symptom and signs of diarrhea?

_____

_____

How will you identify and classify the dehydration?

_____

_____

Is there any treatment for diarrhea? 1 yes 2 no 3 don't know ☐

What are they?

1. 2. 3.

4 5 6

What are drugs given to the affected people as per standardized case management?

1 2. 3.

5 6

What is the dose schedule for diarrhea?

Is there any standardized case management for diarrhea? IYES 2NO 3 DON'T KNOW

Any Cases treated last year? IYES 2NO

If yes how many

Is it preventable? 1 yes 2 no 3 don't know

What are the programmes related to diarrhea?

How many ADD cases identified in your surveillance this year?

How many new ADD cases identified in the last 15 days?

Which area and population are at risk for developing for diarrhea in your sub centre?

Do you know what is ORT/ORS/ ORT Corner? 1 yes 2 no 3 don't know

Do you have ORT Corner in your Hospital? 1 yes 2 no

What is the purpose of taking ORS?

How will you advice the people to take ORS?

What is the dose schedule for diarrhea?

How often ORS to be given to the people 1.once in a year 2 don't know 3 as per the dehydration

Do you know its side effects 1.yes 2 don't know? ☐

If yes, what are they?

What is your requirement of ORS this year? ☐

How much have you received? ☐

How much used> how much not used? ☐ ☐

How many ADD cases are referred to hospital during this year 2002? ☐

Have you identified any outbreak of cholera in your area during the last two years? 1 yes 2 no 3 don't know ☐

IF YES HOW MANY? ☐

ANY DEATH? 1 yes 2 no 3 don't know ☐

What will you do in the event of Outbreak? 1.inform the District authority 2. Advice them to go to hospital 3 give first aid and refer4. Any other activities 5.all ☐

Analysis and use of data

How will you assess your programme performance in your District?

Have you done it? Yes (1), No (2) ☐

What was the result?

Are you analysing the data collected? Yes (1), No (2) ☐

Describe the Data management and analysis procedures and outputs

---

Who will do the analysis? ☐

How often is it done? ☐

What are the findings of the analysis report?

Describe data by person (case based, outbreaks, sentinel)?

Observe description of data by age and sex.

Describe data by place? Yes (1), No (2) ☐

Describe data by time? Yes (1), No (2) ☐
Perform trend analysis? Yes (1), No (2) ☐

Observe line graph of cases by time List disease(s) for which line graph is observed

Do you have an action threshold defined for any of the country's priority diseases? Yes (1), No (2) ☐

Do you have an action threshold for any diseases targeted for eradication or elimination? Yes (1), No (2) ☐

If yes, what is it? Cases % increase rate

(Ask for two priority diseases)

Eradication

Epidemic prone

Have appropriate denominators? Yes (1), No (2) ☐

If yes what is the source of your denominator?

Observe presence of demographic data E.g. population by district and hard to reach groups)

Use appropriate denominators? Yes (1), No (2) ☐

Describe the Response and follow-up mechanisms.

Case investigation and outbreak response

Number of outbreaks suspected in the past year ☐

List the diseases

Of those, number investigated

(Observe reports and take copies if possible)

Number of outbreaks in which risk factors were looked for

Number of outbreaks in which findings were used for action

[Observe report]

Epidemic preparedness (relevant for epidemic prone diseases)

Is there any Existence of a national plan for epidemic preparedness and response? Yes (1), No (2) Don't know (3)

Observe a written plan of epidemic preparedness and response

Existence of emergency stocks of drugs, vaccines, and supplies at all times in past 1 year

Has the country/state/district/PHC had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year? Yes (1), No (2)

Observe the adequacy of stocks of drugs, vaccines and supplies at time of assessment

Drugs

ORS

IVF

DISINFECTANT

Has the country/State/District /PHC experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? Yes (1), No (2)

Is there any standard case management protocol for epidemic prone diseases? Yes (1), No (2)

If yes list

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

Observe the existence of **a written case management protocol** for at least 1 priority disease

---

Is there a budget provision for epidemic response? Yes (1), No (2)

Is there any District level epidemic management committee?

Yes (1), No (2) ☐

Observe report of epidemic management committee

_____

Does the District have a rapid response team for epidemic? Yes (1), No (2)

☐

Response to epidemics

Is there any epidemic preparedness contingency plan for the /PHC district? Yes (1), No (2)

☐

Ability of the District level to respond within 48 hours of notification of most recently reported outbreak

Observe that the central level responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

_____

_____

Describe the Overview of laboratory support and policies

Do you have the facilities to collect sample for analysis for epidemic prone diseases? Yes (1), No (2)

If yes how will you collect samples? ☐

_____

Is their any standardized procedure for collecting the specimen? Yes (1), No (2) ☐

How many samples collected during 2002?Catecory wise?

_____

_____

What were the results of the analysis?

How will you transport the specimens?

_____

Do you have the facilities to store the specimen before transporting? Yes (1), No (2 ☐

Where will you send the specimen?

_____

What are the facilities do you have to collect the specimen at each level?

_____

Supervisory activities conducted for surveillance

Describe the Supervisory activities conducted for surveillance

_____

_____

How many supervisory visits should a supervisor make in a month at PHC/Block/ level?

Percent of supervisors that ma[ ] of supervisory visits in the past 6 months

How many supervisory visits ha[ ]t 6 months?

What is your observation?

Do you help them to improve their knowledge/ to rectify the defect /. Help to solve the problem? Yes (1), No (2)

If yes what are they?

---What are the reasons for not making all required supervisory visits?

1.no vehicle 2. No time 3. Too busy in op 4.single MO 5 on leave 6.meeting

7. Any other reason

Is anybody supervising your Surveillance work? Yes (1), No (2)

If yes mention the designation of the supervisors_____

How many times he /she supervises in a month?

What is his/her observation?

Do they help you to improve your knowledge/ to rectify the defect /. Help to solve the problem Yes (1), No (2)

Describe the training activities conducted for surveillance

What percent of your subordinate personnel have been trained in surveillance?

Have you received any post-basic training in **disease surveillance**? Yes (1), No (2)

If yes, specify when, where, how long, by whom?

Percent of health personnel that have received post-basic training in epidemic management?

Have you received any post-basic training in **epidemic management**? Yes (1), No (2)

If yes, specify when, where, how long, by whom?

In an average how many hours have you spent in the training?

How many times have you undergone training on Disease Surveillance Systems?

Do you feel additional training is needed? Yes (1), No (2) ☐

Obtain and analyze the content of the surveillance and epidemic management training Module and observe its

Strengths

Opportunities

Threats

Weakness

Resources

Percent of sites that have

1.Data management

Computer

Printer

Photocopier

Data manager

Statistical package

2.Communications

Telephone service

Fax

Computers that have modems

3.Manpower

_____

_____

_____

4. Logistics For surveillance

Reportingformat_____

_____Others_____

_____

Opportunities for strengthening surveillance

How could surveillance be improved?

_____

_____

_____

Surveillance co-ordination

Is there a surveillance co-ordination body at District level?

Yes (1), No (2) don't know (3) ☐

If yes, describe its composition, function and links to various sectors including the laboratory

Is there a focal unit for surveillance at the **District** level?

Yes (1), No (2) don't know (3) ☐

Feedback and feed-forward mechanisms

Describe the Feedback and feed-forward mechanisms

Are you getting /giving any feed back on Surveillance from higher level/lower level? Yes (1), No (2) ☐

If yes How many times in a month / year? ☐

How are you getting/giving the feedback?

Is there any capacity for publication of health and surveillance information at the district/state? Yes (1), No (2) don't know (3) ☐

Is there any report or bulletin that is regularly produced to disseminate surveillance data? Yes (1), No (2) don't know (3) ☐

IF yes how many feedback bulletin or reports has the central level/district level produced in the last year? ☐

Observe the presence of a report or bulletin that is regularly produced to disseminate surveillance data

Is there Good collaboration/regular communication among surveillance, laboratory, immunization and clinical staff? Yes (1), No (2 ☐

Is there at the Ministry of health any publication? Yes (1), No (2) don't know (3) ☐

What are the other Disease Surveillance Systems available in our district?

Opportunities for integration

What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)?

What is your suggestion regarding how all surveillance can be linked?

What are the Diseases / Syndromes that currently under Surveillance?

		4	
		5	
		6	

What are diseases / syndromes that you suggest to be added or deleted from Surveillance? List

		4	
		5	
		6	

Do you accept Routine report/ Surveillance system because? ☐

1) It is your government job responsibility
2) It is useful for the Health system
3) It creates interest in you
4) Any other

Do you feel surveillance system is additional burden but Useful (1) / Not useful (2)

☐

Do you feel surveillance system is complementary? Yes (1), No (2) ☐

What types of constraints are you facing for Surveillance in your set up?

1. _____ 2. _____ 3. _____

4. _____ 5 _____ 6. _____

How the data collected through Surveillance is used by you?

By using the surveillance system how many outbreak identified or forecasted category wise?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

Questionnaire for health workers (Male &Female)

(Note: Please put the number wherever possible)

1.**IDENTIDIFICATION DATA**

Name Age Sex 1.Male2. le

Address

Designation

Duration of services

Duration of services in the present position

2.General information

1.Did you undertake any survey or enumeration this year? IYES 2NO

2.What is the population size?

3.Age wise

4.Sex wise

5.What are the common health problems in your area?

3.**INFORMATION FOR THE DISEASE SURVEILLANCE**

A. Routine surveillance policies/practices

1.Is there any mandatory Routine reporting/surveillance for any diseases? IYES 2NO 3 DON'T KNOW

List diseases, *if yes*:

1. 2. 3.

4 5 6

2.Is there ***any*** a national manual for surveillance? IYES 2NO 3 DON'T KNOW

3. *If yes*, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease

4.Is there any Routine surveillance policies/practices at various level like central, state, district /, PHC AND SUB -Center level IYES 2NO 3 DON'T KNOW

5.Is there ***any*** written guideline for how data should be collected, recorded and reported at each level? IYES 2NO 3 DON'T KNOW

6.Are the surveillance policies, strategies and procedures clearly defined in a standardized manner? IYES 2NO 3 DON'T KNOW

Disease surveillance system

Do you know what is Disease Surveillance system? IYES 2.DON'T KNOW ☐

If yes define surveillance?

_____

_____

What is the Population under surveillance in your area? ☐

What are the Events under surveillance?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

Where the events are detected?1.at the field level 2.at the sub centre3.both ☐

What are the principles of surveillance?

What are the objectives of surveillance? Put (tick mark) where you agree.

1	Detecting and monitoring outbreaks/ epidemics	7	Identify disease risk factors
2	Monitoring disease trend	8	Lead to improved Health planning
3	Identifying contacts and administering prophylaxis	9	Helps in Research
4	Generating Hypothesis about aetiology of the disease	10	Influencing policy makers
5	Estimate morbidity and mortality	11	Any other (Specify) _____
6	Contribute to the prevention and control of disease condition	12	All the above

Are the objectives for surveillance of each disease clearly defined? IYES 2NO 3 DON'T KNOW

Is the system meeting these objectives efficiently? IYES 2NO 3 DON'T KNOW

Describe the surveillance system, including the reporting system in your area

Do you know the different Disease Surveillance system available in your area? I.YES 2. DON'T KNOW ☐

If yes what are the different surveillance systems?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

What are the components of surveillance? Put (Tick mark) where you agree.

1	Data Collection	5	Feed back
2	Data compilation	6	Action taken
3	Data Transmission	7	Any Other (mention)
4	Data analysis	8	All the above
		9	No component

In which of the above components are you involved?

Which components are functioning satisfactorily?

Data collection methods, data flow and reporting procedures

Data collection methods,

Describe data collection methods,

Do you have standard case definitions/criteria for the country's priority diseases? 1. Yes 2. No 3. Don't know

Observe the standard case definition for each priority disease

Are you following the case definition / criteria for the Disease Surveillance Systems while detecting cases? Yes (1), No (2)

If yes, do you follow only lay case definition or WHO recommended case definitions like probable, suspected, or confirmed -Yes (1), No (2)

Do you have any guidelines/ criteria other than case definition to identify diseases Yes (1), No (2)

Which case definitions do you think are difficult to understand?

What is the time gap between notification and the actual onset of outbreak during past 2 years?

What is the time gap between n[illegible]n and the actual onset of Illness during past 1 Month/2 years?

Recording Procedure

Describe the recording procedure?

What are the registers and records maintained for the diseases surveillance?

1. 2. 3.

4 5 6

Reporting procedures

Describe the *reporting procedures*?

What is the reporting time interval in Surveillance? Weekly (1), Bl- weekly (2), Monthly (3) ☐

Do you have standardized reporting format for the diseases under surveillance? 1 yes 2 no 3 don't know ☐

Is it easy or difficulty to follow? 1. Easy 2. Difficulty to follow ☐

The information required in the reporting format is sufficient or too much unnecessary information is included?

1. Sufficient 2 too much ☐

Is the District/ .PHC level responsible for providing surveillance forms to the health facilities? 1 yes 2 no 3 don't know ☐

If yes, have you lacked appropriate surveillance forms at any time during the last 6 months. 1 yes 2 no 3 don't know ☐

Number of reports sent in the last 3 months compared to expected number ☐

On time

Number of weekly reports sent on time: ☐

Number of monthly reports sent on time: ☐

Are you sending nil report 1 yes 2 no 3 don't know ☐

Data flow procedures

Describe the *data flow procedures*

INFORMATION FOR THE PRIORITY DISEASE

What are the diseases included in the ADD Category?

1. 2. 3.

4 5 6

What is diarrhea?

How it spreads?

What are the symptom and signs of diarrhea?

How will you identify and classify the dehydration?

Is there any treatment for diarrhea? 1 yes 2 no 3 don't know ☐

What are they?

1. 2. 3.

4 5 6

What are drugs given to the affected people as per standardized case management?

1. 2. 3.

4 5 6

What is the dose schedule for diarrhea?

Is there any standardized case management for diarrhea? IYES 2NO 3 DON'T KNOW

Any Cases treated last year? IYES 2NO ☐☐

If yes how many ☐

Is it preventable? 1 yes 2 no 3 don't know ☐

What are the programmes related to diarrhea?

How many ADD cases identified in your surveillance this year? ☐☐

How many new ADD cases identified in your areas in the last 15 days? ☐

Which area and population are at risk for developing for diarrhea in your sub centre?

Do you know what is ORT/ORS? 1 yes 2 no 3 don't know ☐

What is the purpose of taking ORS?

How will you advice the people to take ORS?

What is the dose schedule for diarrhea?

How often ORS to be given to the people 1.once in a year 2 don't know 3 as per the dehydration

Do you know its side effects 1.yes 2 don't know? ☐

If yes, what are they?

What is your requirement of ORS this year? ☐

How much have you received? ☐

How much used> how much not used? ☐ ☐

How many ADD cases are referred to hospital during this year 2002? ☐

Have you identified any outbreak of cholera in your area during the last two years? 1 yes 2 no 3 don't know ☐

IF YES HOW MANY? ☐

ANY DEATH? 1 yes 2 no 3 don't know ☐

What will you do in the event of Outbreak 1.inform the PHC Doctors 2. Advice them to go to hospital 3 both 4. Any other activities ☐

Describe the Response and follow-up mechanisms.

Case investigation and outbreak response

Number of outbreaks suspected in the past year? 1.nil2.1 3.2 ☐

List the diseases

Of those, number investigated 1.nil 2.1 3.2 ☐

(Observe reports and take copies if possible

Number of outbreaks in which risk factors were looked for 1.nil 2.1 3.2 ☐

Number of outbreaks in which findings were used for action 1.nil 2.1 3.2 ☐

[Observe report]

Epidemic preparedness (relevant for epidemic prone diseases)

Is there any Existence of a national plan for epidemic preparedness and response? 1 yes 2 no 3 don't know ☐

Observe a written plan of epidemic preparedness and response

Existence of emergency stocks of drugs, vaccines, and supplies at all times in past 1 year

Has the country/state/district/PHC had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year? 1 yes 2 no 3 don't know ☐

Observe the adequacy of stocks of drugs, vaccines and supplies at time of assessment

Drugs
ORS
IVF
DISINFECTANT

Has the country/State/District /PHC experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? 1 yes 2 no 3 don't know

Is there any standard case m gement protocol for epidemic prone diseases? 1 yes 2 no 3 don't know ☐

If yes, list

_____

_____

Observe the existence of a written case management protocol for at least 1 priority disease

Is there a budget provision for epidemic response? 1 yes 2 no 3 don't know

Is there any ct level epidemic management committee? 1 yes 2 no 3 don't know

Does the District have a ra esponse team for epidemic? 1 yes 2 no 3 don't know

Describe the Overview of laboratory support and policies

Do you have the facilities to collect sample for analysis for outbreak prone diseases? 1 yes 2 no 3 don't know ☐

If yes, how will you collect samples?

_____

_____

Is their any standardized procedure for collecting the specimen? 1 yes 2 no 3 don't know

How many samples collected during 2002?

How will you transport the specimens?

Do you have the facilities to store the specimen before transporting? 1 yes 2 no 3 don't know

Describe the Supervisory activities conducted for surveillance

Is anybody supervising your Surveillance work? Yes (1), No (2)

If yes, mention the designation of the supervisors_____

How many times he /she supervises your work in a month?

District Officers

PHC Mo

SHN

CHN

What is their observation?

Do they help you during their supervisory visit 1.To improve your knowledge 2.To rectify the defect 3.to help to solve the problem4. Find fault with me 5.all the above

Describe the training activities conducted for surveillance

Have you been trained in disease surveillance? 1 yes 2 no

If yes, specify when, where, how long, by whom?

Have you received any post-basic training in epidemic management? 1 yes 2 no

If yes, specify when, where, how long, by whom?

In an average how many hours have you spent in the training?

How many times have you undergone training on Disease Surveillance Systems

Do you feel additional training is needed? Yes (1), No (2)

Obtain and analyze the content of the surveillance and epidemic management training and look for its

Strengths

Weakness

Opportunities

Threats

Logistics

How many Reporting format Available at present? ☐

Surveillance co-ordination

Is there a surveillance co-ordination body at District level/PHC level? 1 yes 2 no 3 don't know

If yes, describe its composition, function and links to various sectors including the laboratory

Is there a focal unit for surveilla☐t the **District/PHC** level? 1 yes 2 no 3 don't know

Describe the Feedback mechanisms

Are you getting any feed back on Surveillance from higher level? Yes (1), No (2) ☐

If yes How many times in a month / year? ☐

How are you getting the feedback? ☐

What type of feedback? Please mention

What are the other Disease Surveillance Systems have you involved? ☐

1		4	
2		5	
3		6	

What is your suggestion regarding how all surveillance can be linked?

_____

_____

What are the Diseases / Syndromes that currently under Surveillance?

1. _____ 2. _____ 3. _____

4 _____ 5 _____ 6 _____

What are diseases / syndromes that you suggest to be added or deleted from Surveillance? List

		4	
		5	
		6	

Do you accept Routine report/ Surveillance system because? ☐

5) It is your government job responsibility
6) It is useful for the Health system
7) It creates interest in you
8) Any other

Do you feel surveillance system is additional burden but Useful (1) / Not useful (2)

Do you feel surveillance system is complementary? Yes (1), No (2)

Usefulness

How the surveillance system helpful to you/used by you?

Have you identified /forecast *any outbreak* using the data analysis? 1 yes 2 no 3 don't know

If yes, how many? 1.nil 2.1 3.2

What types of constraints are you facing for Surveillance/ Routine reporting in your set up?

1. 2. 3.

4. 5 6.

2.2. Evaluation of mass drug administration for the control of lymphatic filariasis, Tiruchirappalli, Tamil Nadu, 2003

The pinwheel, logo mentioning the spirit of the Global Alliance, [1] The logo symbolizes shared strength and optimism and memorable. The five elements of the pinwheel form a spiral represents the forward motion of the Alliance with all partners united in a synchronized movement and scheme—all revolving around a dot symbolizing the elimination of and the improvement of millions of people's lives. The one orange arm of the pinwheel, echoed by the orange in the word "free" in the tagline, symbolizes hope for the future free of LF. (Available from: www.filariasis.org.)

1. Background

Lymphatic filariasis (LF) is a major vector-borne disease problem in many developing countries. Globally Lymphatic Filariasis has been recognized as the second leading cause for the permanent and long-term disability [2,4] with deformity and mutilating diseases of limbs and genitals it produces not only physical crippling but also results in psychosocial crippling as well. One of the neglected diseases both by the individual and the community, which disables millions[2,11]

It is responsible for 5 million Disability Adjusted Life Years (DALYs) lost annually and ranking third among the diseases in term of DALYs next to Malaria and tuberculosis[3]. India estimated to have lost 1 million dollars per year due to filariasis.[3] About 119 million people in 73 countries are infected (40% in India alone). The disease is a leading cause of disability[4] and impedes socio-economic development of the affected communities It impairs the mobility both of domestic and occupational activities.

It is very difficult to diagnose the disease without the very tedious and cumbersome standard test procedure. It is difficult to eradicate the vector and the available costly control measures are limited to urban areas. Hence, the only availability weapon to control the diseases is the cost-effective antiparasite drugs. Despite so many hurdles that exist in controlling the ddisease, it is one of the potentially eliminatable diseases. Lymphatic filariasis has been targeted for global elimination.[5] Annual

single-dose mass treatment with diethylcarbamazine (DEC) or ivermectin – is one of the recommended strategies to achieve the goal of elimination.[6,7,10]

The efficacy of single-dose DEC on microfilaria prevalence and intensity has been proved beyond doubt in clinical and small community trials. [2,5,7] The major factor that determines the success of any control/elimination programme is the effective distribution of DEC and good compliance of communities with treatment.[6,7] The effectiveness of programme depends on treatment compliance.

2. Justification

Although there have been some significant successes in the control of the disease, in most endemic countries the burden of lymphatic filariasis remains unaffected, or is even on the increase.[3,8] However, the introduction in recent years of new drugs and single-dose treatment regimens with diethylcarbamazine (DEC) and/or ivermectin has been an important breakthrough for filariasis control. [3,8] To achieve the goal of elimination it is very important to maintain the highest level of coverage and consumption.[2,5,7,10] Data on the treatment compliance achieved in large-scale are necessary to initiate corrective steps and determine the required rounds of annual mass treatment. According to WHO, there is a gap between the reported coverage and observed coverage.

Tamil nadu is one of the endemic states for filariasis and is pioneer in taking control measures. It is implementing mass DEC drug therapy since 1997.[12] This study attempts to assess factors responsible for the coverage and compliance of mass diethylcarbamazine citrate (DEC) administration conducted annually as part of the programme to eliminate lymphatic filariasis in the Tiruchirappalli District of Tamilnadu, India.

Objectives

The following are the objectives of the evaluation:

- To evaluate the mass DEC administration (drug distribution)
- To assess the outcome (in terms of actual consumption)
- To suggest measures to improve the lacunae, if any

3. Magnitude of the problem

LF is a mosquito-borne disease.[3] As the parasites grow in an infected person, they shed microfilaria into the person's bloodstream. The worms are immature, but ready to be passed on in the next stage of their life cycle. If a mosquito bites an infected person, it will absorb the microfilariae as it ingests their blood. The process of development then begins until the tiny parasites are ready to infect another person. They then move within the mosquito's body to the area close to its mouth. Next time the mosquito bites someone the microscopic worms are deposited on the skin. They can then pass through the skin and into the bloodstream, where they begin to mature and spread inside the victim's body causing serious incapacity or disability due to the thousands of worms that build up inside the body, causing swelling of the limbs and genitals and internal damage to organs and the lymphatic system.

Lymphatic filariasis does not kill the body, but it can kill a person economically and socially and leave them ostracised by their own community.[2,4] People with advanced cases of LF often find it difficult to find work; if they are single, it is almost impossible to find a partner; if they are married, their husband or wife may leave them.

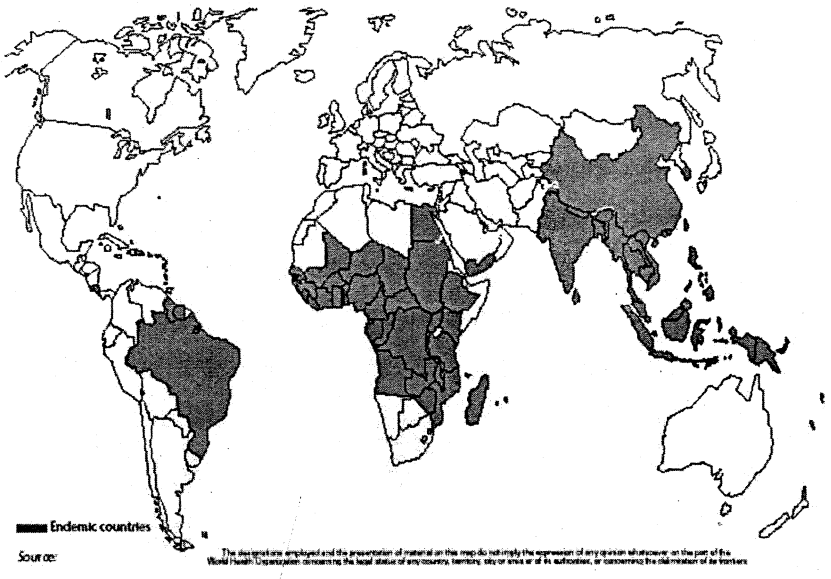
People who are already suffering the effects of lymphatic filariasis will not be completely cured by the drugs, but there are relatively simple measures they too can take to ease the effects of the parasites.

Careful washing of the infected area can prevent the most severe effects of the disease. Researchers now know that the most extreme symptoms of lymphatic filariasis are largely due to secondary bacterial or fungal infections, which can be prevented with good hygiene.

Global scenario

Global distribution of Filariasis[11] is shown in figure 1.

Figure 1. Global distribution of Lymphatic Filariasis, 2001

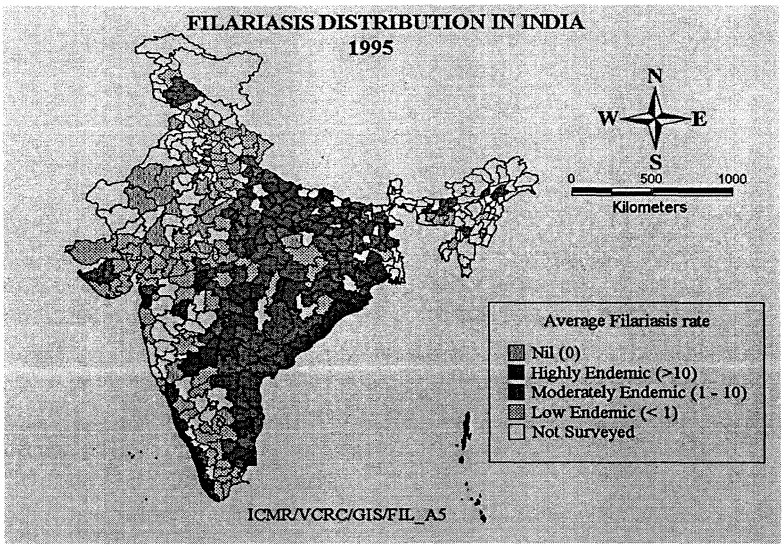


It is around 119 million in spreading over 73 countries. The most affected countries are from less developed countries like India and African countries. In 32 out of 38 least developed countries with a population of 289 million and 11 out of 21 low income countries with a population of 633 million are at risk for developing the lymphatic filariasis.[11]

Magnitude of filariasis in India

The burden of filariasis in India is 412 million spreading over 18 states. Eighteen states/Union territories are endemic. 20 million chronic cases and 32 million microfilaria carriers are present in the country (Figure 2).

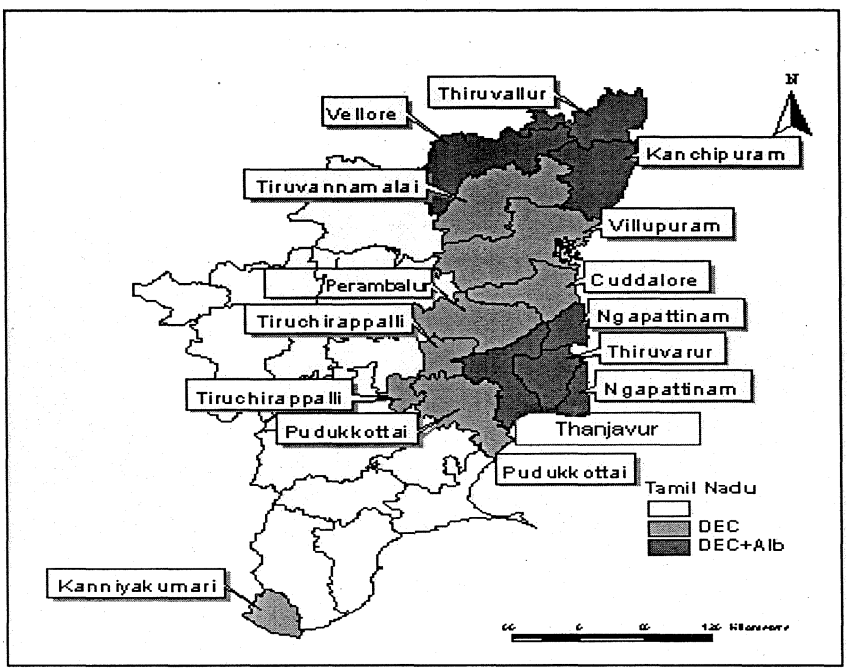
Figure 2.Distribution filariasis in India



Lymphatic filariasis in Tamil nadu

In Tamil nadu out of 30 districts, 13 Districts are endemic for Lymphatic Filariasis. (Figure.3). 29.7 million people are exposed to the risk of infection with a distribution of 22.4 million in rural and 7.3 million in urban areas. Year 2000 statistics accounts for 13564 Hydrocele cases, 22703 Lymphoedema cases, and 2693 mf. carriers in blood were detected in the endemic districts.[12]

Figure 3. . Distribution filariasis in Tamilnadu.



4.Control Activities in India

Evolution of programme for elimination of lymphatic Filariasis in India [13]

National Filaria control programme

The control programme was launched in 1955.The two primary intervention designs namely transmission control and morbidity control were implemented under control programme. About 11% of the population in the endemic districts covered in National Filariasis Control Programme.

The above control measures reduced the transmission potential to some extend. Although there have been some significant successes in the control of the disease, in most endemic countries the burden of lymphatic filariasis remains unaffected, or is even on the increase[3 ,8] With a view to cut transmission potential, WHO recommended a new revised strategy.

The strategy components were

a) Single dose mass DEC therapy at a dose of 6mg/kg once a year

B) Management of acute and chronic filariasis through referral services.

c) Continuation of anti- vector measures

d) IEC for individual and community based protective and preventive measures

A pilot project on mass DEC drug therapy initiated in 1997[12].Following the success of the pilot project, it was extended to all states and finally the programme to eliminate lymphatic filariasis (PELF) with combined mass DEC and Albendazole was introduced since 2000.

Evolution of programme for elimination of lymphatic filariasis in Tamilnadu

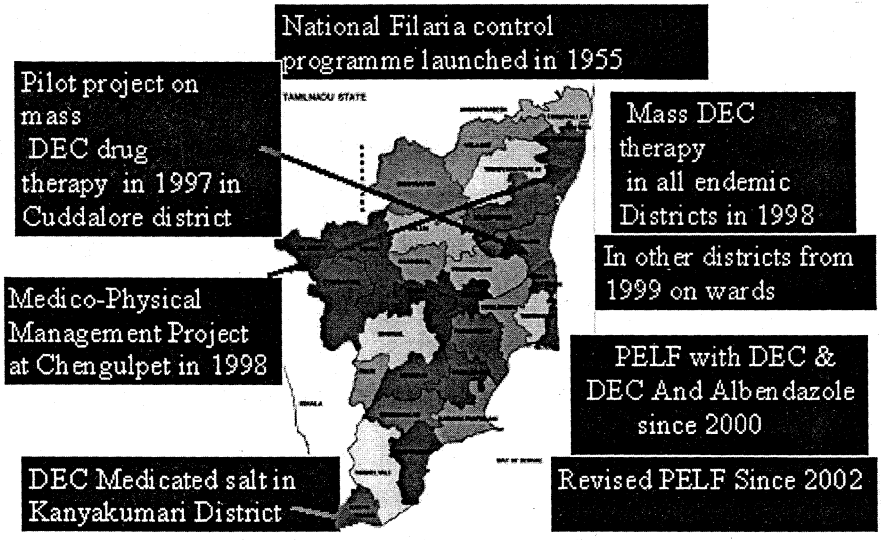
Control Activities in Tamilnadu (Figure 4)

National filarial control programme (NFCP)[13] was launched in 1955 in all 13 endemic districts.The above strategy yielded limited success because of very

tedious diagnostic procedure and costly antilarval measures. Hence, a pilot project of DEC medicated salt was initiated in Kiliyur in Villupuram district. Following the success of the project DEC, medicated salt was implemented in entire Kanyakumari District. However, it was not extended to other district for logistic reasons. Based on the recommendation of WHO, a revised strategy pilot project on mass DEC drug therapy was initiated in 1997 in Cuddalore district. Following the success of the project, this mass DEC drug therapy was extended to all endemic districts in 1998.

For the management of the already affected persons a pilot project of Medico-Physical Management therapy (Heat therapy, air compression and electric stimulation in a single place) was initiated at Chengulpet in 1998. This was later extended to all the endemic districts. Pilot Scale Programme on Co-administration of DEC+Albendazole on started on 25th March 2001 and later extended to other endemic districts.

Figure 4. Control activities for filariasis in Tamilnadu



The concept of mass treatment

A disfiguring disease that can affect everything from a person's sex life to his or her ability to work can be eliminated simply and effectively. [5] All it takes is a dose of two drugs once a year for five years. The tiny worms that spread the disease are killed and prevented from passing on the infection.

Regular annual doses of two drugs can completely prevent the disease being passed on by killing or affecting the parasites in an infected person and killing their

microscopic offspring. Then there is no infection for a mosquito to pick up and pass on to others.

As mentioned earlier, the efficacy of single-dose DEC on Microfilaria prevalence and intensity has been proved beyond doubt in clinical and small community trials. [3] The idea is to treat the entire 'at risk' population, which means about one billion people worldwide, for a period long enough to ensure that levels of Microfilaria in the blood remain below those necessary to sustain transmission. [3] Annual doses of two drugs are needed for approximately four to six years, which is the reproductive lifespan of the parasite[3]

One of benefits of mass DEC is that the tedious procedure for night blood survey to identify the mf carrier and diseased persons will be reduced.

The activities related to the implementation of mass therapy

The following are the activities related to the implementation of mass drug administration in a community:

1. Sensitization of the health service and the community;
2. Development and utilization of health education messages and IEC materials;
3. Choice of distributors as well as timing and mode of drug distribution;
4. Training of the various actors at all levels, and
5. Procedures for drug distribution, monitoring and record keeping.

The various activities of mass DEC therapy are given below. Three different stages namely before, during and after DEC administration are present namely

- Preparatory phase
- Implementation phase
- Evaluation phase

A.Preparatory phase

1) Selection of sentinel sites

Delimitation of filariasis endemic areas by using rapid assessment procedures (RAP) (RAP survey)

2) Resource mobilization like manpower, drug, IEC and other materials

3) Training to health workers and volunteers

4) Enumeration

5) Social Mobilization

6) Pre entomological and Parasitological Survey

B. Implementation phase

1) Distribution of drugs (House to house)

2) Observation and active reporting system for adverse reactions

C. Evaluation phase

1) Estimation of drug distribution and consumption
2) Community acceptance
3) Management of adverse reaction
4) Post mass DEC entomological and Parasitological survey (Impact assessment)

Mass Treatment in Tamil Nadu

Introduction of mass DEC in 1997

In the year 1997, the mass DEC treatment strategy was introduced. The activities carried out were

- Mapping of endemic area
- Enumeration to assess the disease load
- IEC Activities
- Door-to-Door delivery of DEC by health workers- 1 Week
- Consumption in presence of health workers

The dose schedule is given in Table 1.

Table 1. Dose Schedule for Mass DEC in 1997,Tamilnadu.

Age group (in years)	<1	1-2	3-4	5-8	9-11	12-14	>12 years
Single dose of DEC (mg)	Nil	50	100	150	200	250	300

New strategy in 2000

The programme to eliminate lymphatic filariasis (PELF) with combined mass DEC and Albendazole since 2000 was introduced with combination drug therapy (DEC+Albendazole) in 6 districts

Mass DEC treatment in 2002

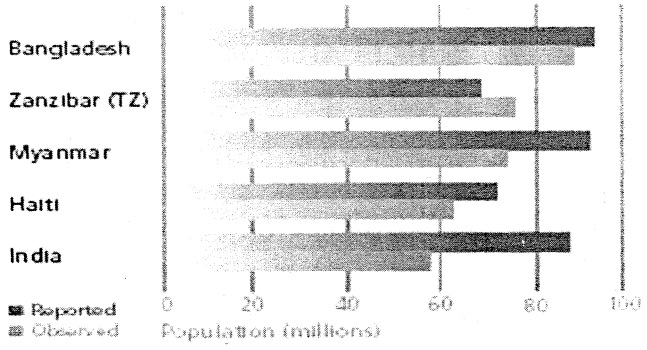
The following new features are introduced in 2002 in Mass DEC treatment

- Revised PELF strategy with the introduction of filaria prevention assistants (FPA) and COMBI-PLAN
- Introduction of Filariasis Prevention Assistant (FPA)
- Introduction of "combiplan" as advocacy tool
- Limiting drug distribution to "Single day"
- Reducing the treatment class from 6 to 3 (2-5 years 100 mg, 5-14 years 200 mg and above 14 years 300 mg)
- Use of uniform DEC strength (100 mg) i.e., reduce number of tablets

Problems in Mass treatment

The major factor that determines the success of any control/elimination programme is the effective distribution of DEC and good compliance of communities with treatment. The effectiveness of programme depends on the drug distribution & treatment compliance. According to WHO, there is a gap between the reported coverage and observed coverage (Figure 5).

Figure 5. Gap between the reported coverage and observed coverage



* Drug coverage calculated as percentage of people administered the drugs over total population in IUs

The need for evaluation of mass DEC strategy

To achieve the goal of elimination it is very important to maintain the highest level of coverage and consumption. Data on the treatment compliance are necessary in order to initiate corrective steps and determine the required rounds of annual mass treatment. However, only limited data are available to assess the treatment compliance. Hence, the evaluation of the programme is undertaken.

5. Methods

The methodology for the *process evaluation* was mainly qualitative[3] and consisted of in-depth interviews with community leaders, distributors and health workers, and a few focus group discussions (FGDs) with community members. The evaluation addressed in particular

(i) Training of health workers (content and method of training),

(ii) Sensitization of the community (approaches and forum)

(iii) Selection of the distributors

(iv) Operationalization of treatment (how and where drug was delivered, availability, storage and delays, distribution, rationale for the mode of distribution, compliance, constraints, any payment made), and

(v) Awareness & experience of the community with the other community-based programmes.

The evaluation of the effectiveness of the different approaches was done through a survey of treatment coverage in all study communities. As in the qualitative evaluation, the survey was done some 2-3 days after distribution started

Indices for Operational Evaluation :(The evaluation of the effectiveness) Process evaluation was carried out using some indicators and comparisons can be made between P.H.Cs or between urban and rural or between districts. The following are the indicators that can be used for this purpose:

1. Coverage of distribution and
2. Consumption

Indices for Impact Evaluation:

Impact assessment is most critical. The current understanding and knowledge of filariasis suggest that overall impact of Filariasis control by single annual dosage of DEC cannot be observed in a short period. The planning of impact assessment therefore requires understanding of possible impacts in short and long terms. The expected outcomes of the Programme are:

1. Reduction in Microfilaria density in treated population
2. Consequent reduction in transmission
3. Reduction in infection prevalence (relatively slower than 1)
4. Reduction in appearance of new cases of infection
5. Reduction in appearance of new cases with filarial disease (slowest)

Component evaluated in this study:

Process component

1. Before Mass DEC Administration

To assess the preparedness and awareness among the providers (District Health Officer, (Block) Medical Officers, Health workers, and the Filaria prevention assistant (FPA) and awareness among consumers

2. During the Mass DEC day

To observe how it is being implemented

3. Post DEC day

To assess the coverage, consumption, side effects and severe adverse reaction.

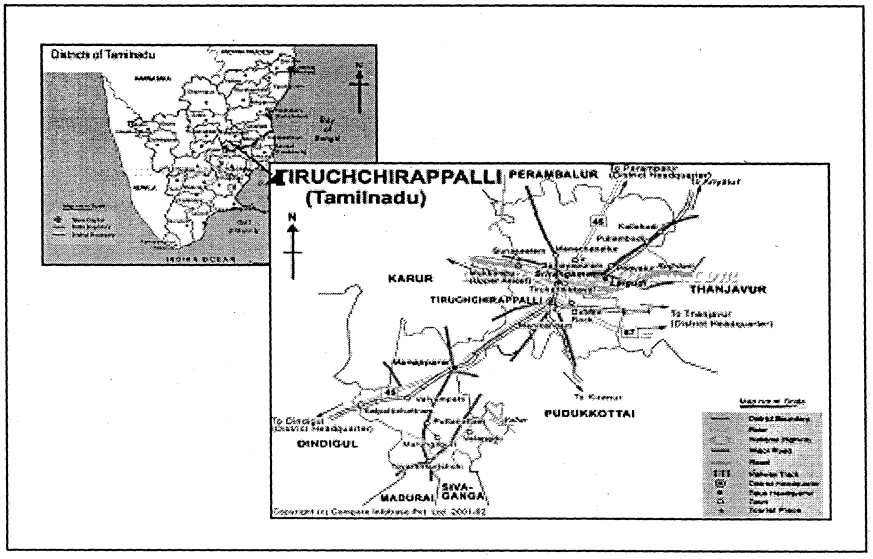
Study Design

A Cross- sectional survey of all individuals in a selected sample of households.

Study setting

Tiruchirappallidistrict is situated at the centre of Tamilnadu State India (Figure1). Its boundaries are Thanjavur in the east, Karur in the west, and Namakkal in the north, and Pudukottai in the south. Tiruchirappalli is known as Rock City due to the presence of hillock at the heart of the town. It is located 320km to the Southwest of Chennai and 128 km North east of Madurai on the banks of the river Cauvery. The area is mostly plain and the river Cauvery flows through the city and is the source of water for domestic and irrigation purposes. It is one of the important industrial and pilgrimage centers. The economy of the district is essentially agrarian in nature. The setting up of a public sector undertaking industry Bharat Heavy Electricals Limited (BHEL) at Tiruverambur provided a base for industrial expansion.

Figure 6.Map of Tiruchirappalli District



Selection of study area

Filariasis is not distributed uniformly throughout the district and is clustered in certain pockets of the districts. Further rural areas differ from the urban characters; For the purpose of the study, the district was stratified into rural and urban areas. As per the stratification, this district has 1 corporation, and 2 municipalities and 48 PHCs in the rural areas.

Rural areas:

The rural areas were further stratified, based on the number of filaria Patients registered with PHC, as low, medium, no endemic and high endemic PHCs. Generally endemicity is decided by microfilara rate and disease rate. However, the facilities for routine anti-filarial activities were not available as in urban areas and rural areas are not covered under NFCP. Thus, for the purposes of this study, endemicity status is decided as per the number of manifested filarial patients registered with PHC registers. As per this stratification, the following is the distribution of PHCs (Table 2).

Table 2.Stratification of PHCs by number of filarial patients, Tiruchirappalli, 2003.

Endemicity level	Criteria used*	No. of PHCs
High	>50	3
Medium	10-49	7
Low	<10	10
Nil	0	28

*Number of filaria patients)

All three PHCs in the high endemic stratum, two each from medium and low endemic strata and one from the nil endemic PHCs were selected (Totally 8 PHCs in rural area were selected for this study). From each PHC, one health subcentre(HSC) and from the each HSC, one village is selected randomly (lot method). From each village, 10 % of the household was interviewed or one fourth of the households were interviewed by dividing the village into four quadrants.

Urban areas

Out of three urban areas, one is selected randomly, which turned out to be Tiruchirappalli Corporation. From the corporation areas, one ward each from high

and low endemic area and from the each ward one census enumeration block were selected and interviewed all the available households with semi-structured questionnaires (each census block consist of about 120-150 households in 1-2 street)(Figures 7 and 8).

Figure 7. Selection of study areas for evaluation of Mass DEC distribution, Tiruchirappalli, 2003

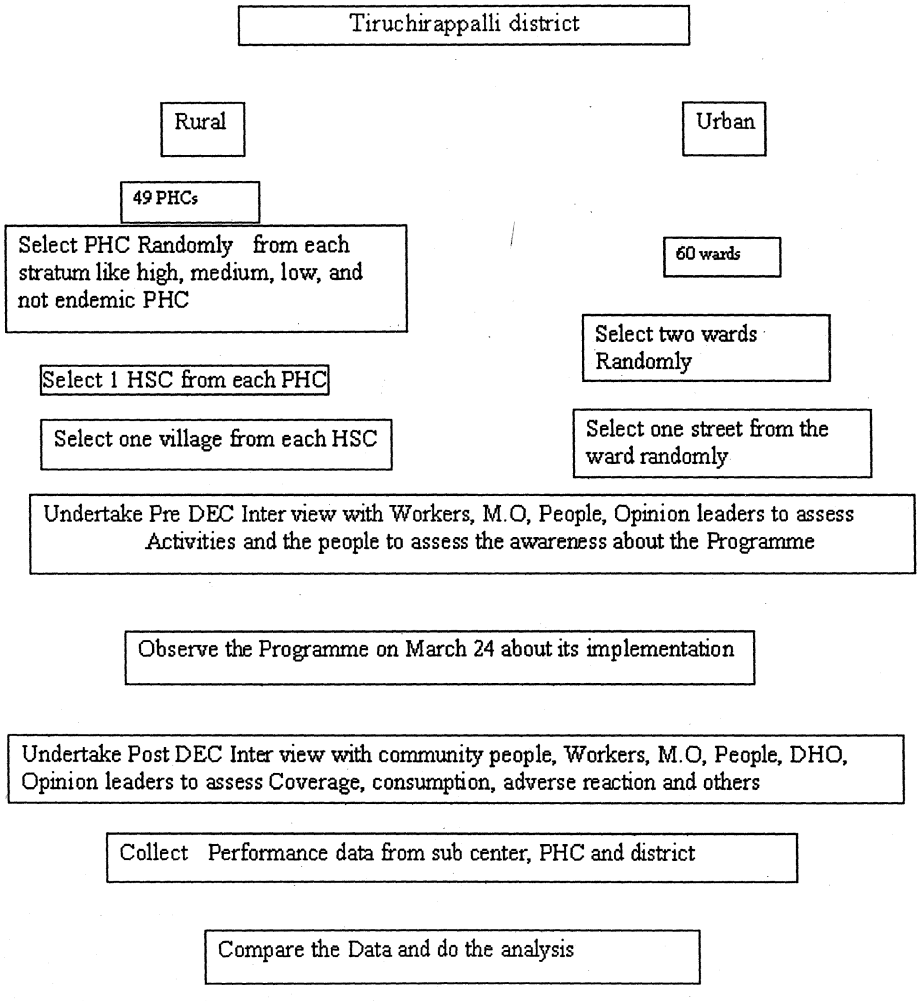
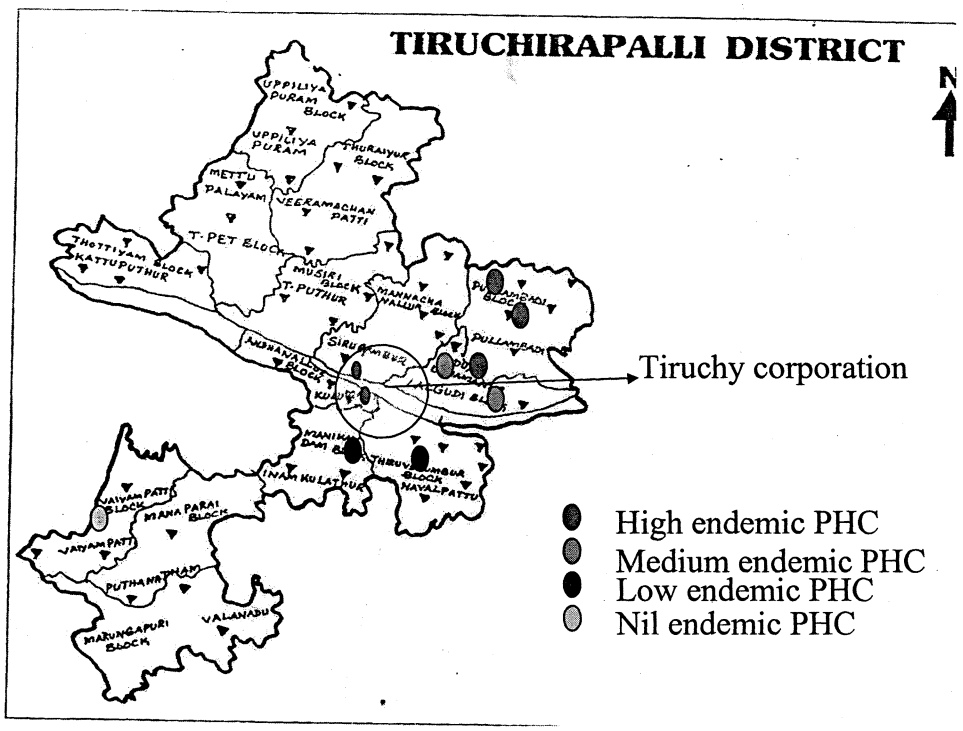


Figure 8. Location of study areas in Tiruchirappalli district



Study Team

A Two-member team was constituted, which included.

1. The FETP –Scholar (the author of this study) as a principal investigator.
2. One helper (female health workers or Anganvadi Workers as per availability

Study instruments

A semi-structured questionnaire was designed to interview the family members. Questionnaire is given as Annexure I. The questionnaire has 2 parts. Part one for the common people to assess the awareness about the programme and the other one for assessing the coverage and consumption of drugs

Data collection procedures

Data Collection period; March –April 2003

Data Collection Methods

It includes qualitative and quantitative. Secondary data available from PHC registers and records was used. Primary daa was collected through semi-structured questionnaires during face-to-face interview with consumers as well as providers of the programme before and after the mass DEC as follows:

The common people were interviewed in all the 10 selected places before and after mass DEC day for their awareness about the diseases, the programme, their response to the programme, coverage, consumption, side effects, and severe adverse reaction etc.

Providers were interviewed before and after the mass DEC day for their planning, preparedness, implementation, their problem while implementing, their performance, data collection and coverage etc.

At the household level, details on the number of inhabitants, their demographic features were gathered. The head of the household was asked whether he/she was aware of drug distribution for filariasis in the village. Then, each household member was interviewed with the help of a structured questionnaire. These data were collected from the villages selected for household survey.

Medical officers (*n* = 7), health workers (*n* =25) and other drug distributors were interviewed.

Data analysis

The quantitative household survey data were analyzed using EpiInfo 6.04d. The results of the study are presented using two terms – % drug distribution rate (number people who received drug / total population x100) and % treatment compliance (number of people who received and consumed drug / total population x100).

6. Results

Preparatory phase

Mosquito collection

Prior to the drug distribution, district officials selected some PHCs and villages randomly and collected mosquitoes to assess the transmission potential to assess

the impact of previous year distribution. This year they have collected around 3000 mosquitoes and none of them showed any evidence for Microfilaria.

Blood smear collection

They selected 10 PHCs and then 10 villages from the selected PHC and collected around 15622 smears of which 4 smear become positive for micro filarial parasite. (Table 3)

Drug procurement and distribution process

DEC was procured for the entire state of Tamil Nadu by the state level health administration. A couple of months before distribution, the drug was transported to the district headquarter town, from where it was sent to P.H.Cs within the district. From the P.H.Cs, the drug was sent to the Health Subcentre, (HSCs) managed by Multi purpose health worker (MPHW,) who finally handed it over to the leaders or distributors in the villages. There were no problems either with drug procurement or storage.

Training

At the district level, training was given to medical officers and health supervisors. At PHC level, medical officers trained all the health workers and FPA on the dosage of DEC, exclusion criteria, contra indication and side-effects caused by the drug and their management.

Communication for behavioral impact (Combi) plan

In order to sensitize the communities regarding DEC Programme, the VHNs and FPA visited the allotted areas, organized meetings of community leaders and members to motivate them to take DEC tablets (Table 4).

Dosage of DEC and exclusion criteria

DEC was distributed at the dose of 6-mg/kg-body weight. The strength of the tablets used was 50 and/or 100 mg. The drug was distributed according to age based on WHO recommendation, since; weighing hundreds of thousands of people is cumbersome (Table 5).

Table 3. Preparedness for implementation of mass DEC distribution, Tiruchirappalli, 2003

Activity	Planned/ Required	Received/ Achieved
Blood smears collected	15622	15622
Positive for Micro Filaria		4
Drug Distributors	10850	10850
Health Workers	458	458
Anganwadi Workers	313	313
Students	1223	1223
Self-help group	8856	8856
Training planned For M.Os	2	2
Training planned FPA	3	1
Drugs	6000000(100mg)	6000000(50 &100 mg)

Table 4. IEC materials used during mass DEC distribution, Tiruchirappalli, 2003

Type of material*	Quantity
Banners	200
Stickers	5000
Hand bills	25000
Posters	1300
Door slips	50000
Notice	56800
Stencils	9
Hand cards	500

* Mike announcement, press releases, meetings, announcement through school teachers, School rally, Tom Tom

Figure 9. IEC material used during mass DEC distribution, Tiruchirappalli, 2003

Table 5. Dose schedule for mass DEC distribution, Tiruchirappalli 2003.

Age group (in years)	Single dose of DEC (mg)
0 to 2	Nil
2 to 4	100
5 to 14	200
> 14	300

Summing up the preparatory activies:

Planning was done two-months prior to mass DEC programme. Mosquito collection and dissection was done two months prior to mass DEC Programme. Manpower and material planning was done early. However, the requirement was not fulfilled till the second week of March due to prevailing uncertainity about the inclusion of FPAs in the programme. During IEC activities this year, a novel idea was used (by preparing a chariot) to disseminate the programme information. There was no problem in drug procurement and distribution to the P.H.Cs. Enumeration was not done this year. Training was adequate for the health workers but inadequate for FPAs because of uncertainty of their inclusion.

Observation during mass DEC distribution day

The drug distribution was well started on 22nd March itself. No complaint of shortage of drugs/Men/material was noticed in the district. However, very few supervisors were in the field during the day. It may due to the telecast of final match of world cup cricket tournament on that day. During the entire day, no complaint of side effect or adverse reaction was observed. The IEC material was distributed evenly.

Demographic distribution of surveyed population

Demographic distribution of the surveyed population is shown in table 6. Females were interviewed more than males all the surveyed area.

Table 6. Distribution of respondents by sex, Tiruchirappalli, 2003

Village	1	2	3	4	5	6	7	8	9	10	Total
Male	15	20	23	12	28	16	16	20	46	43	239
Female	37	59	36	41	77	43	57	68	114	67	599
Total	52	79	59	53	105	59	73	88	160	110	838

Reported coverage in Mass DEC programme

The reported coverage and consumption in mass DEC programme since 1998 is shown in table 7. The coverage and the consumption are fluctuating year by year. In rural area, the coverage was maximum in 2003 and minimum in 2002 and in consumption maximum was in the year 2000 and minimum in 2002. In urban area, the coverage was maximum in 2001 and minimum in 2003.

Table 7. Reported Coverage (%) of mass DEC distribution, Tiruchirappalli District, 2003

Year, Round		Rural		Urban		Total	
		Coverage	Consumed	Coverage	Consumed	Coverage	Consumed
1998	I	95.9	89.9	90.6	71.9	94.2	80.9
1999	II	93.9	83.0	97.7	80	95.1	81.5
2000	III	98.5	92.0	99.2	85	98.7	88.5
2001	IV	98.5	74.7	98.2	87.5	97.2	81.1
2002	V	90.6	82.3	87.9	76.2	90.3	79.2
2003	VI	98.4	90.0	87.6	75.4	93.0	82.6

(Source. District Health Office)

Assessed coverage in rural area

As per the survey, the assessed coverage is shown in table 8. Coverage was highest in village 1 (83%) and lowest in the village 2 (40%). Overall coverage in rural area was 71%. Overall proportion of drugs received and consumed wass 49%, drugs received and not consumed was 22% and not at all received was 29%. Village wise coverage and consumption is given in table 3.The coverage and consumption was maximum in village 3 and minimum in village 2,whereas proportion who did not receive the drugs at all was maximum in village 2 (60%) and minimum in village 8(13%).

Table 8. Assessed (Actual) coverage and proportion consuming the drugs, mass DEC distribution in rural area, Tiruchirappalli district, 2003

Village (Code)	n	Received and swallowed		Received but not swallowed		Not received		Total Coverage
		Number	%	Number	%	Number	%	%
1	52	37	71	6	12	9	17	83
2	79	13	16	19	24	47	60	40
3	59	41	69	7	12	11	29	71
4	53	17	32	14	26	22	42	58
5	105	42	40	23	22	40	38	62
6	59	27	45	21	35	11	20	80
7	73	44	60	16	21	13	19	81
8	88	58	65	18	20	12	13	85
Total	568	279	49	124	22	165	29	71

Coverage and consumption in urban area

The overall coverage in urban area is 56% and consumption is 40%. The percentage of drugs received and not consumed is16 and not at all received is 44 (Table-9)

Table 9. Assessed (Actual) coverage and proportion consuming the drugs, mass DEC distribution in urban area, Tiruchirappalli district, 2003

Ward (Code)	Received and swallowed		Received but not swallowed		Not Received		Overall coverage
	Number	%	Number	%	Number	%	%
1 (n=160)	38	24	25	16	97	60	40
2 (n=110)	70	63	18	16	22	21	79
Total (n=270)	108	40	43	16	119	44	56

Combined coverage and consumption (Table 10)

The overall coverage(both rural and urban combined) was 66% and consumption was 46%. The overall coverage was highest in rural (71%) low urban (56%). The stratified coverage and consumption was highest in rural (49%) lowest in urban (40%). However, the proportion who did not receive the drug at al was higher in urban (44%) than rural (29%).

Table 10. Assessed combined coverage&consumption, Tiruchirappalli district, Tamilnadu 2003. (Both in rural & urban area)

Place	Drugs Received& Swallowed		Drugs Received but not swallowed		Drugs not Received		Total Coverage
	Number	%	Number	%	Number	%	%
Rural (n=568)	279	49	124	22	165	29	71
Urban (n=270)	108	40	43	16	119	44	56
Total (n=838)	387	46	167	20	284	34	66

Reported coverage

In both the reported coverage and assessed coverage, the highest percentage was in rural than urban area. (Table11). The difference between reported and assessed coverage in rural area was higher in urban area than rural area.

Table 11. Comparison of reported and observed coverage of mass DEC, Tiruchirappalli district, 2003

	Reported			Observed		
	Rural	Urban	Combined	Rural	Urban	Combined
Coverage%	98	88	93	71	56	66
Consumption%	90	75	83	49	40	56

Adverse reaction

The overall reaction due to consumption of the drug was 9.4%. The reaction is more are less equal in rural and urban. The commonest reactions were giddiness (35%), fever (25%), nausea (16.5%), and abdominal pain (10%). There was no report of any severe adverse reaction due to the drug intake (Table 12).

Table12. Incidence of side reaction due to DEC, Tiruchirappalli district, 2003

Type of reaction	Rural (n=568)	Urban (n=270)	Both* (n=838)
Nausea	8	5	13(16.5)
Vomiting	3	2	6(7.6)
Giddiness	18	7	28(35.4)
Abdominal pain	5	3	8(10.1)
Fever	12	8	20(25.3)
Fever& Rigor	6	2	8(10.0)
Leg Swelling	0	0	0(0.0)
Severe Adverse Reaction	0	0	0(0.0)
Overall incidence	52 (9.1%)	27 (10.0%)	79 (9.4%)

* figures in parentheses are %

Reason for not consuming the drugs

The overall percent of not consuming the drug was 20%(Table 13). It was more in rural area (22%) than the urban area (16%). The commonest reason for not consuming were fear about the drug (15.6%) not necessary (16.8%), no time and gone to work (12%), forgotten (15%), not well (11%) and other reasons including family functions (11.4%).

Table 13. Reasons for not consuming the DEC, Tiruchirappalli district, 2003

Reported reason	Rural (n=568)	Urban (n=270)	Both* (n=838)
Fear	23	3	26(15.6)
Don't know how to take	6	0	6(3.6)
No time/gone to work	16	5	21(12.6)
Forgotten	21	4	25(15.0)
Never take any medicine	9	4	13(7.8)
No faith in Govt Medicine	0	7	7(4.2)
Consult my doctor	0	6	6(3.6)
Not suffering from diseases/ not necessary	15	7	28(16.8)
Supplied the tablet unhygienically	0	5	5(3.0)
Don't like the worker/FPA	0	0	0 (0.0)
Not well	15	3	18(10.8)
Others like death / function/ Antenatal or postnatal mother/old age	19	0	0(11.4)
Overall	124 (21.8%)	43 (15.9%)	167 (19.9%)

* Figures in parentheses are %

Reason for not receiving the drugs

The overall proportion of not receiving the drug is 34% and the proportion was more in urban (44%) than rural (29%). The commonest reason for not receiving the drugs was no body approached them for giving the drugs and the other reason was that they had gone out to other places or for work (Table 14).

Table 14. Reasons for not receiving DEC Tiruchirappalli district, 2003

Reported reason	Rural (n=568)	Urban (n=270)	Both* (n=838)
Out of Station	19	6	25 (8.8)
Don't know /not aware	7	0	7 (2.4)
No body has given any tablet	93	49	142 (50.0)
Gone to Field/work	18	8	26 (9.1)
No faith in Govt Medicine/Refused	4	15	19 (6.7)
Consult my doctor	0	5	5 (1.8)
Not suffering from diseases/ Not necessary	3	7	10 (3.5)
Supplied the tablet in unhygienically	0	10	10 (3.5)
Don't like the worker/FPA/Stranger	4	6	10 (3.5)
Not well/diabetic/HT/Heart Problem/old age	8	5	13 (4.6)
Others like death / function/ Antenatal or postnatal mother/old age	9	8	17 (6.0)
Over all	165 (29.1%)	119 (44.1%)	284 (33.9%)

* Figures in parentheses are %

The overall evaluation results are given in table 15. The performance was low in urban area than rural in all areas starting from distribution to reported side reactions.

Table 15.Summary results of evaluation of Single dose mass DEC treatment, Tiruchirappalli, Tamil nadu, 2003

Summary results	Rural	Urban
Villages (rural) /Wards (urban) selected (n)	8	2
Total interviewed (n)	568	270
Received DEC (%)	71	56
Received DEC and consumed (%)	49	40
Received DEC and not consumed (%)	21	16
Did not receive DEC (%)	29	44
Reported side reaction (%)	9	10

Summing up observations during post DEC

It was observed that the pubic were not properly educated regarding the programme as well the date of distribution of the drug. In one place (Pudur uthamanur), the awareness was very high; contrastingly, the distribution was very poor. The involvement of FPAs, who were students from school or college, without adequate training created lot of confusion. In some places, even the sons and daughters of FPAs distributed the drugs. With respect to intensive follow-up of locked or left over houses, no second visit was made. New and extension areas in the urban area were not covered properly by the workers.

Regarding the drug, the variable dose (i.e., 6 categories in corporation area and 3 categories for rural areas) created lot of confusion about the exact dose to be given. In the corporation area, the tablets were given from loose packets. People were reluctant to receive the drugs since it was not hygienically distributed. Anganwadi workers advised different dose schedule. Anganwadi workers did not follow the guidelines. Instead of door-to-door campaign, they asked children to bring their parents to noon meal centres and distributed the tablets. Some times, the drug was given to the families through the children. On the contrary, at some places, the drug was given to children without the knowledge of the parents. It was observed that wherever, anganwadi workers and VHN distributed the drugs jointly the correct schedule was followed. Although old people and antenatal or post-natal mothers are not excluded form DEC administration, they were not given drugs in many places. The undistributed drugs were supposed to be collected by the health workers. However, at some places, health workers did not collect the undistributed drugs from anganwadi workers.

With respect to consumption level, it was observed that most people were not telling truth about consumption /distribution of tablets either because of fear or not to give embarrassment to the health worker since most of them were local people and they did not want to spoil the relations. Many were not taking the tablets / programme seriously.

The level of consumption was low at places where an adverse reaction was reported during the previous year. The consumption level was high when VHN and

anganwadi worker had a good rapport with a community and when they jointly distributed the drugs at a time convenient to most of the people(i.e., at night).

The adverse reaction reported was very low. No effort was made by FPAs or health workers to monitor / follow-up the adverse reactions.

This year it was observed that the honorarium was distributed immediately after the programme was over.

7. Discussion

Evaluation of programmes during their execution is essential in order to determine whether satisfactory progress is being made and whether any adjustments are required. [14]

Preparedness of the system

The overall preparedness of the system for implementing the mass drug distribution programme was in the expected line except the training part. In manpower, for the distribution of drug, health staff alone was not enough to cover the entire endemic population. Hence, the Government included the volunteers such as Filaria prevention assistant (FPAs) to help the health workers in motivating the community and distributing the drugs since 2002. But this year, the inclusion of FPAs in the programme was delayed because of some administrative problem. This resulted in lesser training to the volunteers. This year during the IEC activities, to motivate the community they disseminated the programme through a chariot. Other activities like drug procurement and distribution to peripheral area, and logistic problem was not seen in our observation. Little over 60% of the people in rural and 56% of the people in urban area were aware of the programme which is lower than to study done by VCRC Pondicherry.[10,20]

The Coverage

The overall coverage was comparatively below the recommended level of W.H.O for elimination of lymphatic filariasis.[5] This finding of low coverage is consistent with other studies.[10,15] Similarly, the coverage was lowest in urban than rural, which was consistent with other studies.[10,15,17,21] Similarly, the consumption rate was below the

recommended level and lower in urban area than rural area. These findings were consistent with other studies. One of the reasons for low consumption in urban was the lack of awareness and low priority given to filariasis by the people because of its longer duration to produce impact on the people. Again, coverage is low in high endemic area (village 1) than low or medium endemic areas. The reason as expressed during interview with the people was that if the drugs were not helping those who were afftected with the disease then, how it would prevent the disease among those without the disease. This wrong perception was prevalent in high endemic area. This should be given top priority in future years to rectify the misconception.

The proportion of people who received but not consumed formed a special group both in rural and urban areas. This people should be motivated in future to increase the coverage. The main reason identified during our surveys was that in rural areas, the volunteers and workers failed to make second visits to the allotted areas. If they visited the area second time after the distribution, the percent consumption might be in close to the recommended level.

The proportion of people not at all received the drug was very high in our survey when compared to other studies. [10,15,16,19,21] The proportion was high in urban than rural area. The reason for not receiving the drug was that the drug distributors did not approach half of people who have not received the drug. This is very important area where we must concentrate if we really want to eliminate the disease. If the coverage percentage continued to be low, the number of rounds for mass drug distribution will be increased [5] to manifold. This will be an additional burden for the society. It will beat the very purpose the elimination strategy.

Among those people who received but not consumed was high in rural area than urban area. This finding was contrary to the general belief that consumption and coverage was always good in rural than urban and also inconsistent with other studies.[10,15,19,21]

The adverse reaction was very low and more in rural than urban. The commonest adverse reactions, giddiness, nausea, fever and abdominal pain formed the major portion which were preventable just by motivating the people to take drug after

meals and probably at bed time may reduce side reaction further.[15,17] In this study no severe adverse reaction was reported in all the 10 study centres.

Our study results of coverage and consumption were compared with the coverage reported by the health department. There were marked differneces both for coverage and consumption. This difference in reported and assessed coverage and consumption was consistent with similar studies undertaken n India.[10,15,17,20,21]

Limitation

This study is a very small one to assess the coverage and consumption in a small section of the people. The common limitation in studies with convenient sampling procedures is applicable to this study also. The recall and information bias is the commonest limitation in this study,

Suggestion/Recommendation

1. IEC activities to be increased
2. More stress on Combi plan
3. More role for health workers
4. Supervision is a must during and after distribution
5. Motivation is the corner stone of success especially to those people have received but failed to consume
6. Timing of distribution should be chanced/modified according to the convenience of consumer.
7. The number of drug distributors need to be increased in such a way that one FPA/workers not to cover more than 50 families.
8. Drug manufacturers need to be motivated to produce single dose DEC tablets for 300 mg, 200mg to avoid the confusion about the number of tablets to be consumed and to avoid different dose schedule.
9. Loose packing drugs (Unstripped) should be avoided to encourage the acceptance and consumption rate.

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Annexures: questionnaires used in the study:

Questionnaire for common people/opinion leaders

1.Identification data
Name
Address
2.Demographic data
Age ☐

Sex 1.Male 2.Female ☐ **marital status** 1.Married 2 unmarri☐

Educational qualification ☐ **Occupation** 1Agri cooly2 semi sk☐d
1. Educated 2.un educated 3.Unskilled 4, Professional
5.others

3.Information data
1. What is the importance of March 23 1.NFD 2. Don't k☐w
1. Do you know what is filariasis/ Hydrocele 1.yes 2 don't ☐ow?
2. How it spreads 1.Through water 2. By mosquito bite 3.don't kno☐.others
3 Is there any treatment for Filariasis? 1.yes 2. No 3.d☐'t know
4 Is it curable? 1.yes 2. No 3.don't ☐ow

5.Is it preventable? 1.yes 2. No 3.don't☐ow

6.do you know what is DEC? 1.yes 2. No 3.do☐ know

7.What is the purpose of taking DEC? To prevent filariasis 2.to treat filariasis 3.both 4 don't know

8. Is it necessary for a normal person to take DEC? 1.yes 2. No 3.don't k☐w

9 Is it necessary to take DEC by all members of Family? 1.yes 2. No 3.don't☐ow

10.when will you take DEC 1 before meals2 after meals3? Don't k☐w

11.How many tablets to be taken 1, as per age 2 don't know 3-1 4-☐5-3

12.how often 1.once in a year 2 don't know 3 oth☐s

13.do you thing it will produce side effects 1.yes 2 don't k☐w?

14. If yes what are they?

15 what will you do in the event of side effect 1. Contact the drug distributors/h☐alth workers 2. Go to hospital 3 don't know 4.both

16.how will you take tablets 1 all the tablets simultaneously 2, one in the morning o☐ in the afternoon one in the night3 don't know

17if one of your family members develops side effect is it necessary for other members☐ot to take tablets

18.how did you know all about the filariasis 1.health workers/drug distributors 2. P☐per 3 TV

4.radio

19 did anyone from health department has taken blood for examination in the night

20. Did you take tablets in the previous year 1.yes2 no 3 don't remember?

Signature of the investigator

Questionnaire for all Health Personnel (POST DEC)

1.IDENTIFICATION DATA

Name
Address
Designation

2.INFORMATION FOR THE PROGRAMME IMPLEMENTATION

1.What is the area allotted for this year?

_____

2.How many families are allotted to you this year?

3.Did you undertake any survey or enumeration this year? 1.yes 2 no

4.What is the eligible population for this year?

5.Age wise

6.Sexwise

7.How many families are given DEC tablets?

8. How many families refused to receive the tablets?

9.How many family members consumed the tablets?

10.How many swallowed in front of you?

11. How many family members develops side effect?

12.what did you do in the event of side effect?

13. How many houses are locked during your visit?

14.Did you make a second visit to your area to issue the tablets?
1.yes 2 no

15.How did you assess the consumption and adverse reaction?

_____

_____

16. What was the last year performance?

_____

_____

16. What was this year performance?

_____

_____

17.What are your suggestions to improve the coverage and consumption?

18.Do you accept mass DEC, because? ☐

1.It is your government job responsibility
2.It is useful for the Health system/people
3.It creates interest in you
4.Any other

19.Do you feel mass DEC is additional burden but Useful (1) Not useful (2) ☐

20.Do you feel Mass DEC system is complementary to the health system? Yes (1), no (2) ☐

21.Have you faced any shortage of drugs /manpower / logistics this year?

22.What types of constraints are you facing while implementing Mass DEC in your set up?

Signature of the interviewed person Signature of the investigator

QUESTIONNAIRE FOR HEALTH WORKERS (pre dec)

1.Identification data ☐

1.Name Age ☐ Sex1.Male2.Female
2.Address

3.Designation
4.Duration of services
5.Duration of services in the present station

11.INFORMATION FOR THE DISEASE

1What is the population in your PHC Area ☐
Age wise ☐
Sex wise ☐

2.No of HSCss in your PHC

3.No of Villages in your PHC

4.What are the symptom and signs of Filariasis?

5.How it spreads

6.Is there any treatment for Filariasis? 1 yes 2 no

7.Is it preventable? 1 yes 2 no

8.What are the programmes related to Filariasis 1.NFCP 2.MassDEC 3 PELF 4 ALL 5 don't know

9.What is PELF? 1.Don't know2.know

10.No of Filariasis cases in your area?

11.No of HSCs endemic for Filariasis

12.No of villages endemic for Filariasis

13.What is the Endemicity rate in your area?

14.What is the MF Rate in your area?

111. DATA FOR THE PROGRAMME IMPLEMENTATION

1.What is the importance of March 24 1.NFD 2. Don't know

2.What is mass DEC Programme? 1 It is giving Dec to all people2. Giving total doses to a single person 3.Giving total doses in a single day to affected persons 4 all 5don't know

3.What is Comb plan?

4What is FPA

5.What is NEW in mass DEC Programme During 2002

1.Introduction of FPA 2, Reducing the drug distribution day3Introduction of COMBIPLAN4.Redccing the treatment class5use of uniform DEC Strength 6 All the above 7 don't know

8.What is NEW in mass DEC Programme During 2003

9.Where did you do the same services during last year?

10.Did you undertake any survey or enumeration this year? 1 yes 2 no

11.How many families are enumerated this year?

12.How many families are allotted this year

13.What is the eligible population size?

Age wise

Sex wise

14.How many Filariasis cases are identified in your survey this year?

15.How many new cases identified this year in your area? ☐

16.Do you know how many blood samples are collected in your area? 1 yes 2 n☐

17.If yes how many ☐

18.Any M.F. Cases identified and treated last year 1.yes 2.no 3 don't know☐

19. If yes how many ☐

20.Did you undergo any training in Filariasis this year? 1 yes 2 no ☐

21. What is the purpose of taking DEC?

22. Is it necessary for a normal person to take DEC? 1.yes 2.no 3 don't know ☐

23.How will you advice the people to take DEC? 1 before meals 2. After meals ☐

24.How many tablets to be taken 1, as per age 2 don't know 3-14-2 5-3 ☐

25.What is the dose schedule for this year? ☐

26. Is it necessary to take DEC by all members of Family SIMULTANEOUSLY? 1 yes 2 no 3 don't know ☐

27.how often DEC to be given to the people 1.once in a year 2 don't know 3 others ☐

28.what are the side effects of DEC?

29.what are the advices will you give to the family members before giving drugs
1.Importance of DEC 2. Its side effect, 3. After meals, 4. All members to be taken simultaneously, 5.signs and symptoms of adverse reaction, 6.where to contact in the event of adverse reaction ☐

30.what will you do in the event of side effect? 1.inform the DISTRICT AUTHORITY 2. Advice them to go to hospital 3 both 4.Give first aid and refer ☐

31.if one of the family members develops side effect is it necessary for other members not to take tablets1.yes 2.no 3 don't know ☐

1V) IEC

1.What is Comb plan? 1.don't know 2. Know ☐

2.How did you motivate the community? 1 personnel contact 2. Through workers 3. Through iec activities ☐

3.How many IEC Mate[illegible]ike pamphlets, stickers and posters received pamphlets, stickers and posters received from DHO

Pamphlets, ☐
Stickers ☐
Posters ☐
Banners ☐

4.How many distributed so far ☐
5.How many not distributed ☐
6.Reason for not distributing

7.Any other communication activities taken in your area 1 yes 2 no
Your self ☐
PHC ☐

District office
Local Panchayats office

8.What are they?
1.Dom Dom, 2. Mike announcement, 3.personal contact, and 4. Paper advertisement5. All

V) Training

1.How many drug distributors are required for this year

2.How many available

3.Category wise
Health workers male Female

Volunteers

Others

4.How they are trained

5.How many sessions are planned to train the drug distributors

6.How many actually given

7.How many session are skipped

8.Reason for not implementing the training programme

9.Have you received any training modules/training guides/agenda? 1.yes 2.no 3 don't know

10.Is it sufficient? 1.yes 2.no 3 don't know

11.If it is not sufficient how did you manage?

12.The information given in the module is 1.Adequate 2. In adequate

13.If it is in adequate what are the content to be added in the training module

V1) LOGISTICS

1.How many reporting format received from district officials
2.Is it sufficient? 1.yes 2.no 3 don't know

3.The information required / mentioned in the reporting is1. Sufficient 2. Not sufficient 3. Too much

4.How to you think about the form? 1.is it simple to fill 2.Difficult to follow?

5.What is your requirement of drugs this year?

6.How much have you received?
7.Is it sufficient to cover the entire eligible population?
1. Sufficient 2. Not sufficient

Signature of the Medical officer

Signature of the investigator

Questionnaire for M.O (POST DEC)

1.IDENTIFICATION DATA
Name
Address
Designation
2.iNFORMATION FOR THE PROGRAMME IMPLEMENTATION
1.What is the area allotted for this year?

2.How many families are allotted to you this year?

3.Did you undertake any survey or enumeration this year? 1.yes 2 no

4.What is the eligible population for this year?
5.Age wise
6.Sexwise

7.How many families are given DEC tablets?

8. How many families refused to receive the tablets?

9.How many family members consumed the tablets?

10.How many swallowed in front of your FPA/Workers?

11. How many family members develops side effect?

12.what did you do in the event of side effect?

13. How many houses are locked during your FPA/Workers visit?

14.Did you make a second visit to your area to issue the tablets?
1.yes 2 no

15.How did you assess the consumption and adverse reaction?

16. What was the last year performance?

17. What was this year performance?

17.What are your suggestions to improve the coverage and consumption?

18.Do you accept mass DEC, because?

1.It is your government job responsibility

2.It is useful for the Health system/people

3.It creates interest in you

4.Any other

19.Do you feel mass DEC is additional burden but Useful (1) / Not useful (2) ☐

20.Do you feel Mass DEC system is complementary to the health system? Yes (1), no (2) ☐

21.Have you faced any shortage of drugs /manpower / logistics this year?

22.What types of constraints are you facing while implementing Mass DEC in your set up?

Signature of the interviewed person Signature of the investigator

QUESTIONNAIRE FOR PHC MO/ BLOCK MO (pre dec)

1.IDENTIFICATION DATA
1.Name Age☐ Sex1.Male2.Female ☐
2.Address

3.Designation
4.Duration of services
5.Duration of services in the present station
11.INFORMATION FOR THE DISEASE
1What is the population in your PHC Area ☐
Age wise ☐
Sex wise ☐

2.No of HSCss in your PHC ☐

3.No of Villages in your PHC ☐

4.What are the symptom and signs of Filariasis?

5.How it spreads

6.Is there any treatment for Filariasis? 1 yes 2 no ☐

7.Is it preventable? 1 yes 2 no ☐
8.What are the programmes related to Filariasis 1.NFCP 2.MassDEC 3 PELF 4 ALL 5 don't know ☐

9.What is PELF? 1.Don't know2.know ☐

10.No of Filariasis cases in your area? ☐

11.No of HSCs endemic for Filariasis ☐

12.No of villages endemic for Filariasis ☐

13.What is the Endemicity rate in your area? ☐

14.What is the MF Rate in your area? ☐

111. DATA FOR THE PROGRAMME IMPLEMENTATION

1.What is the importance of March 24 1.NFD 2. Don't know ☐

2.What is mass DEC Programme? 1 It is giving Dec to all people2. Giving total doses to a single person 3.Giving total doses in a single day to affected persons 4 all 5don't know

3.What is Combiplan? ☐

4What is FPA

5.What is NEW in mass DEC Programme During 2002 ☐

1.Introduction of FPA 2, Reducing the drug distribution day3Introduction of COMBIPLAN4.Redccing the treatment class5use of uniform DEC Strength 6 All the above 7 don't know

8.What is NEW in mass DEC Programme During 2003

9.Where did you do the same services during last year?

10.Did you undertake any survey or enumeration this year? 1 yes 2 no ☐

11.How many families are enumerated this year? ☐

13.What is the eligible population size? ☐

Age wise ☐

Sex wise ☐

14.How many Filariasis cases are identified in your survey this year? ☐

15.How many new cases identified this year in your area? ☐

16.Do you know how many blood samples are collected in your area? 1 yes 2 no ☐

17.If yes how many ☐

18.Any M.F. Cases identified and treated last year 1.yes 2.no 3 don't know ☐

19. If yes how many ☐

20.Did you undergo any training in Filariasis this year? 1 yes 2 no ☐

21. What is the purpose of taking DEC?

22. Is it necessary for a normal person to take DEC? 1.yes 2.no 3 don't know ☐

23.How will you advice the people to take DEC? 1 before meals 2. After meals ☐

24.How many tablets to be taken 1, as per age 2 don't know 3-14-2 5-3 ☐

25.What is the dose schedule for this year

26. Is it necessary to take DEC by all members of Family SIMULTANEOUSLY? 1 yes 2 no 3 don't know

27.how often DEC to be given to the people 1.once in a year 2 don't know 3 others

28.what are the side effects of DEC?

29.what are the advices will you give to the family members before giving drugs
1.Importance of DEC 2. Its side effect, 3. After meals, 4. All members to be taken simultaneously, 5.signs and symptoms of adverse reaction, 6.where to contact in the event of adverse reaction

30.what will you do in the event of side effect? 1.inform the DISTRICT AUTHORITY 2. Advice them to go to hospital 3 both 4.Give first aid and refer

31.if one of the family members develops side effect is it necessary for other members not to take tablets1.yes 2.no 3 don't know

1V) IEC

1.What is Combiplan? 1.don't know 2. Know

2.How did you motivate the community? 1 personnel contact 2. Through workers 3. Through iec activities

3.How many IEC Materials like pamphlets, stickers and posters received pamphlets, stickers and posters received from DHO

Pamphlets,
Stickers
Posters
Banners

4.How many distributed so far
5.How many not distributed
6.Reason for not distributing

7.Any other communication activities taken in your area
1 yes 2 no

Your self
PHC
District office
Local Panchayat office

8.What are they?
1.Dom Dom, 2. Mike announcement, 3.personal contact, and 4. Paper advertisement5. All

V) TRAINING

1.How many drug distributors are required for this year

2.How many available

3.Category wise

Health workers male Female

Volunteers

Others

4.How they are trained

5.How many sessions are planned to train the drug distributors ☐

6.How many actually given ☐

7.How many session are skipped ☐

8.Reason for not implementing the training programme

9.Have you received any training modules/training guides/agenda? 1.yes 2.no 3 don't know ☐

10.Is it sufficient? 1.yes 2.no 3 don't know ☐

11.If it is not sufficient how did you manage?

12.The information given in the module is 1.Adequate 2. In adequate ☐

13.If it is in adequate what are the content to be added in the training module

V1) LOGISTICS

1.How many reporting format received from district officials ☐

2.Is it sufficient? 1.yes 2.no 3 don't know ☐

3.The information required / mentioned in the reporting is1. Sufficient 2. Not sufficient 3. Too much ☐

4.How to you think about the form? 1.is it simple to fill 2.Difficult to follow? ☐

5.What is your requirement of drugs this year? ☐

6.How much have you received? ☐

7.Is it sufficient to cover the entire eligible population?
1. Sufficient 2. Not sufficient ☐

Signature of the Medical officer

Signature of the investigator

Questionnaire for The common people for post DEC information

Name of the informer	Age& Sex	No of persons in the family	Address	Have you received DEC 1.yes2.no	Have you taken DEC 1.yes2.no	If yes, When and in front of the workers or after	How many tablets	Have you/any one in your family developed any side effects 1.yes2.no	If yes, what are they 1.nausea 2.vomiting 3.giddines 4.fever&rigor 5.abdominal pain	Is anybody from your family not taken tablets 1.yes2.no	If yes, What are the reasons 1.fear 2.no time 3. Don't know how to take 4. Don't need	If not received the tablets what are reasons 1.not available on that day 2.nobody has given 3.went to work 4.don't have any believe on Govt

SECTION 3:

OUTBREAK INVESTGATIONS

3.3. Outbreak of Cholera in Siruvayalur Village, Perambalur District, Cental Tamil Nadu, 2002

Background

Outbreaks of water-borne diseases are still one of the major public health problems in India[1]. Several studies[2-12]conducted on focal outbreaks have identified the responsible agents. Lack of clean water, over crowding, poor personnel and domestic hygiene and lack of sanitation[3-8] are major contributing factors for spread of diseases and appearance of epidemic of diarrhoeal diseases in India. It has also been seen that where diarrhoea is endemic the risk of an outbreak is enhanced many fold. During his visit to Tiruchirappalli District, the Director, National institute of Epidemiology (N.I.E) was having discussions with Deputy director of health services (DDHS) Tiruchirappalli. At that time, we were informed about an ongoing outbreak of diarrhea at a place called Siruvayalur village in the neighbouring district called Perambalur. Immediately, it was decided that MAE-FETP Scholar investigates the outbreak. The DDHS of Perambalur was contacted immediately on 15th May. His permission was obtained to investigate the outbreak. MAE-FETP Scholar joined the PHC team on 16th May, which was working there since 13th May. An investigation was undertaken to identify the etiological factors and to understand the epidemiological features.

Notification of the illness

Increased number of acute watery diarrhoeal cases was reported from all the streets from 12th May onwards. This was creating panic among the people. Since the local village health nurse (VHN) is staying within the village and is having good rapport with the local people, the people immediately contacted her for treatment and first aid. In addition to giving first aid to the people, she immediately informed the outbreak to the Medical officer on 13th May who in turn informed the same to the district health authority. The district administration was informed by the local Panchayat leader. The district authority requested DDHS to undertake investigation and control measures.

The team

The investigation team consisted of DDHS, PHC Medical Officer, health staff, the principal investigator (MAE- FETP Scholar) and the Department of Microbiology, Tiruchirappalli Medical College.

Objectives

The objectives of the investigation were to

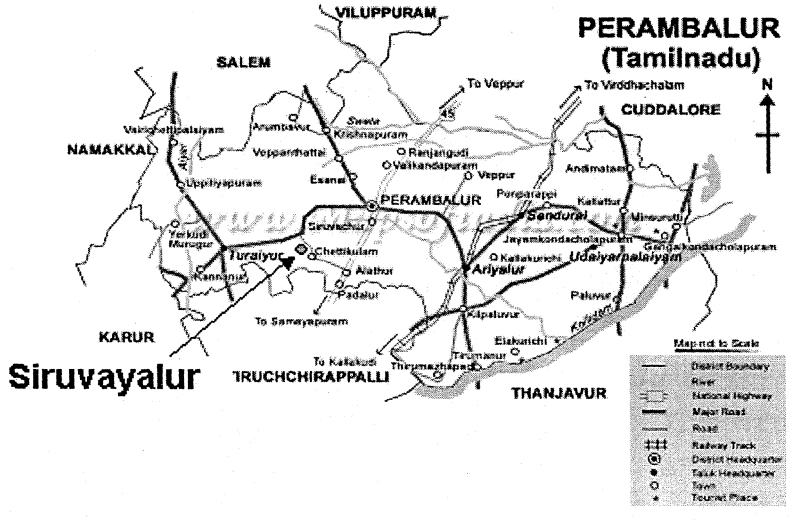
- Confirm the outbreak
- Identify all cases
- Determine sources and mode of transmission
- Initiate control measures
- Suggest measures to prevent the occurrence in future

Methods

Study setting

Siruvayalur village is situated in Perambalur District, central Tamilnadu It is located on the middle of the village highways connecting NakkaSalem and Alathur Gate. It is well connected with surrounding villages and District head quarters by roads (Figure 1).

Figure 1. Location of Siruvayalur village, Perambalur district, Central Tamilnadu



Socio-demographic features

The village population is 1957 (937 women and 1020 men) according to the enumeration done by health workers. The birth rate is 21/1000. The literacy rate is around 42%. The main occupation is agriculture. Most of the people belong to low and middle-income groups. Employment opportunities are very few except for agriculture activities that too for a few months only.

Basic amenities

The village is provided with all basic infrastructures like roads, electricity, schools, and transport and communication facilities. It is provided with three open wells, one bore well, three Over Head Tanks (OHTs) and three hand pumps. However, water is mainly drawn from borewell located within the panchayat office premises and supplied to the community through OHT and pipes. The water available in the bore well is sufficient during monsoon seasons but insufficient during summer. Among the three wells, two are not used because of non-availability of water and the 3rd well is used at the time of emergency. The village streets are not cleaned regularly and solid and liquid waste disposal is not done properly. Open drainage system is present.

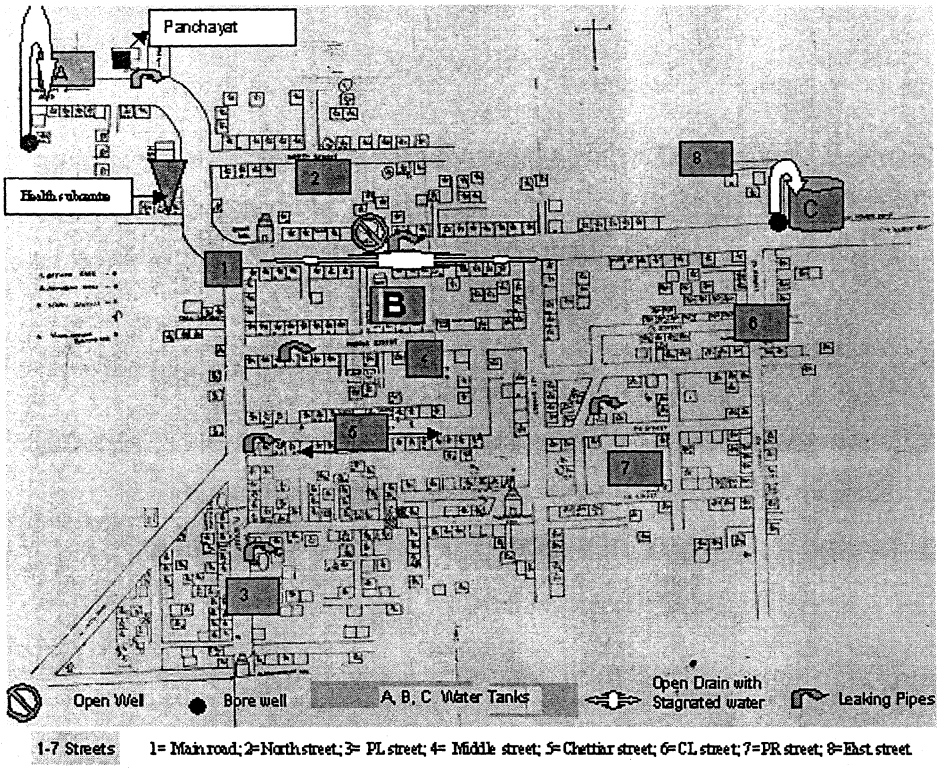
Health facilities

The village is provided with one HSC, which is located at the centre of the village and easily approachable by all sections of the people. The village health nurse is staying within the village. The nearest PHC Chettikulam is 5 km away from the village. The hospital is at Thuraiyur, 15 km away from this village.

Local administration

The village is having an elected council of members for the village Panchayat administration. The main festival of this village is the Mari Amman festival, which is celebrated every year during April -May. However, this year it was not celebrated.

Figure 2. Location of Water sources, streets, Health Sub center and Panchayat office, Siruvayalur, Perambalur, 2002



Epidemiological investigation

Case definitions

Since this village is endemic for diarrhoeal diseases, we have used the following case definition,

Suspected case

Any person with symptoms of acute diarrhoea with or without vomiting and dehydration, who lived in the Siruvayalur village between 1st May up to 24th May" were included as case.

Confirmed case

A suspected case with isolation of *Vibrio cholerae* from stools

Data collection

Primary data was collected through environmental inspection, door-to-door survey for identifying cases and interview with local administrative officials.

Based on the case definition and clinical and risk factors, we prepared questionnaire to identify all the cases and risk factors. The questionnaire included Identification data, clinical features and risk factors. Staff meeting (Multipurpose Health worker Female and male) was organized to give training to them for the house-to-house survey to identify all cases, for identifying and managing dehydration and giving health education to the community. By selecting few families, we demonstrated how to collect data. The workers were standardized for collecting data through a preliminary survey.

The village was divided into 5 parts for the convenience of survey. The survey was done on 16th May and completed it on19th May. We identified 175 cases including 155 cases suitable for case definition.

Environmental investigation

We inspected the entire village to assess the existing sanitary conditions like drainage facilities and its maintenance, water supply and its distribution systems and sanitation around the water sources and the public fountain. We inspected the panchayat office to assess the availability of disinfectant and bleaching powder and its facilities and methods used for storage.

Laboratory investigation

Water samples

We collected water samples in sterile bottles (provided by Medical College) from the tank 1,2, 3, the open well, distribution systems and from the house vessels as (shown in the table) adapting aseptic precaution. The samples were sent for analysis to medical college, Tiruchirappalli.

Stool Samples

Stool samples (both from the stool and rectal swab [2-3]) were collected in buffered peptone water solution and Cary-Blair transport medium and were sent to medical college in vaccine carrier. In the Medical college laboratory, standard techniques[2] were used to culture the stool samples. Since bio-typing technique was not available in Tiruchirappalli Medical College, the positive culture plates were sent to National Institute of Cholera and Enteric Diseases, Kolkata.

Data analysis

We used EpiInfo 6.04d for data entry and analysis of the collected data. We calculated relative risk and corresponding 95% Confidence interval (C.I). Chi-square test was used to assess the statistical significance of relationship between exposure variables and outcome.

Results

We have interviewed all houses (approximately 500 houses) except the locked houses. The response to our house-to-house survey was almost 100% except those who were left for work and those who were admitted in various hospitals. The patients admitted in the hospital were interviewed either in the hospital or after they returned from the hospitals.

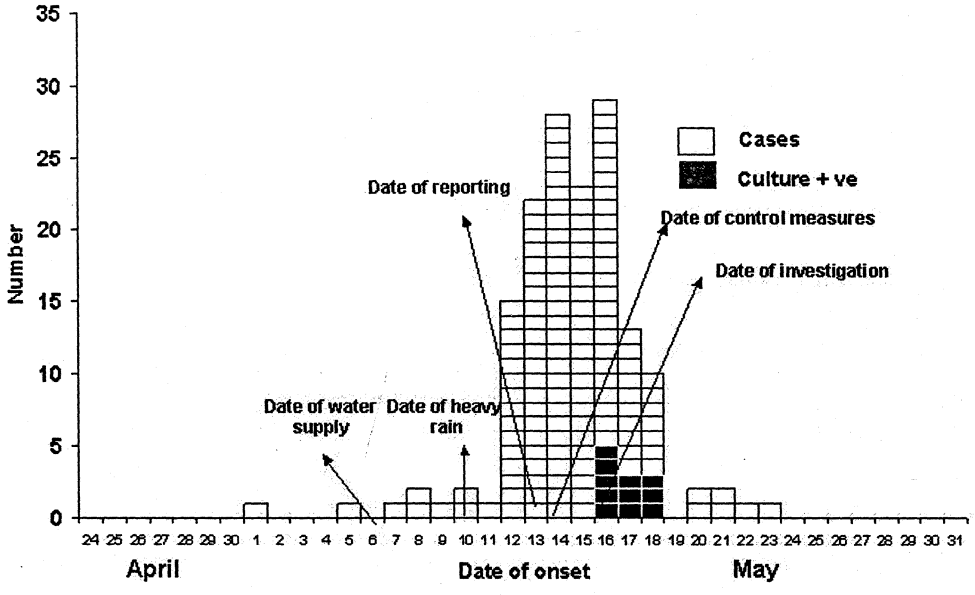
Descriptive Epidemiology

Time

The time distribution curve shows distribution of cases by the onset of acute diarrhoeal diseases. The cases occur over a period of 20 days. Cases occurred sporadically until 11th May and sharp increase of cases was observed from 12th onwards till 16th May and therafter sudden decline was seen. There were two peaks in the epidemic curve. The occurrence of few cases after 19th may be due to person-to-person indicating[4] mixed type of epidemic. The outbreak started to occur in epidemic from 12th May and came to the knowledge of health department on 13th May and control measures were taken from that day onwards. The number of cases started declining from 16th onwards and the epidemic came to the end on 24th May. No case was reported after that date. Since the outbreak occurred in the neighboring District of the principal investigator's filed posting area (FETP Scholar),

investigation was started only on 15th May. The likely mode of transmission was through water and to some extent through person to person.

Figure 3. Number of diarrhoeal cases (n=155) by date of onset, Siruvayalur , Central Tamil nadu, 2002



Person

The population structure of Siruvayalur is given in Table 1.

Table 1. Population structure of Siruvayalur village, Perambalur, 2002

Sex	0-1	1-4	5-14	15-19	20-49	50+	Total
Female	15	73	118	99	432	200	937
Male	15	65	139	97	478	226	1020
Total	30	138	257	196	910	426	1957

Overall attack rate

Totally 155 cases occurred during the outbreak. The overall attack rate was 7.9%. No death was reported from that village during epidemic period.

Attack rate by age and sex

Sex stratification indicates that attack rate among female was 8.4 and in male it was 7.4/ 100. (Table 3). The difference was not statistically significant (χ^2=0.56; p=0.45).

Table 2. Attack rate of Cholera by sex, Siruvayalur, Perambalur, 2002

Sex	Total	No. of cases	Attack Rate (%)
Male	1020	75	7.4
Female	957	80	8.4

The age stratified attack rates indicate that attack rate was higher in the 50 and above agegroup (12.7%). The trend was statistically significant (χ^2_{trend}=37.7; p < 0.0001).

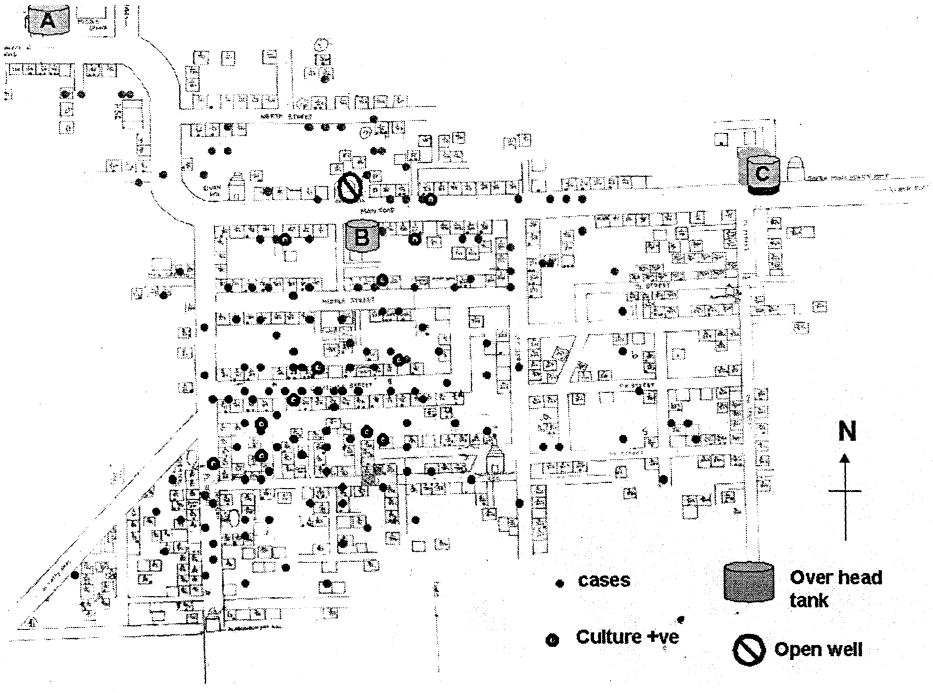
Table 3. Attack rate of cholera by age, Siruvayalur village, Perambalur, 2002

Age	Total	No.of cases	Attack rate (%)
0-1	30	0	0
1-4	138	1	0.7
5-14	257	4	1.5
15-19	196	17	8.5
20-49	910	79	8.6
>50	426	54	12.7
Overall	1957	155	7.9

Place

The spread of affected people in relation to location of houses indicated that clustering of cases in few streets and more people were affected in few streets (Figure 4).

Figure 4. Distribution of diarrhoeal cases by residence, Siruvayalur, Perambalur, 2002



The streets mostly affected were PL Street, Main Road, Chettiar street and PR street. The least affected streets were the CL street and East street where the number of persons affected was 8 and 2 respectively. Similarly, the street wise attack rate was very high in the North street (19%),Chettiar Street (15%) than East and CL streets where the attack rate was only 2% 5% respectively (Table 4).

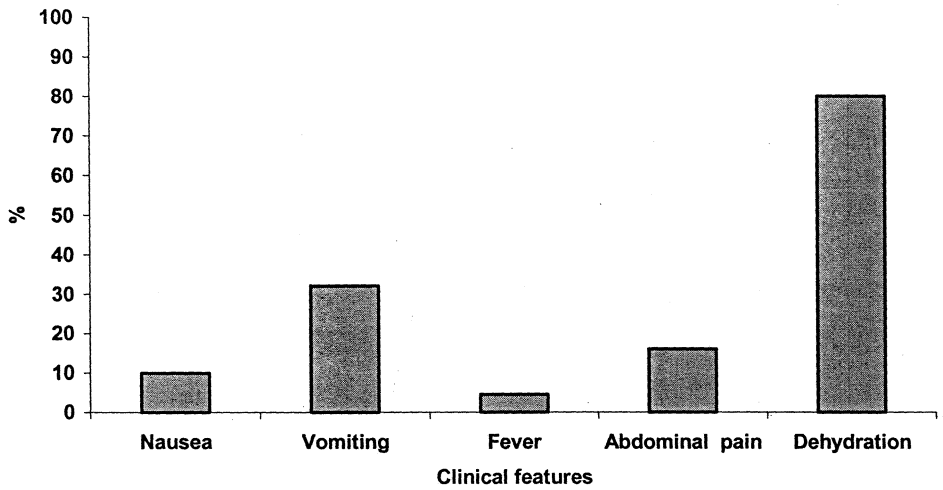
Table 4. Attack rate of cholera according to streets, Siruvayalur, Perambalur, 2002

Name of the street	Total population	No. of cases	Attack rate (%)
Main road	427	22	5.2
PR Street	437	22	5.0
PL Street	510	46	9.0
Chettiar Street	126	19	15.1
Middle street	100	14	14.0
North Street	112	22	19.6
CL Street	148	8	5.4
East Street	97	2	2.1

Presenting signs and symptoms

The commonest symptoms were vomiting (37%) and dehydration (80%). Bloody stools were reported in two cases. The stool frequency was 3 to 7 times / day (Figure 5). Almost 30% of the patients were hospitalised for treatment.

Figure 5. Predominant clinical features of cases of cholera during the outbreak, Siruvayalur, 2002



Attack rate according to source of water

The attack rate of cholera according to the source of water is shown in table 5. Approximately three-fold risk of cholera was observed for those who had taken water from OHTs 'A' and 'B' as compared to those who used water from OHT 'C' [Relative Risk: 2.7 (95% CI: 1.53, 4.85)].

Table 5. Attack rate of cholera according to water source Siruvayalur, Perambalur, 2002

Water source	Population	Cases [Attack rate (%)]
Through overhead tanks 'A' and 'B'		
North street	112	22 (19.6)
P.R street	437	22 (5.0)
PL street	510	46 (9.0)
Chettiar street	126	19 (15.1)
Middle street	100	14 (14.0)
Main road (Western)	308	16 (5.2)
Total population	1593	143 (9.0)
Through overhead tank 'C'		
East street	97	2 (2.1)
CL street	148	8 (5.4)
Main road (Eastern)	119	2 (1.7)
Total population	364	12 (3.3)

Geographical distribution of cases

PL.street had many cases than any other streets. Next, the main road, PR street and North street were equally affected. The least affected streets are CL street, eastern part of the main street and East street.

The least affected streets were CL street, eastern part of the main street (1) and East street. They were getting water from tank water (Tank-C as shown in the map), which draws water from separate bore well.

Confirmation of the outbreak

We confirmed the outbreak by verifying with the number of cases reported at outpatient department of the PHC. The record was available with VHN for the past 4 years. There was no such epidemic in that village for the past 4 years and there was no increased reporting of cases of acute diarrhoea in that village during these months in the previous 4 years. The epidemiological linkage and clustering cases in in few streets (PL.street, Chettiar Street, and Middle Street) at varying times between 1st May to 24th May further confirmed the outbreak.

Environmental inspection

During our inspection, we identified that general sanitation was very poor. People were using the streets and roads as latrine to ease themselves since they did not have latrine facilities either in their houses or at the community level. Even though drainage facilities were available, they were poorly maintained leading to stagnation of water at many places and there was no disposal point or methods available. The sanitation of those houses who rear domestic animals were very poor and the people throw the waste on the streets indiscriminately leading to vector breeding.

When we had discussions with officials and health workers they informed that water supply to that village was not sufficient to meet the demand especially during summer. So in addition to the water from the routine bore well, they augmented the supply by adding water drawn from the well, which was not used regularly. Close to the so-called not regularly used well, there was a big drain and culvert where water stagnation was always there. Prior to the outbreak, there was heavy rain in that village and within few days after rain, the outbreak occurred.

Normally the water is supplied to the community from the bore well, which is connected to both tank 'A' and 'B'. The entire village is supplied by these tanks. The areas like CL street, east side of the main road and East street were getting water from the tank 'C', which gets water from another bore well. There is another open well, which was not used regularly after the installation of the new bore well and the tanks few years back. This well is also connected to the tanks 'A' and 'B'. Due to drought conditions during this summer, water yield from the borewell became insufficient to meet the needs of the community. Hence, they started using the wellwater (the exact date is not known; because of fear of victimization the village leaders and the panchayat waterman were not willing to disclose the date). The procedure they used to fill the tank was as follows: they first fill the tank 'A' by using the available water from the borewell and use the well water to fill the remaining part of the tank and viceversa. Similarly, the tank B was also filled by using the both the old well water and bore well water. The eastern side of the village was high lying area and water from the tank 'A' and 'B' could not reach that area. Therefore, they were getting the water from the tank 'C', which is connected, to another borewell near the tank. The areas, which received water from the tank 'C', were the C.L Street, eastern part of the main road and the east street.

On 8th May there was heavy rain and followed by flooding of streets. Within the next 2 days, the reporting of acute diarrhoeal cases started occurring and which came to knowledge of health workers who in turn not only treated the cases and reported to the higher authorities.

We have identified many leaking pipes on the water supply pipelines, which were not attended for a long period. The most important one is the leakage adjacent to the pump house of the open well i.e. near the open well and on the main road. There was a big drain and culvert where water stagnation was always there. Pump house is constructed in such a way that if any flooding on the street due to rain the changes of flood water or the stagnated drain water entering into the well through holes of the pump house are more.

The other places where the leakages were found include: near the water tank 'A', two in the PL street, two in the Chettiar street, one on the Viralipatty road near the house connection. We have identified those areas like, the bore well, water tanks

and public fountains, were flooded with used water and without proper maintenance.

Laboratory findings

Out of 14 stool samples sent for analysis, 11 became positive for *Vibrio cholerae* Non- 01 and serotyping was not done. Out of 15 water samples, only one sample was positive for contamination with *E.coli*. Reason might be due to proper chlorination of water before collection of samples. Samples were collected only few days after the initiation of control measures since we went there for investigation very lately.

Intervention measures

We have treated approximately 100 patients in camps with intravenous fluids, doxycycline and oral rehydration salt solution. Ten patients were referred other hospitals. Health education was given for proper disposal of stools of the affected persons by covering with earth, and sterilizing the clothes with disinfectants and boiling and cleaning the affected person's house with disinfectant. The community was advised to use only the chlorinated and boiled water.

We took steps to ensure the supply of chlorinated water with at least 1 ppm of free chlorine to be available at the consumer level by frequently testing the water with ortho-tolidine solution at various levels, including at the household level. With the help of the panchayat leaders and community, leaking pipes and stagnated water were rectified and the stagnated solid waste were cleared.

Discussion

Confirmation of outbreak and diagnosis

Even though sporadic cases occurred since 1st May, the outbreak began only on 12th May 2002. We have confirmed the outbreak by identifying the epidemiologically linked cases and clustering of cases in few streets and by verifying the number of cases with the previous year's data. We have also confirmed the clinical diagnosis by laboratory investigation, which showed positive

for *Vibrio cholerae*. At varying times, during May 12th –23rd more than 150 people developed symptoms requiring treatment and 46 cases were admitted in hospitals.

Causative agent

Vibrio cholerae was isolated from stool samples. No other organism was found in the culture confirming the causative agent of *Vibrio cholerae*. Cholera infection has occurred in epidemic proportions in many parts of India[2] and even within Tamilnadu. The organism usually causes illness like diarrhoea, vomiting, and dehydration by invasion of the intestine. It also produces heat stable enterotoxins, which is responsible for loss of fluids causing dehydration.

Source and mode of transmission

No common food items were identified through interviews. There was no family or village function in that village prior to the outbreak, so chances for the food as the common source became remote. Even the clinical feature and the incubation period were also not in favor of food poison or food related sources. Illness is not limited to one area or street. Entire village is affected except few streets as where only few people were affected. If it was a food-borne or any food poison there must be a gathering of people and duration will be very short. Since entire village is affected, the likely mode of transmission could be through water. The epidemic pattern is also consistent with common source and person-to-person spread.

The time distribution of cases and place distribution of cases showed the likely mode of transmission is through water. For example, more number of cases in the streets like PL Street, main road, Chettiar street and Middle street where they got water supplied from the not regularly used well and where we have identified leakage of pipe and stagnation of drainage water. The number of cases suddenly increased after the supply of water from the unused well that too after the heavy rain two days prior to the outbreak. All the above reasons indicated that the likely source and the mode of transmission were through water. This was again proved by water taken from storage places and its contamination with E.coli. The appropriate control measures reduced further occurrence of cases of cholera. The prolongation of the epidemic may be due to delayed control measures taken by the local body and person-to-person transmission.

Risk factors

Vibrio cholerae non-01 was the primary causative agent for this outbreak, which was due to contamination of water. As it is happening in most places of India, poor sanitation of the village was the main reason especially due to their practice of going to the field to ease themselves, indiscriminate use of roads and streets for open defecation, in adequate and improper maintenance of drains, all contributing to the contamination and pollution of water sources. Since the village was not provided with any latrine facilities or open spaces to be used as open latrine, they were using the only available open spaces like streets and roads to ease themselves. This village was also not provided with adequate drainage facilities leading to flooding of streets during rainy seasons Because of this practice and insufficient draining facilities, during rainy seasons the water sources were polluted.

The village was not having sufficient water, especially during summer. Therefore, they (authorities) tried all possible methods to compensate the inadequacy. This year they supplied water from the not regularly used well along with the water from normally used bore well water without chlorination. There was a culvert with stagnated water close to the open well and there was heavy rain in that village 2 days prior to outbreak and likely chance of mixing of drain water with well water because of close proximity and a leaking pipe within the culvert. This was not noticed by the authorities. This was main contributing factor for this outbreak and it was proved by water analysis, which showed gross contamination of water with E.coli.

Another risk factor for this outbreak was the neglect of leaking pipes leading to contamination of water. We have identified during our site inspection such leaks, which was later attended immediately. This was proved by more cases in some streets and less cases in some streets. PL Street had 46 cases and CL street just 8 cases. In the case of PL street they were getting water from the tank located near the open well, where as in the case of CL street in addition to the above water they were drawing water from the tank ('C') attached to another bore well which was not supplied through pipelines.

Another risk factor was the poor maintenance of the surroundings of public fountain and bore well plate forms, which were possible chance for seepage and

contamination. In this village we have seen such places in the PL. Street, main road, Chettiar street areas and middle Street.

The most significant rain prior to the outbreak was actual beginning of the outbreak. Although the original source of contamination of the water (Tank) is uncertain, there are at least two plausible explanations. The well water might be contaminated with *Vibrio cholerae* presented in the drain water following heavy rain and flooding prior to the increased number of cases. The attack rate and clustering of cases were more in the in the areas which received water from tanks 'A' and 'B', which were filled with water from the borewell and open well.

Limitation

It is unclear exactly when this outbreak began. It is possible our case definition either excluded some earlier cases in May beginning or included unrelated cases early in May.

Since the water distribution system is not clearly understandable because of lack of proper information from panchayat, we were not able to identify the main water source, which is responsible for this outbreak.

Since the investigation was started only at the middle of the outbreak, the main culprit of water contamination is not identifiable even though water samples were taken from all possible sources for analysis.

Summary

The outbreak occurred following the use of (contaminated) well water following the heavy rain and the outbreak came to the knowledge of health department after 3 days. In this outbreak, about 155 patients were affected with 46 were admitted in various hospitals and approximately 100 cases were treated in the Primary Health Centre and temporary camps. Following the control and intervention measures, the outbreak ended on 23rd May. The occurrence highlights the importance of effective reporting system system; with help of laboratories and local linkages with panchayat leaders and other health related departments.

Recommendations

Many developed countries eliminated acute diarrhoeal and cholerae just by improving the sanitation and supply of potable water and awareness of using treated water. In India, ADD outbreaks occur only when there is deterioration of sanitation and supply of drinking water become scarce. In order to prevent the further recurrence of this type of water related outbreak, we recommend the following:

1) Effective monitoring of water supply and its quality
2) Health education to create awareness to demand and use only potable water
3) Alternative source for proper and adequate supply of potable water
4) Health education for the proper storage of water at the storage level (household level)
5) Steps to be taken to improve the financial position of the village panchayat
6) Village panchayat officials and the leaders to be educated and trained about the importance of the chlorination.
7) Disease reporting system system and epidemic response to be improved

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Annexure

Chronology of important events:

Event	Date
• Use of unused well water	6/5/02
• Heavy rain	10/5/02
• Occurrence of first case	1/05/02
• Occurrence of increased number of cases	12/5/02
• Recognition of outbreak	13/5/02
• Reporting	13/5/02
• Initiation of control measures	14/5/02
• Start of investigation	16/5/02
• Declining of cases	17/5/02
• Last case	23/5/02

Questionnaire used

Outbreak Investigation Form

Identification data

NAME ..... Address

Age ☐ Street

Sex : 1. Male 2. Female ☐

Occupation ☐

Educational status ☐

Clinical Features

1) Date of Reporting ☐

2) Date of onset ☐

3) Time of onset ☐

4) Nausea 1.yes 2no ☐ No of times ☐

5) Vomiting 1.yes 2no ☐ No of times ☐

6) Diarrhoea 1.yes 2no ☐ No of times ☐

7) Blood stained 1.yes 2no ☐

8)Mucus 1.yes 2no ☐

9) Abdominal pain 1.yes 2no ☐

10) Fever 1.yes 2no ☐

11) Dehydration 1.yes 2no ☐ if yes types 1. Mild 2.Moderate 3. Severe ☐

12) Urine output 1.Normal 2Decreased ☐

13) Hospitalized 1.yes 2no ☐

14) If yes 1.IP2.OP ☐

15) Type of Hospital ☐ 1PHC 2Taluk hospital 3,District hospital 4Private

16) Recovered from illness 1.yes 2 no ☐ If yes When ☐

17) Duration of illness ☐

Risk factor Information

1.Food Taken out side home 1.yes 2 no ☐

2.Water Taken out side home 1.yes 2 no ☐

3.Travelling out side home 1.yes 2 no ☐

4.Attending any function/ festival 1.yes 2 no ☐

5. Type of Food Taken for the past 3 days ☐

Environmental risk factors

1.Disposal of solid waste1. Dumping 2 Manure pits 3. Others ☐

2.Laterine facilities1.yes 2 no ☐

3.Storage of water 1.Pot 2. Silver vessel 3. Others ☐

4.General sanitation of the House 1 Good2 bad 3 others ☐

5.Source of Water 1 within the house 2 our side the house3 both ☐

6.Type of Water Source

1.Well 2.Hand pump 3.OHT 4. Bore well ☐

Signature of investigator

3.2. Outbreak of Cholera, Sirunavalur, Tiruchirappalli District, 2002

Background

Food hygiene and safety, supply of potable water, and sanitary disposal of solid including stools and liquid waste receive scanty attention in India despite the fact that several millions people, including children are affected daily. Food and water borne outbreaks are common but are seldom investigated. The present report describes the investigation of a suspected outbreak of water borne acute gastro enteritis (Cholera), which provided evidence for the contamination of drinking water as the probable cause.

Notification of the illness

The outbreak began on 30th May 2002 in a village, Sirunavalur, in Erakudi P.H.C. area in Thuraiyur taluk of Tiruchirappalli District. It came to the attention of District health authorities on 2nd of June through the District authorities. The District authorities received the information through panchayat leaders who told them that there were more than 10 cases of acute diarrhoeal cases admitted in Thuraiyur Government Hospital and more than 20 cases attended at the Outpatient department of PHC. They also reported that two patients died during the outbreak. The outbreak came to the attention of local Health workers only after the death of two cases who in turn informed the District health office. The Deputy Director of Health services (DDHS), Tiruchirappalli requested MAE-FETP Scholar to investigate the outbreak.

Urgency and scope of investigation

Death of two cases in the village due acute diarrhoea had created panic among local people. The outbreak was reported in the local press. Political parties and the public pressed for immediate preventive measures which lead to the undertaking of this investigation. Moreover, systematic epidemiological investigation was required to understand type and cause for the epidemic.

Investigation team

The team consisted of DDHS, Epidemic response team (two staff nurse and one health inspector), P.H.C Staff, microbiology department of the local Medical College and the principal investigator (MAE- FETP Scholar)

Objectives

The objectives of the investigation were to

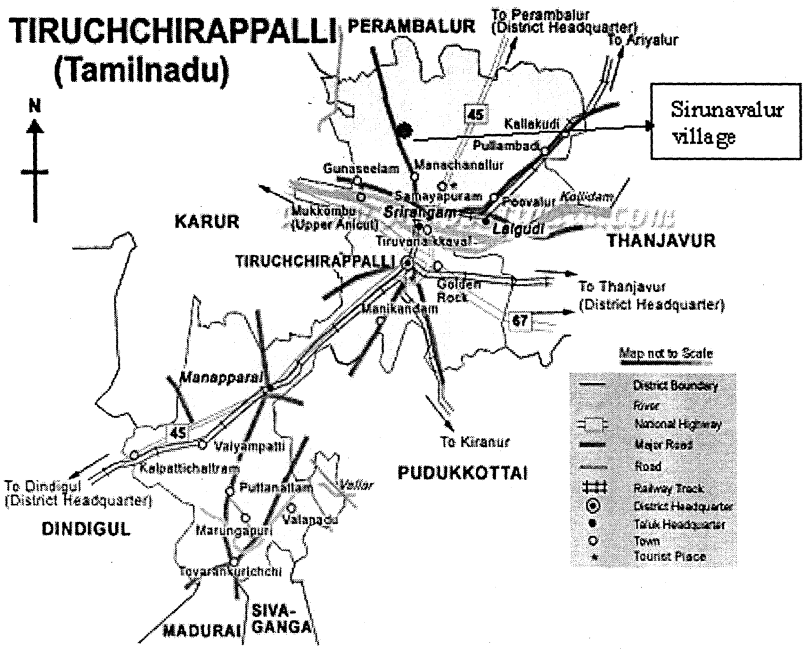
- Confirm the outbreak
- Identify all cases
- Determine sources and mode of transmission
- Initiate control measures
- Suggest measures to prevent the occurrence in future

Methdos

Study setting

Sirunavalur village is located (Figure 1) at the foothills of Pachamalai in Thuraiyur Taluk of Tiruchirappalli district. There is a lake in the village, which provides water for agriculture at least for 6 months.

Figure 1. Location of the Sirunavalur Village, in Thuraiyur taluk, Tiruchirappalli District



Infrastructure facilities

The village is well linked with taluk head quarters and nearby villages by roads. Bus transport facilities are adequate. There is a lake in the outskirts of the village for irrigation purpose. The village gets water from open well, which is located just out side the village. The water is supplied to the people by pipe through two overhead tanks. The well and water supply are maintained by village panchayat. The village is not provided with any sanitary latrine facilities. The village is provided with electricity, one preschool noon meal centre, two primary schools and one high school.

Health facilities

The Village is having a HSC, which is located at the centre of the village, easily approachable by all sections of the people. The VHN is staying within the village and having good rapport with the local people. The PHC is located just 3 km away from the village at Erakudi. There are few private heath facilities available in the near by Erakudi and Mettupalayam village which are easily approachable by road.

Epidemiological investigation

Study design: Retrospective cohort

Data collection

Actually, we received the information about the outbreak on 2nd of June morning from the District administration and from the Medical officer concerned. We, the response team immediately rushed to the affected area and started our investigation. First, we confirmed the existence of out break by counting the cases enrolled at HSC, O.P register where emergency treatment was given. The clustering of cases in few streets also confirmed the clinical diagnosis of acute gastroenteritis. Since the data for the acute diarrhoeal diseases were not available, we took the number of cases and clustering of cases in few streets to confirm the epidemic.

Case definitions

Since this village is endemic for diarrhoeal diseases, we have used the following case definition,

Suspected case

'Any person who lived in Sirunavalur village with symptoms of acute watery diarrhoea with or without dehydration during the period between 29.5.02 to 12.6.02'

Confirmed case

A suspected case with isolation of *Vibrio cholerae* from stools

First, we used the case definition to identify all cases in the community and in the hospitals. A questionnaire was prepared for the house-to-house survey. The questionnaire included identification data, demographic, environmental, and clinical and risk data. Based on the questionnaire we gave training to the health workers for the survey. Simulataneously the health workers were given instructions to identify cases, recognize dehydration, treatment methods, preventive measures and creation of awareness among common people to seek medical help after developing clinical symptoms.

By selecting few families, we demonstrated how to collect data. The workers were standardized for collecting data through a pilot survey. We divided the entire village into four areas for convenience of survey. The quality of the interview and information collected by the health workers were monitored frequently. We completed the survey by visiting door-to-door within 3 days.

Environmental investigation

On 2nd June, we under took sanitary and water survey to assess the general sanitation and supply of potable water to community, Sanitation around the water sources and water scorces. We also verified the availability of disinfectant and bleaching powder in the local panchayat office.

We enquired about the general sanitation, supply of potable water to community, availability of disinfectant, bleaching powder, method of treating the water, the possible source of infection and mode of transmission by interviewing and discussing with leaders, water supply man, Health inspectors, and the medical officers.

Laboratory investigation

Water samples

We collected samples of water from two places one each from both the public wells under aseptic precaution. This was sent for analysis to the Medical College, Trichirappalli. During the next two days(5th and 6th June, 2002), we collected eight water samples from the distribution systems and from the house vessels.

Stool Samples

On 2nd June we collected three stool samples from new patients. During the next 2 days (5th and 6th June), we collected 4 more stool samples (both stool samples and rectal swab). Stool samples were collected from patients in OP and IP departments, in buffered peptone water solution and Cary-Blair transport medium and were sent to medical college in vaccine carrier. In the Medical college laboratory, standard techniques were used to culture the stool samples. Since bio-typing technique was not available in Tiruchirappalli Medical College, the positive culture plates were sent to National Institute of Cholera and Enteric Diseases, Kolkata.

Data analysis

We used EpiInfo 6.04d for data entry and analysis of the collected data. We calculated relative risk and corresponding 95% Confidence interval (C.I). Chi-square test was used to assess the statistical significance of relationship between exposure variables and outcome.

Control measures

Cases were treated in the temporary camp (which started functioning from 2nd June onwards in the affected village) itself and severely dehydrated patients were referred to near by Thuraiyur Taluk Hospital.

We requested the panchayat leaders to make available sufficient quantity of bleaching powder and disinfectant for taking preventive measures to control and contain the spread of disease. We also requested the local authorities to supply water only after chlorination, to improve the general sanitation of the village, up keeping of drains and to take immediate measures to set right the leaking pipelines.

Results

Total population of the village was around 1, 719 according to the survey. People here are mostly dependent on agriculture for livelihood. Most of them belong to

lower and middle-income groups. Its birth rate is 20 per 1000 and death rate is 7 per1000. Its literacy rate is less than 40% (District health report).

Table 1. Population of Sirunavalur village, Tiruchirappalli District, 2002

Sex	0-1	1-4	5-14	15-19	20-49	50+	Total
Female	11	35	138	67	325	291	867
Male	14	52	147	62	348	229	852
Total	25	87	285	129	673	520	1719

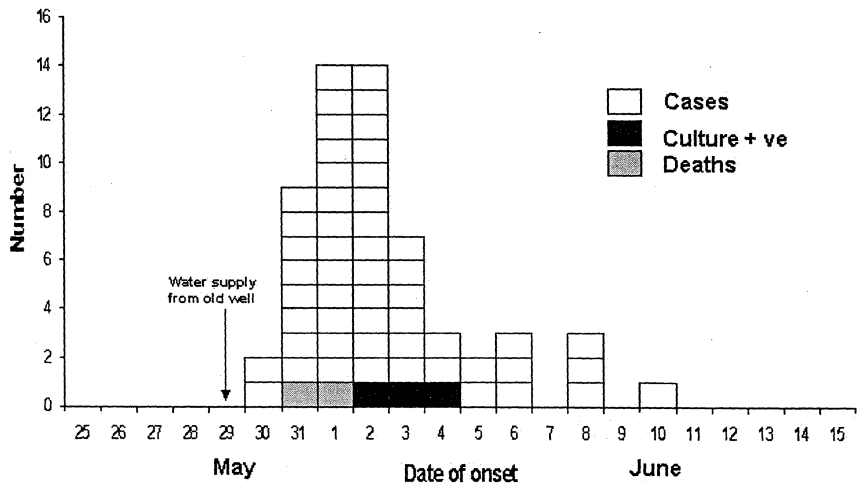
The response to our house to house was almost 100% except those who were left for work and few students who were studying in nearby towns. There is no history of refusal to give details during interview with the community leaders and the people.

Descriptive epidemiology

Time

All cases occurred between 30th May and 10th June (Figure 2). The time gap between the supply of unused well water and the development of illness ranged from 2-3 days. The epidemic curve shows a rapid increase of cases and rapidly declines on the next 2 -3 days. The shape of the curve suggests a point source outbreak i.e. common source outbreak.

Figure 2. Number of diarrhoeal cases (n=58) by date of onset, Sirunavalur Village , Tiruchirappalli District, 2002



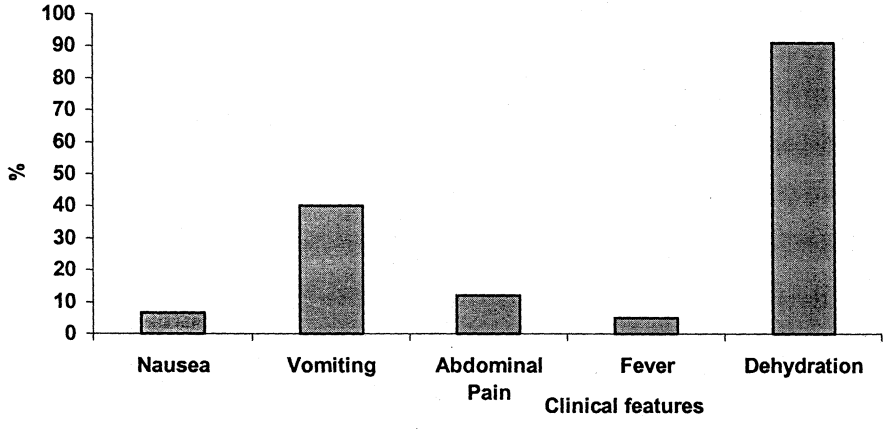
Person

Outbreak of acute diarrhoeal disease has affected all age groups. 60% of cases were females. 41% and 43% of cases were from 20-49 and above 50 years respectively. The affected individuals ranged from 4 to 71 years.

Presenting signs and symptoms

The commonest symptoms were vomiting (40%) and dehydration (91%). Bloody stools were reported in two cases. The stool frequency was 3 to 7 times per day (Figure 3). Approximately 25% of the patients were hospitalized for treatment.

Figure 3. Predominant clinical features of cases of cholera during the outbreak, Sirunavalur,Tiruchirappalli district, 2002



There were two deaths in the village during epidemic. One was the 7-year-old female child and another person was the 70-year man. The case fatality rate was 3.5%

Overall attack rate

The overall attack rate was 3.4 per cent and more females are affected than the males.

Attack rate by age and sex

Sex specific attack rate was not statically significant (χ^2=1.97; p=0.16).

Table 3. Attack rate of Cholera by sex, Sirunavalur, Tiruchirappalli District, 2002

Sex	Total	No. of cases	Attack Rate (%)
Male	852	23	2.7
Female	867	35	4.0

The age stratified attack rates indicate high attack rate in the>50 age group and minimal attack in under 4 children. Even though the numbers of cases are more in 20-49 age group, the attack rate is high in the age group of 50 and above (The age stratified attack rates indicate that attack rate was higher in the 50 and above agegroup (12.7%). The trend was statistically significant (χ^2_{trend}=7.47; p=0.006).

Table 4. Attack rate of cholera by age, Sirunavalur,Tiruchirappalli,2002

Age	Total	No.of cases	Attack rate (%)
0-4	112	1	0.9
5-14	285	5	1.8
15-19	129	3	2.3
20-49	673	25	3.7
50+	520	24	4.6
Overall	1719	58	3.4

Place Distribution

The spread of affected people in relation to location of houses indicated that (Figure 4) clustering of cases in few streets and more people were affected in few streets like the colony, Muthuraja street and main road than the PL Street where the number of person affected were only 7. Similarly the street wise attack rate was very high in the (centre east) street- 3(12%) than the (colony) street –1 where the no of persons affected were 17 and the attack rate was only 3.8% (Table 5)

Figure 4. Distribution of diarrhoeal cases by residence, Sirunavalur, Tiruchirappalli District, 2002

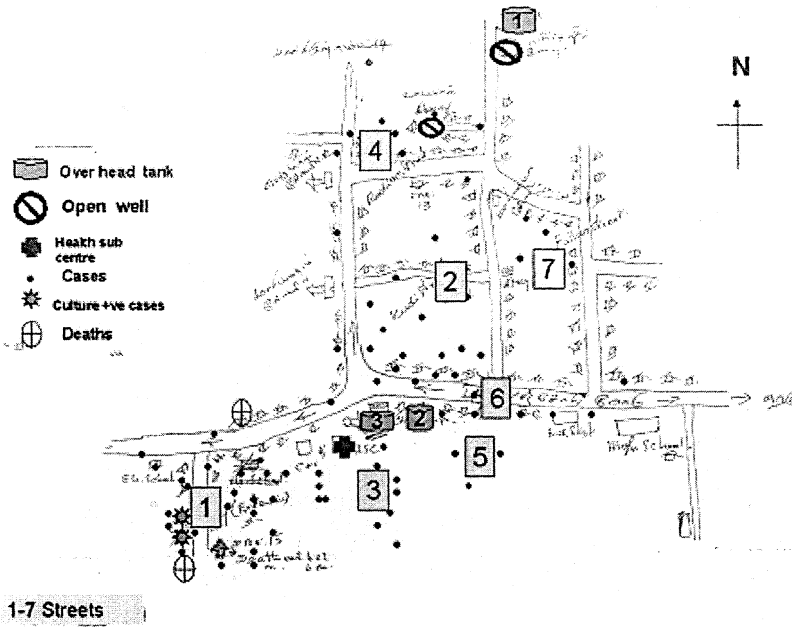


Table 5.Attack rate of cholera according to streets, Sirunavalur, Tiruchirappali, 2002

Name of the Street	Total population	No. of cases	Attack rate (%)
Colony	435	17	3.9
Muthuraja	402	16	4.0
Centre east	41	5	12.2
Reddiar street	96	5	5.2
Valluvar street	45	1	2.2
Main road	290	8	2.8
PL street	410	6	1.5

Attack rate according to source of water

The water source wise attack rate was high in the areas, which received water from the well 1 through the tank 3 (4.8%) than the other areas, which received water from the well 2 through tank 1 (1.6%) as shown in table 6.

Table 6. Attack rate of cholera according to water source, Sirunavalur, Tiruchirappalli, 2002

Source of water	Population	Cases [Attack rate (%)]
Well 1 Water through tank 3		
Colony	435	17 (3.9)
Muthuraja	104	11 (10.6)
Centre east	41	5 (12.2)
Reddiar Street	40	3 (7.5)
Valluvar street	45	1 (2.2)
Main road	250	8 (3.2)
Total population	915	45 (4.9)
Well 2 water through tank 1		
PI street	410	6 (1.5)
Reddiar Street	56	2 (3.6)
Muthuraja Street	298	5 (1.7)
Main road	40	0 (0.0)
Total population	804	13 (1.6)

The streets which received the water from the well-1 through the tank 2 had three times more number of cases as compared to the area which received water from the well -2 through tank 3 (Relative Risk=3.04; 95% CI: 1.65, 5.60).

Confirmation of the outbreak

We confirmed the outbreak by verifying the outpatient register maintained by the Village health Nurse (VHN) for this outbreak with previous year records. There was no such epidemic in that village for the past 3 years and there was no increased reporting of cases of acute Diarrhoea in that village in the same period during the previous 3-years. The number of cases treated by the response team which was camping in that village since 2nd June, were more than the previous year's data and the epidemiological linked cases and clustering of cases in few streets like (Muthu raja Street, main road and Colony) confirmed the outbreak. At varying times

between May 30th to 10th June, 58 people developed symptoms requiring treatment and some 14 cases were admitted in various hospitals.

Environmental investigation

Site inspection revealed poor sanitation of the village due to open defecation on the streets and roads. We saw people using the streets roads for open defecation. We saw indiscriminately thrown solid wastes, stagnated water around the public pipes (Street pipes), uncleanness of streets, indiscriminate use of street for defecation, unhygienic atmosphere near the well-2, leaking pipes, improperly maintained platforms around the street pipes, improper maintenance of drains leading to stagnation of polluted water etc.

Water survey revealed many defects in the water supply like unsanitary condition around the wells and street pipes and leakages in few places. The leaking pipes identified during survey include one near well 1, near subculture, the colony (n=2), one on the main road near the panchayat office and one in the centre east streets which were later rectified.

We came to know that before the epidemic, water was supplied without chlorination (according to people's statement). Only during the outbreak, they started to use the bleaching powder for chlorination. The village was having two open wells (Well- 1 was the old one; well 2 was the new one). After the installation of new well, old well water was not used frequently. When we had discussion with officials and health workers, they informed that water supply to that village was not sufficient during that summer due to drought. Therefore, in addition to the water from the routine well -2, they augmented the supply by adding water drawn from the well-1, without treatment.

Laboratory findings

Microbiological analysis revealed isolation of *Vibrio cholerae* from 3 out of 7 stool samples of the patients. The isolates were sent to Kolkata for confirmation and serotyping. Among the 10 water samples, 5 samples had coliforms of which 3 had coliforms counts greater than180 ml. No other pathogens were isolated from water and stool samples

Intervention measures

We have treated some 40 cases in the temporary camp with I.V fluids, doxycycline, and oral rehydration salt solution and other cases were referred to Thuraiyur taluk or Tiruchirappalli medical college hospital. For the contacts, prophylactic doxycycline was given. Health education was given for proper disposal of stools of the affected persons by covering with earth, and sterilizing the cloths with disinfectants and boiling and cleaning the affected person's house with disinfectant.

We ensured the supply of potable water. With the co- operation of the local leaders the water leaking pipes were rectified and sanitation was improved by removing the stagnated solid waste. The drains were cleaned and spread of the disease was prevented by stopping the open defecation. The community was advised to use chlorinated and boiled water.

Discussion

Laboratory investigation suggested that *Vibrio cholerae* is the primary causative agent for this outbreak, which is due to contamination of water through poor sanitation. Poor sanitation of the village is due to their practice of going to the field to ease themselves, indiscriminate use of roads and streets for open defecation. Since the village was not provided with any latrine facilities or open spaces to be used as open latrine, (they didn't have latrine facilities either in their houses or community latrine are available. Only 10% of the people having sanitary facilities in their houses), they are using the only available open spaces like streets and roads to ease themselves. Most of them go for open field because of their customs and illiteracy. This village is also not provided with adequate drainage facilities leading to flooding during rainy seasons Because of this practice and insufficient draining facilities, during rainy seasons the water sources were polluted.

Water supply

The village is not having sufficient water, especially during summer. So they (authorities) will try all sorts of possible methods to compensate the inadequacy. This year they supplied water from the unused well water (well-1) along with the water from normally used well (well2) water without treatment. This was another

risk factor for this outbreak and was proved by water analysis. The water was contaminated with E. coli.

The water source specific attack rate implicated that the streets which received the water from well-1 through the tank 2 had three times higher risk as compared to areas which received water from the well -2 through tank 3.

The water is supplied without chlorination (according to the people) because of the inadequacy of funds (as stated by the village leaders) and lack of awareness among the panchayat leaders who were responsible for the water supply in the village. Even if they supply chlorinated water, people do not like to use that water because of the smell, taste and unawareness about the importance of chlorinated water. We witnesssed this during our investigation in the village and only after constant persuasion and education, they started to use the chlorinated water. This is another risk factor for the outbreak of cholerae in this village

Epidemic curve indicated typical pattern of single point source outbreak and the incubation period of > 24hours, widespread occurrence of cases, more cases in areas where the suspected source was identified and there was no recent festival or functions in the area ruling out food poisons, are in favor of *Vibrio cholerae.*

Another risk factor for this out break is the neglect of leaking pipes leading to contamination of water. We have identified during our site inspection 4 such leaks which was later attended immediately.

Another risk factor is the poor maintenance of the surrounding of public fountain and bore well plate forms, which is possible chance for seepage and contamination. In this village, we have seen three such places in the colony areas and Muthuraja Street. After the detailed inquiry, we formed a hypothesis that probable reason for the outbreak may be due to use of water from unused well without any treatment due to scarcity of water during this summer. Finally our hypothesis was confirmed by laboratory results which showed that the water from unused well is grossly polluted and 3 stool specimens were positive for *Vibrio cholerae.*

The widespread occurrence of cases affecting entire village indicates that the most probable mode of transmission is through the water. This is again proved by water taken from storage places and its contamination with E.coli indicating the likely mode of transmission i.e through the water source. Again, the decline in number of cases after taking control measures confirms mode of transmission of this outbreak.

In order to control the spread of infection, we initiated preventive and intervention measures like frequently testing the water by ortho- tolidine solution (to ensure availability of free chlorine at the consumer level at least by 1 ppm) , by asking the people to use only the chlorinated water through health education (frequently testing the storage water). We requested the panchayat to improve the general sanitation by clearing the solid waste, by cleaning the existing drains, by giving top priority to rectify the leaks in the water supply lines. Public was educated about using boiled water, stopping open air defecation and seeking health care for suspected diarrhea.

Our finding like pathogens, mode of transmission and source of infection are consistent with other studies undertaken on this topic except the use of unused well water for drinking purposes.

Limitations

Since we started our investigation as quickly as possible the chance for information recall bias is very minimal. Similarly we have covered the entire village, chances for selection are negligible.

Apart from the general confounders of age and sex, other confounder, which may affect the results, are food and water taken outside the village. Out of the 1719 population of the village, only 54 people went outside of the village during that period of which 44 people are employed in Tiruchirappalli and had water outside the village but none of them got the diseases. The confounding factors like age and sex are well taken at the analysis level by stratification. Age stratification showed difference in the attack rate in the age group of 50 and above which is statistically significant where as the sex stratification did not show any difference statistically.

Summary

The outbreak occurred following the use of unused well water without treatment involving 58 patients including two deaths. The outbreak came to the knowledge of health department only after the death of two patients and the widespread occurrence of cases involving the entire village. The investigation showed the potential causative agent to be Vibrio cholerae. The risk of occurrence of cases was three times high for people receiving water from the unused well water without treatment as compared to those who receive water from the other well. This indicated the potential source of the outbreak. Appropriate control and preventive measures ended the outbreak.

Recommendations

Like many other diseases, water borne diseases are mostly man made, thorugh activities like unhealthy practice of open defecation, poor personal and environmental hygiene and polluting the water sources. As for as water-borne diseases are concerned, technologies and cost-effective methods are available. We can prevent recurrence of this type of outbreak. The following suggestions are recommended for preventing such outbreaks in future:

1) Health education and to create awareness to demand and use only potable water
2) Proper and adequate supply of potable water.
3) Proper storage of water at the storage level
4) Steps to be taken to improve the financial position of the village panchayat
5) Village panchayat officials and the leaders to be educated and trained about the importance of the chlorination.
6) Disease reporting system and epidemic response to be improved.

Annexure

Chronology of important events

Event	Date
• Supply of unused well water	29/5/02
• Occurrence of first case	30/5/02
• Death of two cases due to watery diarrhoea	31/5/02 1/6/02
• Health worker knows about the outbreak	2/6/02
• District health authority is informed	2/6/02
• Control and preventive measures	2/6/02
• Start of investigation	2/6/02
• Last case	10/6/02

Questionnaire used

Outbreak Investigation Form

Identification data

NAME ..... Address

Age ☐ Street

Sex : 1. Male 2. Female ☐

Occupation ☐

Educational status ☐

Clinical Features

1) Date of Reporting ☐

2) Date of onset ☐

3) Time of onset ☐

4) Nausea 1.yes 2no ☐ No of times ☐

5) Vomiting 1.yes 2no ☐ No of times ☐

6) Diarrhoea 1.yes 2no ☐ No of times ☐

7) Blood stained 1.yes 2no ☐

8)Mucus 1.yes 2no ☐

9) Abdominal pain 1.yes 2no ☐

10) Fever 1.yes 2no ☐

11) Dehydration 1.yes 2no ☐ if yes types 1. Mild 2.Moderate 3. Severe ☐

12) Urine output 1.Normal 2Decreased ☐

13) Hospitalized 1.yes 2no ☐

14) If yes 1.IP2.OP ☐

15) Type of Hospital ☐ 1PHC 2Taluk hospital 3,District hospital 4Private

16) Recovered from illness 1.yes 2 no ☐ If yes When ☐

17) Duration of illness ☐

Risk factor Information

1.Food Taken out side home 1.yes 2 no ☐

2.Water Taken out side home 1.yes 2 no ☐

3.Travelling out side home 1.yes 2 no ☐

4.Attending any function/ festival 1.yes 2 no ☐

5. Type of Food Taken for the past 3 days ☐

Environmental risk factors

1.Disposal of solid waste1. Dumping 2 Manure pits 3. Others ☐

2.Laterine facilities1.yes 2 no ☐

3.Storage of water 1.Pot 2. Silver vessel 3. Others ☐

4.General sanitation of the House 1 Good2 bad 3 others ☐

5.Source of Water 1 within the house 2 our side the house3 both ☐

6.Type of Water Source

1.Well 2.Hand pump 3.OHT 4. Bore well ☐

Signature of investigator

3.3. Report on the investigation of a case of suspected Acute Flaccid Paralysis, Tiruchirappalli

Background

Notification of a suspected case of acute flaccid paralysis (AFP)

Newspaper reported on 14th December 2003 about the suspected case of acute flaccid paralysis in a 2-year-old child in a Gypsy family at Mannarpuram, in Tiruchirappalli Corporation area. Director, NIE requested the investigator who happened to be a resident of Tiruchirappalli district, to investigate the said suspected case of acute flaccid paralysis. With the permission of the Director of Public Health and Preventive Medicine, Govt. of Tamil Nadu (DPH) the author proceeded to Tiruchirappalli for detailed investigation.

Start of the Investigation

Methods:

Discussions with higher officials

The investigator had a detailed discussion with the DDHS, A.D (Statistic), DPHN (District Public health Nurse) and gathered the information available with them.

Review of records

The investigator reviewed the available records and registers with District Health office and collected the available information.

Field Visit

After gathering the available information, the investigator visited the area where the families are living near Mannarpuram in Tiruchirappalli Corporation and inspected the whole area for its cleanliness and sanitation

Interview with the Families

The investigator had a detailed interview with the Parents of the affected child including their Permanent place , their movement ,demographic characters, detailed history about the child since birth like birth date, place, milestones, immunization status , illness and treatment history up to the present level. Also had

a detailed interview with the other available family members including their Children and other demographic details, immunization status, maternal and child health practices,

Examination of the Children

The examined the affected child and other available children in the group and looked for the features of acute flaccid paralysis and other features like fever and immunization scar

Results

Description of the case

A 2-year-old child from a narikurava family who recently migrated from Bodinoikkanur had a left sided paralysis involving the proximal group of thigh muscles without any sensory loss (The NPSP Case definition was used to identify acute flaccid paralysis). Slight muscle wasting was also present. At the time of examination the child was able to stand and walk with support and climb on the cot without support, .The child didn't have markings of routine immunization. The child is the first for his mother who happened to be a third wife to his father

The family has five more children including an 8-month-old unimmunized child.
No any other children in the camp at the time of examination have the history of fever with acute flaccid paralysis. The detailed information about the child is given in the annexure I.

Description of the 'residence' of suspected AFP case:

The location of the camp and the families are shown in Figures 1, 2 and 3

Figure 1. Tiruchirappalli Corporation

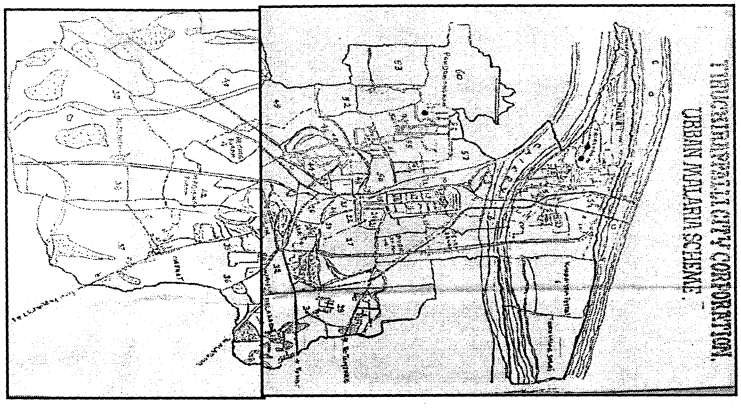


Figure 2. Location of the camp (indicated by a circle)

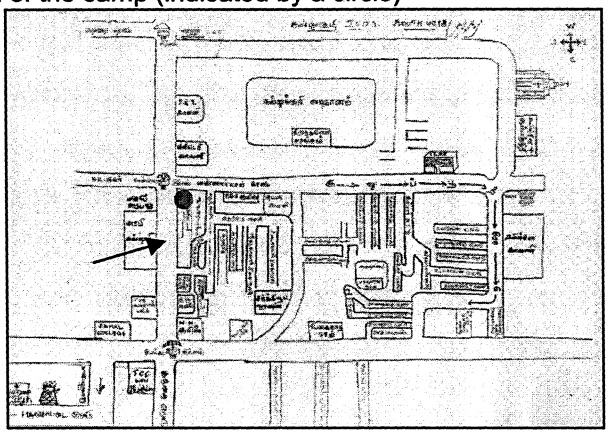


Figure 3. Location of the GYPSY families At Mannarpuram, Tiruchirappalli Corporation a

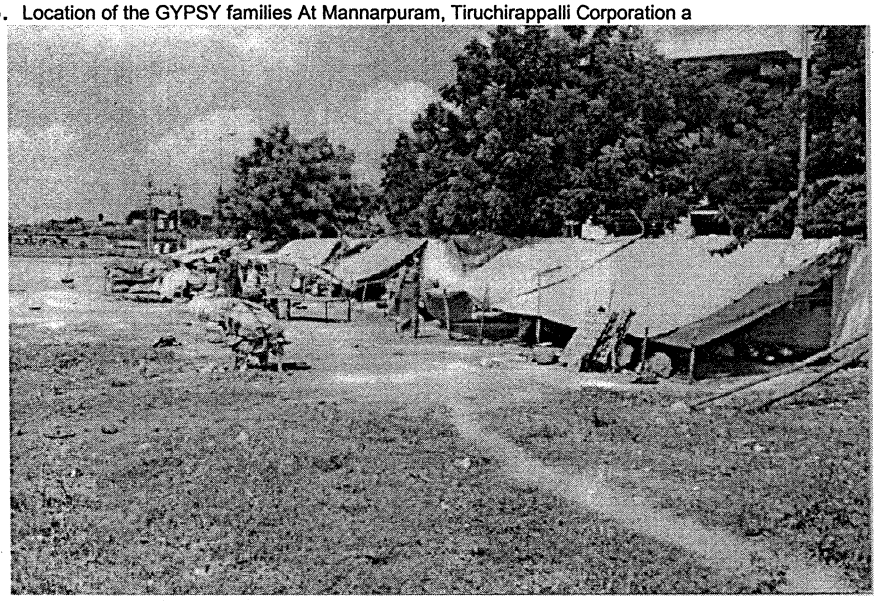


Table 1, Location of the GYPSY families At Mannarpuram, Tiruchirappalli Corporation as per figure 3.

	Family 1	Family 2	Family 3	Family 4	Family 5	Family 6	Family 7	Family 8	Family 9	Family 10	Family 11	Total
T												
Family No	1	2	3	4	5	6	7	8	9	10	11	Total
Male	3	2	1	2	1	3	2	1	1	1	1	15
 Adult	1	3	1	3	2	2	4	1	1	1	2	20
	0	1	0	3	0	0	2	1	0	0	2	9
Under 5 years	0	1	3	1	1	0	0	0	0	0	1	7
Male  Female (Above 5 years)	0	0	1	2	0	0	0	0	0	0	0	3
	0	0	1	1	0	0	0	0	0	0	0	2
Total	4	7	7	12	4	5	8	3	2	2	6	56

Demographic Character of Gypsy families

In the 11 families, who are staying in the temporary camp, around 56 Members are present, at the time interview of which Males are 15, females are 20,Male children are 12 and Female children are nine

Age & sex Distribution of Children

In the Group of 11 families, 21 children are there of which 16 are below 5 years and 5 are above 5 years and among the under 5 years 9 are Male, 7 are female. Their immunization status are given in the Table 2

Table 2 -Immunization Status of the Under 5 year Children
(As reported by Parents of the children)

Immunization status of the children (For routine Immunization)	No of Children
Total under five Year Children	16
Fully Immunized	08
Partially Immunized	06
Not Immunized (In the Affected Family including the affected child)	02

Table 3. Details of immunization status – family wise

Family No	No of under5 Children	Fully immunized	Partially immunized	Not Immunized
2	2	1	1	0
3	3	1	2	0
4	4	1	1	2
5	1	1	0	0
7	2	2	0	0
8	1	1	0	0
11	3	1	2	0
Total	16	8	6	2

Table 4. Place of Delivery Status (Under 5 Years) in the Camp.

Place	**No of <5Children**
Home	11
Hospital	5

Discussion

Could it be an outbreak?

The State of Tamilnadu is one of the best performing State in the whole country in immunization and pioneer in many programme in the field of health. Including the immunization whose coverage level is always maintained at very high level. For the past 4 years there is no report of any Polio cases In this situation, a single case should be considered as an outbreak.

What could be likely source?

Since the affected child belong to gypsy family who move from one place to other frequently and don't stay permanently in a place, it is very difficult to give and Monitor the immunization and other heath activities. Because of their migrating nature and illiteracy and ignorance of the parents the child couldn't' be immunized against routine immunization. This could be one reason and another possibility could due to the visit of a family from the Neighboring state with young children.

Conclusion

After knowing the suspected case of acute flaccid paralysis the Department of Public health in Tamilnadu have done very wonderful and laudable action by taking containment measures including ORI and active reporting system of the affected

area and high risk areas. They have meticulously followed all steps recommended by the NPSP. At the same time, the outbreak has given a clear-cut warning to the reporting system. It should be strengthened to prevent further recurrence. It also indicated the importance of urban health revamping scheme to improve the status of the urban people and the people like the Gypsies who are mostly settle temporarily in sub urban areas. We recommend the strengthening of reporting system activities, especially in urban area where reporting system activities not comparable with rural because of lack of manpower and other facilities.

Acknowledgement

The Principal investigator sincerely thank, the Director of Public health who has given permission to investigate this Acute Flaccid Paralysis case

The investigator sincerely thank the Director NIE for his immediate response to the public health problem like this by deputing me get the first hand information. The investigator also thank the DDHS Tiruchirappalli and his team for their help in this investigation

ANNEXURE I

Location and Socio demographic characteristics of place of living of the AFP case

(See the Picture)

There are 11 Families are temporally staying in a Samiana like Pandal (As Shown in the Picture near the traffic signal on the Chennai- Madurai National highways bypass road at Mannarpuram within the corporation area of Tiruchirappalli City. They originally belong to a village Near Cheyyar in Tiruvannamalai District. They belong to Narikurava community (One of the GYPSY Group) who migrate from one place to another frequently for want of job. Their main occupation is selling the comb, Mirror, Needle Safety pin, Fox Horn etc and hunting the small animals like rat, rabbit, and cat, Fox etc for eating. They will never take any food without any animal food. Almost every day they take Non-Vegetarian. Always they live in-groups.

In this site also 11 families are living together in a group. Their relatives visit the camp and stay there for short period (1 Week –1 Month) and do the small business

and go back to their original camps. These 11 families are living in the present camp at Mannarpuram since Feb 2003 after shifting the camp from Bodinoikkanur in Theni District.

Annexure-2

Information Regarding the Affected Child

Name of the Child - Deveraj
Parents Name; Ramarajan (39) Alliammal, (21)
Present Address; S/O Ramarajan, Pathirakaliamman Nattu Marunthu Kadai, Mannarpuram Tiruchirappalli.
DOB - October 2001(Exact Date is not known)
Place of Birth - Theni
Place of Delivery- Home
Delivery Conducted by = Relative Women
Birth order (For this Women)- Primi, For the Family it is 4th order (The Child's Father Married 3 Women, of 1 woman separated from him with I child who is living in Chennai)
Development of Mile stones – normal
Any Chronic Diseases – Nil

Movement of the Family since the birth of this Child (Before the Attack)
From birth to 9 months Stayed at Theni
From 9TH months to 16th month At Bodi (Upto Middle of Feb2003)
From Middle of Feb Till date at Tiruchirappalli Mannarpuram.
From Trichy to Tirupathy 2 days in April
From Tiruchirappalli to Vayalur near Uthiramerur in Tiruvannamali District during middle of August (Tamil Avani Month) and stayed their for 2 days to attend a family Function
After the attack

From Tiruchirappalli to Madurai and stayed at Madurai for treatment from 15th November to 4Th October at Tiruchirappalli
Since 4th October they are staying at Tiruchirappalli

Any Visitor to the Family During recent Past

In the Middle of October, One of their female relatives came from Chittoor in AP and stayed with them for 4 days and went back. She again came there with 2 of their children (I under 5 years and another one above 5 years) and stayed with them for 1 week and went back

History of Present illness

History of inability to use the left lower limb since middle of November .2003.
No history of fever

Previous History of Illness

The child had fever with cough in the Middle of October 2003 for which had treatment at one the Pediatric Hospital at Tiruchirappalli (Child Jesus Hospital) and had injection for 5 days and recovered from the illness. Within the next days he again developed the fever for which his parents taken him to nearby Private Practitioner and had treatment including 5 injection. That was also over. The Child developed again fever for which his got medicine from the Medical shop with old Prescription and gave him the tablet and went to cinema in an A/c theatre. After came from the theatre, she asked her child to stand but the failed to stand so she beaten him with her hand. Only lately in the same night she recognized the child's Problem. So the Parents contacted the nearby Private Practitioner who has treated his previously. The doctor told them that weakness is due to fever and he will be all right.

Not satisfied with the doctor's opinion one of their relative advised them to go to Madurai for the treatment for the weakness. So they went to Madurai in the beginning of 2nd week of November and get admitted in a Private Nursing home, where they have suspected AFP and informed the local Deputy Director of Health Services. The DDHS Madurai who in turn taken stool specimen for culture after examined the affected child and sent the specimen to King institute of public health foe analysis. In the mean time child was given physiotherapy and electric stimulation. After some improvement or due financial problem they returned to Trichy to continue the physiotherapy.
They have applied native medicine like snake fat externally

Present Condition of the Child

The child is active, stand with support, walk with support, and climb on the cot without support, taking normal food. No history of fever or any other symptoms at the time of examination of the child.

Others Children in the camp

At the time of examination about 16 under 5 five years children are present. No child has suffered from fever or acute flaccidity or limping of limbs except the affected child Deveraj. Regarding the immunization status of the children 2 children including the affected child not immunized against VPDs except PPI during 2002 AND 2003

Action taken by Health Department

The Reporting system Medical officer of Madurai region on 8.12.2003 informed DD HS Tiruchirappalli about the POLIO Case (who has been identified and investigated by DDHS Madurai) after knowing about result of stool culture. The DDHS immediately rushed to the given address within the corporation area and located the temporary camp of the Gypsy families near Mannarpuram within the corporation limit. After the preliminary enquiry and examination of the affected child and the other contacts in the camp, they have done the Out break response immunization (ORI) covering the all the children in the camp and the children around the 2 KM Radius of the camp. They have also undertaken Hospital Reporting system, House to house survey to identify the any AFP Cases in the entire corporation area. The entire camp area is kept under reporting system for AFP.

Annexure 3

Chronology of important events

- First Episode of Fever in the Middle of October
- Had treatment in a reputed pediatric Hospital with injection in Tiruchirappalli
- 2^{ND} episode of fever after few days of first episode
- Had treatment with local Medical practitioner with injection
- ? 3 Episode in the 2^{nd} week of November or continuation the 2^{nd} episode
- Only self medication by using the previous prescription
- Developed flaccidity in the left lower limb in the beginning of 2^{nd} week of November
- Contacted the local Medical practitioner
- No treatment, only assurance was given
- As per the advice of their relative child was brought to Madurai for treatment
- Admitted in a Private Nursing at Madurai in the 2^{nd} week of November
- Suspicion of AFP by the attending doctor AT Madurai
- Informed the Local DDHS
- Stool samples taken from the child and sent to King Institute of Public health Chennai for analysis.

- Suspicion of Growth of Polio Organism and the same was informed to Madurai DDHS and SMO (Reporting system Medical officer) of Madurai Region
- The SMO informed the same to DDHS Tiruchirappalli on 8.12.03
- DDHS visited the camp site identified and confirmed the AFP of the affected child on 8,12 03
- ORI and containment measures were initiated on 9.12.03

SECTION 4:

CRITIQUING AND REVIEW OF SCIENTIFIC LITERATURE

4.1 JOURNAL CRITIQUING:

Introduction

Importance of reading journals

Everyday new information, new technique, new drugs, new procedure, new methods diagnostic tools and treatments are coming up. So it is very important for us to keep abreast of the latest development in our field of work. Reading journals will help us to update knowledge, generate new idea, for giving best therapy to patients and also for the research purposes

Why critical appraisal

In order to update and for the evidence based patient management we must read medical articles. But a matter of concern is the information explosion in every sphere of human endeavor. The enormous amount of journals and journal articles that are currently available make it impossible to read and understand even a fraction of it. We therefore need to able to separate and select the good and Useful article and critically review them. Since all good research reports got published in journals it is essential to have ability to critique journal articles to practice evidence based medicine.

Objectives

- To critically review the given article
- To develop skill in reviewing medical article

Format for Review of literature

There are many published formats for critiquing journal articles. One of the earliest and most popular formats came from the McMaster University. This has been replaced new format called evidence based medicine working group format. All format essentially ask for set of questions. The questions will vary depending on the type articles as a clinical trials or a diagnostic test.

Basic questions to ask while appraising an article

The Users' guide recommended the 3 basic questions

1) Are the results of the study valid?
2) What are the results?
3) Will the results help us to care for my patients?

Methodology

By using the checklist of questions the journal article is reviewed starting from abstract to recommendations.

Any Article should contain 5 headings.

1. Abstract
2. Introduction
3. Methods
4. Results
5. Discussion

4.1.1. Cross-sectional, community-based study of care of newborn infants in Nepal.BMJ.2002;325:1063-7.

This article also contains all the 5 headings

Title of the article; Cross Sectional, Community based study of care of newborn infants in Nepal.

Published journal;

British medical journal Volume 325 dated 9th November 2002.

Abstract

Any article should contain abstract in the beginning of the paper .The abstract is the heart of any literature. It should describe the whole story of any study in nutshell, which must impress reader to go for full detailed reading of the whole article. To impress the readers it should be presented in structured form.

This article also contains abstract that is presented in structured form. It is presented in 7 headings and describes the whole study in short account starting from introduction upto conclusion.

Introduction

The introduction section describes about problem statement of existing practice of newborn care in rural Nepal. It also explains the WHO guidelines for newborn care. It also explains the need for such a study to understand the existing practices to form the hypothesis. The introduction section also explains the aim and study designs of the study The aim of the study was to describe the newborn care practices quantitatively in the cohort of women recruited to the trial.

Methods Section

This section describes about the study population and study participants, study design, measure procedure and nature of statistical analysis. Study population consists of women of childbearing (in the agegroup 15-49). Study participants are the women who had given birth to a live baby at least once.

Study design

A cross-sectional descriptive study to collect the information about recent deliveries for women in Nepal.

Data sources used

Primary data were collected from the selected women by 9 field coordinators by using the questionnaires after repeated pilot studies.

Statistical analysis & Measurement procedure

They entered the data into a relational data base management system in Micro soft SQL server 7.0 They have also examined the frequencies and proportions after exporting data to small stata 5.0

Results

The results section reports the findings of the research directed at the questions posed in the study. In addition to providing adequate information on all aspects of the research question. It should demonstrate that the investigators were aware of the possible threat to the validity of conclusions through different types of biases.

They have presented the data in 4 tables for the 4 different variables like

1. Place of birth and attendance at delivery
2. Hygiene practice at delivery
3. Practice related to maintain the warm chain
4. Type and timing of first feed

They have interviewed 25,702 women who have delivered at least once and of which they have selected only 24,285 women who have delivered live baby. The paper describes 5, 411 women who have delivered between March to November 2001 for the analysis. They have given adequate information to answer to the research questions like % of women who delivered in home, who received medical workers attention % of women who practiced the rules of five cleans, % of women giving new born care as prescribed by WHO like maintenance of warm chain, immediate and exclusive breast feeding etc. They were also aware of the potential threat of information biases. They have restricted the bias by confining their analysis only to pregnancies that have occurred in the past one-year. They have explained that there was not much difference if the period was extended to 3 years. They have also explained about the consistency of their results, which are

consistent with those of qualitative research carried out in the same population during the specified period.

Discussion and conclusion

The comment on the study should be consistent with the research question and Attention should be paid to the consistency or lack of consistency between present and previous studies. Extrapolation beyond the data should be avoided short cominings should be pointed out.

In this study, also the comments were in consistent with the previous studies, attention was paid to the consistency the other studies, and there was no extrapolation. The shortcomings like recall bias were taken care in the selection and at the analysis stage.

For example, in previous studies there was a confused statement regarding the home. Here they explained in clear term about the home and cattle shed. Home delivery kits usage was 8%, which was higher than the previous study. Other points like home delivery, room heating, infant feeding, clothing and dressing the cord after cutting were in consistent with the previous studies but with varied percentages.

In the conclusion, they recommended the changes that were needed to improve newborn practice to reduce mortality

CONCLUSION

Are the results of the study valid?

What are the results?

Will the results help us to care for my patients?

The article is a interesting topic for developing countries like us which is similar in the culture and religion

The presentation is very structured form, which helps and attracts the reader to go through entire article. The table is sufficient and if they used some charts and graphs it may help the reader to understand the results very well.

The abstract is a structured one with sufficient headings and in very short form that helps the reader to know about the entire study in a short while.

The introduction section describes the purpose and research questions .The study is needed at this juncture to evaluate the present health practice and need for improvement to reduce IMR, Particularly the neonatal mortality.

In the methodology section, the methodology, study population, target population, study design, inclusion criteria and exclusion criteria, method of data collection and analysis and interpretation are well explained the sample size is appropriate for the study design.

The results section, presentations are appropriate for the study design and the purpose and research questions and the presentation is very structured form, which helps and attracts the reader to go through entire article. If they used some charts and graphs, it may help the reader to under stand the results very well. They were also aware of the potential threat of information biases. They have restricted the bias by confining their analysis only to pregnancies that have occurred in the past one-year. They have explained that there was not much difference if the period was extended to 3 years

In the Discussion section The research questions posed in the study is adequately addressed like delivery site, who conducted the delivery, whether the five cleans were practiced are or not, maintain of warm chain. Breast-feeding practice and timings and pre -lactation practice are discussed adequately. The discussion with relevant result data is consistent with previous study but results are either same level, or more than the previous or less. The conclusion are justified based on the results and are generalized to the appropriate population like the married women in the child bearing age groups The shorting like recall are well taken care of by the researchers.

The shortcomings

1) The educational status, the economic status and the parity of the women and the availability of the health care facilities, other infrastructure facilities are not taken into consideration for analysis that may affect the results.
2) The potential confounders are multiparity and ages of the mother are not taken into consideration for analysis that may affect the results.

3) The compliance or non-response rate are not taken into consideration for analysis
4) The other disadvantages of cross-sectional study methods like analysis of cause and effect are analysis simultaneously, not able to calculate incidence rate and Non- inclusion of those who have died because of the same cause or effect are applicable to this study also.

4.1.2. Risk factors for contralateral breast cancer in Chennai (Madras), India. Int J Epid. 1988;27:743-750.

Type of study: Cohort study

Summary of the study

This is the first cohort study conducted in India to identify risk factors for Contralateral breast cancer (CBC) among the patients with first primary breast cancer.

About 3,492 patients, who were diagnosed as first primary breast cancer between 1960-1989 at the cancer institute in Chennai, were followed up until December 1994. The risk factors for CBC was assessed among unilateral breast cancer (UBC) patients who survived for >12 months following the diagnosis of breast cancer and did not develop a second cancer (n=2665) AND Among those who developed a CBC> 12 months after the diagnosis of breast cancer (n=39).

The age-adjusted incidence of CBC among the women with UBC was 7 times the incidence in the general population. Among the women with UBC the relative risk was 4.5(95%CI: 1.1-19.6) comparing those with and without a history of breast cancer in the mother, and 2.8 (95%C.I: 11.2-6.7) Comparing age at first birth 21-25 Versus Earlier. The RR was 0.3 (95%C.I: 0.1-0.6) comparing those with and without hormone therapy for their UBC. Radiotherapy for the UBC had no significant effect on the incidence of CBC.

Finally, they came to a conclusion that Positive history of breast cancer in the family and later age at first childbirth emerged as stronger factors for CBC than UBC. Hormone therapy reduces the risk of CBC.

A. Description of the evidence	
Title	The title did not mention the type of study which helps to identify and classify the article
Abstract	The abstract mention about the type of study and the abstract is of structured one and they described the entire study in summary, which helps to reader to go through entire article.
What is already known	Family history and later age of delivery are risk factor for breast cancer
What this study is going to prove	Unilateral Breast cancer itself and its treatment methods are risk factors for developing contra lateral breast cancer
Exposure	Patients already had breast cancer, Family history of cancer in the family, and the treatment to the breast cancer
Outcome How it was measured	Development of Contra lateral breast in the already breast cancer affected patients By histopathologically
Design	Retrospective cohort study. The study design is suitable to the research question because the exposure or the prevalence is contra lateral breast cancer (CBC) low Women with breast cancer and had treatment ↓ 3492 fit for the study ↓ Excluded ↓ 2704 selected Exposure: breast cancer, family history & later age of first delivery Outcome: Observe for development of contra lateral breast cancer (1989-1994) 39 developed contra lateral breast cancer ---2665 didn't develop contra lateral breast cancer
Study population	Women with breast cancer and had treatment 3492 fit for the study screened from cancer institute Chennai between 1960-1989
Selection criteria	Patients diagnosed as breast and had treatment between 1960-1989

Exclusion criteria	Those who developed cancer after the first cancer within 1 year , those with 3 primaries , those who had not completed at least one modalities of treatment for the first cancer
Study period	1989-1994 5 year period
Study setting	Cancer institute, Chennai.
Main results	39 developed contra lateral breast cancer ---2665 didn't develop contra lateral breast cancer
Conclusion	Positive history of breast cancer in the family and later age at first childbirth emerged as stronger factors for CBC than UBC. Hormone therapy reduces the risk of CBC.
B.NonCausal explanation	
Observation bias	The cancer institute gathers certain basic data from the patients, the diagnostic criteria, treatment modalities and follow up schedule were strictly followed, and the question of observation bias was doubtful. Nevertheless, chance for the diagnostic bias can be considered because the diagnostic facilities were not so advanced at the start of the study when compared to the present, which can affect study results. And the data were screened by a qualified social scientist and cross-checked by the author herself.
Confounding	The most important confounding factor for breast cancer is the breast feeding to their children and number of children which may decrease the development of breast and it was not taken into account for the analysis
Chance	Unlikely, the R.R and 95% C.I are statistically significant for breast cancer is –Age adjusted incidence was 7 times more than the general population Family history R.R 4.5 C.I-1.1-19.6 Later age at first birth R.R 2.8 1.2-6.7 for hormonal therapy R.R 0.3 0.1-0.6
C.**Features consistent with causations**	
Time relationship	The period between the exposure and development cancer is reasonably acceptable level.
Strength Dose response	Yes, role for dose response like, relative risk for women with breast cancer, family history, later age of first delivery The more the delayed first delivery , the more the chance of getting contralateral breast cancer we may say the longer the gap after the first cancer and the dose &duration of radiotherapy (Table7) , the more the chance of getting contralateral breast cancer
External Validity	
Eligible Population	Women in reproductive age group
Source Population	Women with breast cancer who had treatment

Target Population	Women with breast cancer who had treatment who developed contralateral breast cancer
Comparison with other studies	
Consistency	The study is consistent with other similar studies with their findings on like family history, duration gap after the first breast cancer, radiotherapy, protective effective of hormonal therapy, and women with breast cancer developing contralateral breast cancer(CBC)
Specificity	Difficult to judge
Plausibility	There is biological plausibility between exposure to chemical, radiotherapy, and development of breast cancer but really I don't know is there any no biological plausibility between family history, women with breast cancer
Coherence	The final criteria for causal association are its coherence with known facts that are to be relevant. In this study also there is coherence between the duration of gap between the first breast cancer and development of C.B.C i.e. the more the gap and the more risk of developing the C.B.C

4.1.3. Risk factors for falls as a cause of hip fracture in women. N Engl J Med. 1991;324:1326-31.

Title of the article; risk Factors for fall as a Cause of Hip Fracture in Women
Published journal; The New England Journal of Medicine, 1991, volume 324; pages1326 -31

This article also contains all the 5 headings

Abstract

This article also contains abstract that is presented in structured form.

Introduction;

The introduction section describes about problem statement of risk factors for falls as cause of the Hip Fracture in Women It also explains the need for such a study to understand the risk factors for fall since only few studies assessed on that topic and explain the risk factors which may increase the likelihood of a hip fracture. The introduction section also explains the aim and objective of the study. The aim of the study was to describe the risk factors for fall, which are predictive of hip fracture.

Methods Section

Study populations are White women with hip fracture in the age group of 45 and above who are admitted in one of the 20 participating Hospitals in New York City and residence of New York City and 5 counties surrounding the city.

Cases -The white women with above characters with hip fracture. Out of the eligible patients only174 are included for this study and others are excluded with following exclusion criteria like cognitive impairment, death, pathological hip fracture, severe medical instability etc.

Control --The white women with above characters without hip fracture. Out of the eligible patients only174 are included for this study and others are excluded with following exclusion criteria like declined to participate, death, could not be traced after discharge from hospital, etc.

Study design;

A case control study to examine the importance of risk factors for falls in causing hip fracture.

Data collection and sources used;

Primary data were collected from the selected women by trained interviewers by using the questionnaires for many variables like lower extremity function, eyesight, reproductive history, cognitive function, height, weight, etc. and the medical record are compared between cases and control to identify the difference in the variables.

Statistical analysis & Measurement procedure;

Odds ratio and 95% CI is estimated and by using the conditional logistic regression the effect of matching cases and control according to the hospitals was removed.

Results section;

They have presented the data in 2 tables for the different variables like demographic character and other variables and results of multivariate adjusted odds ratio. Analysis shows that ages ranged from 55-103, 97% of fracture resulted from a fall, and the factors associated with an increased risk includes lower limb dysfunction, visual impairment, and the risk of fracture is elevated among the users of barbiturates and no association is detected with alcohol or use of benzodiazepine.and increased body mass is associated with reduced risk.

Comparison of circumstances for fall between cases and control showed that cases were fallen from standing height than the control which is statically significant and age comparison between younger and older for hard surface is significant in younger .

Discussion and conclusion

In the discussion section they have discussed several risk factors and circumstances for fall that are associated with increased risk of hip fracture like impaired neuromuscular function, impaired vision, barbiturate use would likely to increase the risk of fall in general and impair the protective response when a fall occur and they have also discussed that the case patient fall from a greater height than the control. They also discussed the limitation and potential bias .The shortcomings like recall bias were taken care in the selection and at the analysis stage. They have restricted the bias by confining their analysis only to some risk factors. They have explained that there was not much difference in the information

given by the respondent and the proxy respondent. They have also explained about the consistency of their results, which are consistent with those of qualitative research carried out in the same population

In this study the comments and the results were consistent with the previous studies and attention was paid to the consistency the other studies and there was no extrapolation

Conclusion

The authors suggest having special programme for elderly women to prevent risk factors for fall both at community level as well at home.

Critical analysis

The article is an interesting topic for developing countries like us where the life expectancy is increasing and there will be burden on the health sectors for medical services for geriatrics and one among the many problems of the elderly is fall and hip fracture.

Type of Article; it is an Analysis of records

The presentation is very structured form, which helps and attracts the reader to go through entire article. The table is sufficient and if they used some charts and graphs it may help the reader to under stand the results very well.

The abstract is a structured one with sufficient headings and in very short form, which helps the reader to know about the entire study in a short while.

The introduction section describes the purpose and research questions .The study is needed at this juncture to evaluate the present health problems of elderly and need for improvement or start geriatric health services There is extensive review of literature to show that what is already known and what this study is going to prove

What is already known?

-Hip fracture is due to osteoporosis in the age group of >70 and above

-1-14% of falls in Women result in hip fracture,

-Over 90%of Hip fracture is the results of a fall.

What this study is going to prove?

Whether the risk factors for falls and circumstances of fall are predictive of hip fracture in elderly Women

Special features of the study

Previous studies are concentrated only on the role of psychometric drugs but this study concentrates on the risk factors for fall, which causes fractures, and also for the specific factors like neuromuscular abnormalities and the type of fall, which may determine any fall result in hip fracture.

In the methodology section, the Methodology, study population, target population. Study design, inclusion criteria and exclusion criteria, method of data collection and analysis and interpretation are well explained and the methodology, study design &the sample size is appropriate for the study objectives. They have not mentioned the number of eligible persons for the study, Out of which how many selected for the study. One interesting aspect of the study is the use of **proxy respondents** both in the cases and control but what are the criteria they have used to select the proxy is not explained properly.

Another appealing aspect of the study is the taping of the interview, which is important for any research work. The other interesting aspect of the study is the explanation of each variable and how it should be collected Another interesting aspect of the study is the use of additional variables and confounding like use of thiazide diuretics, estrogen use, smoking, which are eye opener for the beginner like me.

In the result section, presentations are appropriate for the study design, the purpose and for the research questions. The table is sufficient but if tables are presented separately for each variable it will easy for the beginners likes me.

In the Discussion section

In this study they have identified many risk factors for fall that were associated with increased risk of hip fracture. And the results support the others studies. The study is consistent with the previous studies but with varied in percentages and varied from other studies in concentrating on the risk factors for fall i.e. whether the risk

factors for falls and circumstances of fall are predictive of hip fracture in elderly Women.

Consistency with other studies

It is consistent with other studies in increased risk of fall increase the fracture, impaired gait due to lower limb disability, neurological diseases visual impairment, increased standing height, etc.

Inconsistency with other studies

When compared (like Taggart) to other studies there is no association between use of long acting benzodiazepine, alcohol and hip fracture. The research questions posed in the study is adequately addressed like risk factors for fall and are discussed adequately. The discussion with relevant result data is consistent with previous study but results are either same level, or more than the previous or less. The conclusions are justified based on the results and are generalized to the appropriate population like the married women in the child bearing age groups The shortcomings like recall and information bias are well taken care of by the researchers.

Limitations

- Response rate from younger age group is low
- Data are based on interview and the results could be biased. Especially the information given by the proxy responder is not to be compared with the feeling of the suffering.
- Hospitalized control has more prevalence of risk factors for fall than general population (Neurological Illness, Disability

Conclusions

At present, we cannot apply this principle to our Indian condition because even the concept of geriatrics is not yet developed. The life expectancy in our country is just increasing and burden of the communicable is still very high and if we have this new concept it will further increase the burden of the already overburdened health departments. So we can apply this concept at a later date.

4.2 LITERATURE REVIEW

4.2.1. Epidemiology of unintentional injury

1. Background

Globally, most countries are already facing the double burden of communicable and non-communicable diseases. Almost half of the disease burden in high-mortality regions of the world is now attributable to non-communicable diseases.[1] According to World Health Report 2003, injuries are described as one of the *'stealthy but rapidly evolving epidemics'*.

According to the Strategic Plan for Injury Prevention and Control in South-East Asia (SEA)[2], "in 2000 an estimated 5.1 million people died due to injuries worldwide, accounting for 10% of the deaths due to all causes. This burden of injuries is projected to increase in the next decades if the current trend continues. Most of these deaths will occur in developing countries, as the lifestyles of people are undergoing rapid changes due to urbanization, industrialization, mechanization, and migration. Injury is a major contributor of ill health and disability. Injuries can occur everywhere, at home, at work, at public places or during recreational and leisure time activities. It is estimated that more than a quarter of injury related deaths in the world occurred in the South-East Asia Region (SEAR) in 2000. Children saved today from nutritional and infectious diseases are killed and maimed by injuries in hundreds of thousands. In fact, road traffic injuries alone rank as the number one cause of burden of disease among children of 5 to 14 years, and number three cause among 15 to 29 years in 2000. This heavy burden at such an early age has long-term implications on the quality of life and economy of the nations". Road Traffic Accidents (RTA) is listed by World Health Organisation[1] (WHO) as one of the three growing threats to world next only to cardiovascular diseases and tobacco related diseases. Recent estimates indicate that more than 20 million people were killed or injured due to RTA each year. [1]

Since long, injuries have been considered synonymous with "accidents" assuming that occurrence of such events was sudden and caused by external factors and these factors were the uncontrollable acts of fate and luck. [3,4] So, injuries remained a neglected field of research in the past. However, in the last three to four decades

in developed countries, many studies[4-7] have been undertaken to identify the magnitude of the injury-related problem and based on these, appropriate safety measures, laws and regulations have been devised to prevent them. More recently,[4] the epidemiologists of developed countries have expanded their area of etiology of diseases to include injury and have contributed towards the understanding of causal relationships among risk factors, events and the outcomes of injury. In contrast, so far not much attention has been paid to injury awareness, prevention and control in the developing countries.

In developing countries, the morbidity and mortality due to injury[3-6] are higher than the developed countries. The RTAs, in particular, forms more than 85% of all deaths and 90% of disability adjusted life years (DALYs) lost. This may be attributable to limited access to healthcare, education and other developmental activities[2, 8] growth in number of motor vehicles and poor enforcement of safety regulations[6]. This burden on the poor due to this *"emerging epidemic"* of this century is, indeed, an unnecessary one that targeted preventive programmes can alleviate. In spite of this, very few studies were undertaken[4, 5] to identify and address the problem of injuries.

The RTAs and other serious injuries could be remembered for a long period of time because of its seriousness and longer duration of impact. Many studies have been undertaken on RTAs. Different sources of data are available for RTAs like police records, hospital admission records and to some extent the insurance records. This data has certain limitations with respect to completeness and factors associated to RTAs. Review of literature indicated that very few studies are available for other types of unintentional injuries especially of minor injuries, which are occurring within the households as well as in the day-to-day working conditions of people. People often tend to forget these types of injuries in a short period of time and the reference period for these studies has to be kept reasonably short. According to published studies,[9-14] unintentional is affecting approximately 10 to 20% of the population, many of them requiring hospitalization and also resulting in prevention from doing their usual daily activities.

2. Review of literature

Introduction

The important asset of the society is human being. Therefore, the human beings need to be safeguarded from the ill effects of infectious, non-infectious diseases and injuries. This is important for them to assume optimal health and productivity. In recent days, it has been observed that injuries in all forms have assumed high proportion of total morbidity and mortality. Among these, unintentional injuries constitute an important and preventable component. Accident / injury now is on increase in many countries.[19] The numbers of injuries in terms of deaths, hospitalizations, disabilities and socio-economic losses are increasing from year to year. The social, economic and psychological hardships are unmeasured in any developing country and it is estimated that nearly 3% of Gross Domestic Product (GDP) is lost due to road traffic injuries alone. Correspondingly, the health system is not geared to handle this emerging problem in terms of prevention.[2,20] The situation is especially due to lack of professional and technical expertise, alongwith absence of policies and programmes. This has resulted in a huge burden on health care systems, which are already overburdened due to various deficiencies. The present review largely deals with unintentional injuries including RTAs, falls and other injuries.

Definitions and classification of unintentional Injury

Paramount to the epidemiology of any disease or phenomenon is the clear definition of the variables of interest. The definition of injury has been fraught with challenges and complexities. Importantly, injuries unlike diseases must be defined simultaneously by the causative event and by the resulting pathology. For example, bruising can occur in the absence of an injury event (e.g. in the case of sepsis or a bleeding disorder) and thus, taken alone, cannot be considered an injury. Similarly, there are many events, such as car crashes, which result in no pathology, even if 'victims' are bought to an emergency department for observation. Thus, the theoretical definition of injury must incorporate both cause and outcome. Equally challenging is the operational definition of injury, for example, which diagnoses,

codes or combination of codes from the International Classification of Diseases (ICD) [21-23] define injury. Hence, the definition and classification of injury is presented to interpret the comprehensive review of epidemiology of unintentional injury.

Unintentional Injury is defined[22] as any unintentional damage to the body resulting from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as oxygen. (See definitions in appendix)

Causes of injuries can be divided into the following broad categories as recommended by the new internationally accepted standard framework designed for presenting injury statistics [21-23] like cuts / pierce, drowning submersion, falls, fire/burn, firearms, machinery, motor vehicle traffic, pedal cyclist, pedestrians, overexertion, poisoning, struck by / against, and suffocation.

The International Classification of Disease (ICD) system[21]

Classification by external and internal causes of injuries is by two different codes, namely, N codes and E codes.

N codes refer to the nature of an injury and the part of the body injured. It does not explain how the injury occurred. Examples: concussion, fractured hip, burns.

E codes refer to the external cause of injury. It provides information on intentionality (self-inflicted, unintentional) and location where the injury took place (home, playground, swimming pool, etc.) Examples: motor vehicle crash, falls, poisoning.

Connecting the nature (N code) and external cause (E code) of injury is very important to design prevention strategies. Based on the above principles, injuries divided as shown in Table 1.

Table 1. The injury classification based on ICECI using ICD-9-CM codes*

Injury Classification	Codes
All Unintentional Injuries	E800-E869, E880-E929
Motor Vehicle Traffic	E810-E819 (.0-.9*)
Falls	E880.0-E886.9, E888
Pedal Cycle (Bicycle)	E800-E807 (.3*); E820-E825 (.6*); E826.1, E826.9;
Drowning/Submersion	E827-E829 (.1*)
Burns & Scalds	E830.0-E830.9, E832.0-E820.9, E910.0-E910.9
Poisoning	E890.0-E899, E924.0-E924.9; 940-949
Suffocation	E850.0-E869.9, 980.0-989.0
	E911-E913.9

* ICECI : International Classification of External Causes of Injuries; ICD-9-CM: International Classification of Diseases, 9th revision, clinical modification [21-23]

Injury classification by severity

According to the clinical severity, injuries are divided into fatal and non-fatal injuries. Again, the non -fatal injuries divided into grievous and minor injuries.

Injury as a disease[24]

Injury is a disease resulting from an interaction of agent, host and environment. Injury has long been considered an "accident". It has been seen from a medico-legal and criminal perspective and not as a public health problem. Once a person enters a health system for treatment of an injury, only then is it considered a health problem. [24]

Like communicable diseases, injury also needs the factors like agent (product) host (person), environment, physical and social and interaction among these factors are essential for injury to occur like any other diseases.

Injuries occur due to an acute transfer of energy between the human body and the environment around it. Therefore, injuries result from an interaction of the agent, host and environment like any other disease (Figure 1). There are no basic scientific distinctions between injury and disease as shown in the Table 2.

Figure 1. Epidemiological triad in injury

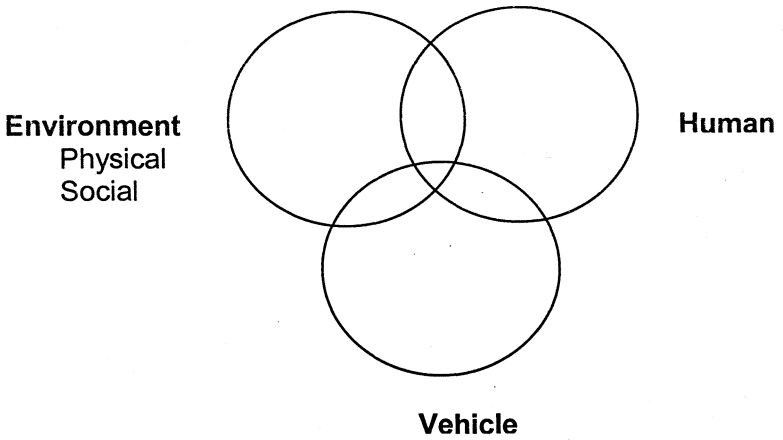


Table 2. Similarities between a communicable disease and injury*

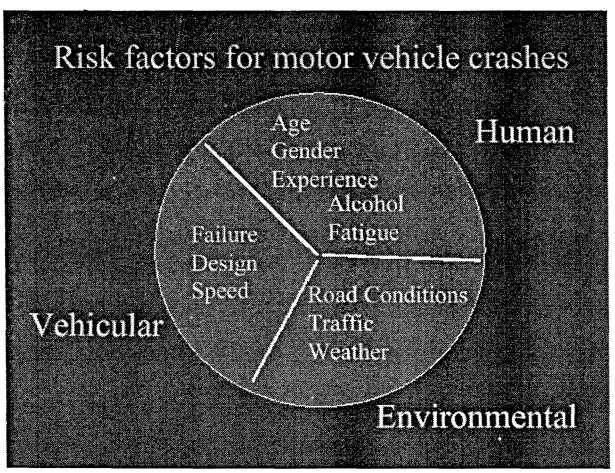
Pathological	Host	Agent	Vehicle/vector	Interaction
Malaria	Human	Parasite	Mosquito	Bite
Skull fracture	Human	Mechanical energy	Motor vehicle	Crash

* Reference: 24

Epidemiological models to analyze the epidemiology of injuries

The four factors that are involved in injury and the relations between them illustrated using RTA (Figure 2).

Figure 2. Risk factors for injuries



Public Health Model [24,25]

The classic public health model, which identifies the agent of injury, the host, and the environment, has emphasized removing harmful agents from or altering the physical environment (Table 3).

Table 3. Possible injury preventive strategies*

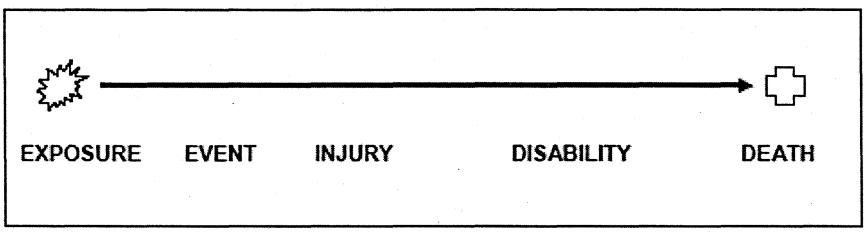
Factor	Possible prevention*
Host	Protect the rider with helmet
	Provide better physical therapy to help them to recover quickly
Agent	Lower speed limits to reduce the energy transfer
Vector	Ban production of the vehicle that speeds well
Environment	Reduce the smoothness, oiliness of road

*Refernce[25]

Injury spectrum

The injury spectrum[5, 25] is another useful model for analyzing the injuries. The injury spectrum is shown in figure 3. It maps an injury over time starting with the host's exposure to a hazard, followed by event through to the occurrence of the injury and finally the possible resultant disability and / or death.

Figure 3. Injury spectrum



Injuries are now recognized to have resulted from a complex interaction of sociological, psychological, physical and technological phenomena. This understanding of injuries helps us design safer products, environments, roads and traffic management systems. Injury can be prevented by reducing the probability of energy exchange between human beings and their surroundings. This is done by lowering the amount of energy available (e.g. speed limits), reducing the amount of energy transferred (e.g. cushioning provided by sand in playgrounds, use of helmets and seatbelts, cushioning impacts), and physical separation of the energy source from human beings (e.g. insulation on electric wires). [24]

For every person killed, there are at least two others who suffer permanent brain damage. Death indicates only the tip of the iceberg. It is estimated that for each death, at least 30-45 injuries occur. [19,20,25]

Deficiency in public health model[24]

In numerous cases, the above two models proved to be an extremely effective approach. This strategy, however, is deficient in recognizing the relationship between psychosocial factors and injury. In all other aspects of public health, we do not depend solely on changing the behaviour of all concerned to control a disease. It will be difficult able to eliminate carelessness, absent-mindedness and even neglect in any day-to-day activity.

So, the combined behavioral and environmental approaches are recommended. Independent researchers need to evaluate the efficacy and cost effectiveness of multiple types of intervention strategies, including those that combine behavioral and environmental approaches.

Haddon Matrix

Haddon Matrix[25, 26] is a useful tool in helping to remember the array of potential strategies. Haddon matrix is a framework developed by Dr. William Haddon as a method to generate ideas about injury prevention that address the agent, host and, physical and social environments to have effects in the pre-event, event, and post-event phases of the injury process.

This planning tool is used to help identify the complete range of option for taking / choosing the strategy for control measures. Motor vehicle crashes are used to explain this matrix as follows. The matrix divides the time sequence of crash into three phases (pre-crash, crash and post-crash) and then considering the human, vehicular and environmental factors which can interact during each phase of crash. The result is a nine-cell matrix (Table 4), each cell of which offers opportunities for intervention to reduce motor vehicle injuries / any other injuries.

Table 4. The Haddon matrix used to identify the possible counter measures

	Human	**Vehicle**	**Environment**
Pre-event	Alcohol		night, rain
Event	No seat belt	no air bag	tree too close to road
Post-event			slow emergency response

Unintentional injury as a public health problem

Injury mortality

An analysis of the leading causes of death shows that in most countries, irrespective of their level of development, accidents are among the top five leading causes of death. According to WHO's Global Burden of Disease estimates [3,7] accidents, as the cause of death as well as DALYs will dramatically rise in the next 20 years.

Globally, more than 5 million people die from injuries every year.[27, 28,] Injuries kill more people than HIV/AIDS and malaria combined. In 1998, of the estimated 5.8 million people who died from injuries, approximately 1.2 million died from road traffic collisions and 2.3 million died from violence, including 948,000 by suicide, 736,000 from homicide and 588,000 from war.[2] The rest died from other injury-related causes, including falls, drowning, burns and poisoning. Many more people survive their injuries, and live with a permanent disability.[27] In 2000, 10% of the deaths due to all causes [3] were due to injuries worldwide.

According to WHO report [29] total number of deaths (both the sexes) due injuries was 57, 64, 825 with a mortality rate of 97.9 per 100,000. The death rates in males and females were 128.6 and 66.7 per 100,000 population respectively.

The problem of injuries in South-East Asia Region, though enormous, remains largely unrecognized.[24] Even clear information on the number of deaths is not available due to problems of non-reporting and underreporting due to various reasons. WHO [2] estimates reveal that nearly 1.4 million people lost their lives due to injury during 2000. The ratio of deaths, hospital admissions, emergency room registrations and hospital non-attending cases varies from 1:20-30:50-100 based on available epidemiological data. Nearly 100% of severe, 50-70% of moderate and 10-20% of mildly injured persons need short-term and long-term rehabilitation services. [2] The economic costs of injuries are profound, with road traffic injuries alone costing 1-3% of GDP across countries. The social costs and hidden impact of injuries in terms of loss of schooling, absence from work, loss of productivity and psychological trauma are significant, though not quantified.[2,45]

The percent of burden of injury in SEA countries [30] was 12.8 and the share of SEA in the injury burden (as percent of world burden) was 29.7. The death rate and DALYs lost due to injuries in India [4] was 3.4% and 142 respectively and for the unintentional injuries it was 2.2% and 98 respectively.[4]

Age and sex specific DALYs lost[4] was maximum in 5-14 age-group (22%) followed by 15-44 (9.1%). According to the WHO report [30,31] in India the injury and poisoning were the third leading cause of mortality next only to cardiac and respiratory diseases.

In Ghana, [32] where systematic studies have been done, the death rate was 83 per 100, 000 in urban and 53 per 100, 000 in the rural areas. The case fatality ratios due to RTA were 5.5 % and 2.3% respectively in the urban and rural areas.

In a hospital-based study, [33] 8% of mortality was attributable to injury of which 54% were due to RTA.

In Uganda[34] the leading cause for mortality was drowning (27%) followed by traffic (18%) and blunt injuries (15%) in rural areas whereas in urban the leading cause was road accident (46%).

Gordon[10] reported mortality rate due to unintentional injuries as 63 per 100, 000 population in rural India. The male mortality was 1.6 times higher than female.

In Andhra Pradesh[36], the mortality rate was 2.22% due to RTA in rural and other unintentional injuries was 4.99% whereas in urban mortality was high in RTA than falls.

In Tamil Nadu, the mortality rate due to accident and poisoning in 1999 was 2.9% of total deaths.[35]

Injury morbidity

Injuries, intentional and unintentional, are accounting for 16% of the global burden of disease in 1998.[3] Globally, injuries are responsible for one in six years lived with

disability. The burden of unintentional injuries was as follows: RTA (12.2%), falls (18.7%), poison (1.1%), fires (5.8%), drowning (6.5%) and occupational (3.4%). [3,4]

The estimated DALYs lost due to injuries in the world[30] was 18,25,54, 000 and in SEA countries 5,42,36,000. The distribution of burden of injury (DALYs lost) [3,4,30,31] by cause among the unintentional injuries was as follows:

RTA	17.5%
Falls	12%
Drowning	7%
Fires	6%
Poisoning	5%

The percent of burden due to falls in SEA is 1.2, which forms 26.1% of the total burden of injury falls worldwide.[30]

Unintentional injuries in India were 86.6% of total reported injuries.[4] According to Andhra Pradash burden of injuries survey, [36] DALYs lost due to falls was 5.45% in rural and in urban DALYs lost due falls was 6.91%, fires 3.47% road accidents was 2.97%. The disability was high in falls both in rural and urban area in that state.[36]

According to Gordon,[10] injury rate was 11.6% (with 4% crippling) in Punjab. The injury rates were high in males between 0-14 years and highest in female in the age-group of 25-44. The leading causes for injury in this study was cutting and piercing instruments like knife and axe followed by cutting and piercing by sharp instruments like glass and sticks.

In another Indian study by Mohan[5] the injury rate was 15% due to RTA and 32% agricultural and all of serious in nature. The studies undertaken India and other developing countries are shown in table 5.

Table 5. Injury morbidity studies undertaken in India and developing countries

Country, Reference	Year	Morbidity
India (Rural)[10]	1962	Incidence: 116 per 1000
India (Rural)[13]	2000	Incidence: 186 per 1000
India (Urban)[12]	1996	121 per 1000
India (Rural)[14]	2002	Childhood injuries: 341.8 per 1000
India[11]	1983	Prevalence of traumatic amputations among males Rural: 24 per 100,000 Urban: 20 per 100,000
India (Hospital-based)[15]	2002	Traumatic brain injuries 240 per 1000
Chile[5]	1990	Incidence: 303 per 1000
Caracas, Venezuela[5]	1990	Incidence: 220 per 1000
Ghana [32]	1999	276 per 1000 (Both urban & rural)

Specific Injuries

Minor injuries

Injury due to use of sharp instruments like knife, hand tool, blade, fall of objects like stone, hit by objects[5] and farm implements, thorn, blade, pencil and stick in rural area and finger nails, kitchen appliances and furniture in urban area [37] are common cause of non- fatal injuries in developing countries.

In Punjab, a study done by Gordon and co-workers[10] 44% of reported non-fatal injuries were due to use of above instruments. The corresponding injuries in Northeastern Ohio were 2.8%. These injuries often received little or no treatment resulting in disability and lose of time. According to the study done by Singh and colleagues[37] in Haryana (both urban and rural) minor injuries in school children per year were 2.9 % in rural and 2.1% in urban area; point prevalence was higher in urban area. First-aid training of teachers or the students was lacking in both the areas. Many of the injuries (41-46%) occurred during the school time. Fingers/hand or feet were affected most.

In study done USA[38], the cumulative one-year incidence of farm injuries for women was 5% based on the number of farmwomen injured. Lower extremities were the most frequently injured body parts. The leading external causes were contact with foreign object/substance, falls, and overdoing/lifting/hauling. Most injuries occurred in the summer or spring. Park H and colleagues[39] mentioned that the cumulative incidence of farm work-related injury during the one year was 10.5% (In the State of Iowa USA).

In another study by Leigh[57] the agricultural injuries constituted 14% of all ill health episode in India.

In Vietnam study [19] injuries / accidents in school and public places make up more than 10%. Proportion of children injured in school is higher than that of adult injured in production sites. Injured risk towards physical education (football, basketball, gymnastic) is triple that towards other subjects. Injury in sports which covers 15 - 20% and has had tendency to increase during the 50 past years.

Falls

The importance and pattern of falls in a community depends on environment and age structure of the population, [5] Falls are a major cause of minor and severe injuries in developing countries. The common causes were fall from trees, fall on the ground while playing, slip in the bathroom, and falls from construction site. In developed countries design features of home and furniture are often significant environmental factors in falls.[24]

Globally, according to the WHO report,[28] an estimated 283, 000 people died due to falls in 2000. A quarter of all fatal falls occurred in the high-income countries. Europe and the Western Pacific region combined account for nearly 60 % of the total number of falls-related deaths worldwide. Males in the low- and middle-income countries of Europe have by far the highest falls-related mortality rates worldwide. [5,9] In all regions of the world[7, 9] adults over the age of 70 years, particularly females, have significantly higher falls-related mortality rates than younger people.

The morbidity and mortality due to falls increases as age decreases. Further, both the extremities of age-groups are affected than any other age-groups.[24] Children

account for the largest morbidity - almost 50% of the total number of DALYs lost globally to falls occur in children under 15 years of age.[9]

Falls are responsible for the largest number of hospital visits for non-fatal injuries especially for children and young adults, in many countries of the SEA Region[24]. As life expectancy increases in these countries, the incidence of hip and other fractures due to falls among the elderly are also assuming greater proportions. In India 18.7 percent of all type of injuries were due to fall.[4]

Older children fall from playground equipment, during play and recreational activities and during sports. Some studies undertaken in developing countries and India confirmed the risk factors.

According to the study by Kopjar B, [40] the incidence of falls-related injuries at home was 25 per 1,000. The incidence was higher among women than men (32 and 13 per 1,000 respectively). The ratio between falls to the same level and falls to lower levels was 2:1 in the age-group 65-79 year and 4:1 in the age-group over 80 years. The most common mechanisms causing injuries were as follows: loss of balance (46%), stumbling (19%) and sliding (12%). 60% of all patients sustained fractures (15 per 1,000). 50% of all patients were hospitalized.
Similarly the study done by Lord SR and colleagues [41], 66.1 percent of the subjects experienced no falls, 19.7 percent fell once and 14.2 percent fell on two or more occasions. . The most common causes of falls reported were trips, slips and loss of balance. Some (27%) suffered injuries as a result of a falls, and the proportion suffering injuries increased with age. Those who rated their health and balance as impaired, those with a limitation in activities of daily living, those receiving community services, those taking psychoactive drugs, and those taking four or more drugs had significantly more falls.

One study in India by Patel JC[42] identified that falls are common in elderly. They cause morbidly, mortality and financial hardship. Another study by Dolinis J [43] indicated that 28 percent reported having fallen at least once in the previous year. Independent risk factors for falling were: age; having left school at an early age; a worsening of vision in recent years; and histories of Parkinson's disease, fractured

hip, glaucoma, stroke (including transient ischaemic attack), corns or bunions, or arthritis.

Ho [44] mentioned many risk factors for falls. Among the risk factors studied, smokers were found to have an independent decreased risk of falls. Neither age nor sex was significantly associated with falls after adjusting for the other explanatory variables His findings differed from other findings that there was no difference in association between injury falls and age and sex.

In a community based Uganda study [34] falls were the second most common cause of severe injuries in both rural and urban areas affecting most often under 10 year children accounting to 33%. This may reflect the high-risk environment such as lack of proper sleeping, and play facilities.

Animal and insect bites[5]

Bites from animals and insects are an important public health problem in developing countries.[5] The customs of people and high risk environment might be reason for the high incidence of animal and insect bites in developing countries especially in rural areas.
The common types of animal bites are dog, snake, rat, and pig and cattle goring. The common type of insect bites are scorpion, centipede. The incidence of animal bites was 11 per 1000 with dog bite predominate in Ivory Coast rural study. In Nigeria 1% of hospital out patient department were of dog bite.

As per the WHO study[5], the reported rabies in India in 1978 was 20, 000 followed by Ethiopia with 412. The highest incidence of rabies was in India with 29.1 million populations followed by Ethiopia. In South Africa, the incidence was 0.1 per million in 1979.

Snakebites[5]

Snakebites are one of the important causes for death and the most neglected area in tropical medicine. Reason for the neglect might be due the fact that majority of bites were occurring in remote rural area, which were not reported. In Savanna (Nigeria) 10, 000 deaths occur annually and in northern Nigeria 1% of all death

were due to snakebites. In Myanmar, deaths due to snakebite is seventh leading cause and in Bangladesh the leading of cause of death in women of childbearing age is snakebites.[5]

Insect bites

The scorpion stings are said to be more important than snakebites in large area of the world[5], such North Africa, parts of Brazil, and Mexico. The study[5] done in Libya during 1979, found incidence of 900 and 7 deaths / 100, 000 population. In Mexico, 1000-2000 deaths occur due to scorpion stings per year with an incidence of 3.8/10000 population per year was reported.

In India, though the burden of animal and insect bite is a public health problem there is hardly any evidence is available from either hospital or community based studies.

Poisoning

Poisoning is a major problem in developing and developed countries.[5, 7,9] More recent data shows that pesticides are the most common form of fatal poisoning in south Asian countries.[24] Poisoning is responsible for an estimated 315, 000 fatalities in world wide. [28] The mortality in European countries is high (21.5 per 100, 000) [5,9] when compared to SEA countries like India where the mortality is 7 per 100, 000 population.

SEA region is responsible for 26% of total mortality due to poisoning. Both the SEA and European region combinely accounts for > 50 % of mortality due to poisoning.[5,9] An estimated 82, 000 fatalities in countries of the SEA Region has been reported.[24] The most common agents responsible for poisoning are pesticides, kerosene, prescription drugs and household chemicals. Pesticides are widely used in many countries where agriculture is an important part of the economy. Reports from India, Indonesia, Sri Lanka and Thailand indicate that common availability and use of toxic pesticides is responsible for intentional and unintentional morbidity and mortality.

In Sri Lanka, pesticides are one of the main agents used in attempted suicide in rural areas.[24] Paraquat intoxication is known to cause irreversible damage in

patients. Many countries also report accidental ingestion of kerosene as a leading cause of poisoning, especially among children. A study from Thailand revealed that 54 per cent of cases of poisoning among pre-school children involved therapeutic drugs. [24]

In all regions males are more affected than female. [5,9] The mortality rate is high in 45-69 age-group (60%). The overall poisoning mortality among male in Europe is 3 times higher than the rate in either sex in any region.

In India, the burden of injury due to poisoning was1.1%. [4] In other developing countries it was 2.3%. The distribution of mortality between male and female due to poisoning in developing countries was 3% each whereas in developed countries it was 7.4 and 6% respectively.[4]

Road Traffic Accidents

According to WHO Director General's report [45] RTAs is the ninth leading cause of all death worldwide. The DALYs due to RTA will jump from the 9th position to 3rd rank by the year 2020. Death from road injuries accounts for 2.2% of the global mortality. This RTA kills more people than Malaria and put tens of thousands of people in hospitals. In the year 2000, 1.26 million [28,3] people died as result of road crash.

In low and middle-income countries road crash victims occupy upto 10% of all hospital beds. In fact, 90% of all RTAs occur in these countries. Of the 1.26 million annual deaths 35% are from SEA which include India 24% from the western pacific including China, 13% in Africa, 11% in America, 10% from Europe which includes Russia and 7% from Eastern Mediterranean including Pakistan.[45]

The human suffering from the victim's of RTA and their households is incalculable. Their death and disability have serious implications for victims, their households and their dependents: reduction in quality of life, suffering and poverty. In strict economic terms, the cost associated with surgery, prolonged hospitalization and the long term rehabilitation of victims, injuries, in addition to their lost productivity cost, represent tens of billions of dollars each year[28, 45,] The burden on the health

system compromises prospect for development. The countries with problem of tuberculosis, malaria, AIDS, find it very difficult to manage the RTA. [45]

According to the World Health Report 2003,[1] "RTA is one of the three growing threats to world next only to cardiovascular diseases and tobacco related diseases. The burden of RTA injury falls mostly on the developing countries because of rapid increase in the number of vehicle. This hidden epidemic receives little attention at the national and international level. The epidemic of road transport, still in its early stage, accounts for 90% of DALYs lost in developing countries. In 2020, it will be the third leading cause of DALYs lost. It is expected to increase in 2020 by 92% in China and 147% in India and 80% in other developing countries"

In India, the reported morbidity / mortality as per WHO SEA Regional Office reports[46] due to road traffic injuries were 3, 30, 000 and number of deaths were 80,000.

In Vietnam, as per the study done by Mooren, [20] every day 30 young people were killed in road crash. For every person killed, there are at least two others who suffer permanent brain damage. Death indicates only the tip of the iceberg. It is estimated that for each death, at least 30-45 injuries occur. The burden of RTA is even more disproportionate when vehicle ownership is considered.

Developing countries own only 40 % of world's motor vehicle, whereas, it accounts for 86% of road fatalities. Africa owns only 3% of vehicle but accounts for 3% of road deaths[20]. According to WHO, Ethiopia has the highest rate of fatalities per vehicle, i.e. nearly 200 per 100000 vehicles. The trend data shows that the total number of persons killed in road crashes in the developing countries continues to increase, whereas in motorized countries, there has been decreasing trend over the last 15 years. For example, in Asia-Pacific, it is 40%, Africa by 26%, whereas in motorized countries, it is only 10%.[20]

According to World Bank Report[22], the cost of road trauma averages between 1-3% of GDP, whereas in Thailand, it is reported as 3% of GDP. WHO puts the GDP at 5-6%.

In the less than 45 years age-group, 67% of all RTAs occur, whereas only 10% of RTA occurs in retired and above age-group. The aggregate economic effect of this is that accidents mains and kills more of the very people required to build the economy and tackle poverty at its roots. This means RTA are one of the factors contributing to the cycle of poverty, which needs to be broken[1, 20]

In a population-based urban study conducted in India[12] the results showed that the incidence of RTA was16 per 1000. The relative risk of males to females for traffic injuries was 3.04 and the relative risk of traffic injuries among male for consuming alcohol was 2.26. The incidence was high in urban slum and is a priority problem. In another hospital based study at Chennai [17] by the same author indicated that 35% of the patients who were attending the causality department were due to RTA and 47% of that cases occurred in the age-group of 21-40 and males were affected more than female. Similarly, the study in Ghana also [32] showed that the major type of injuries in urban were transport related. In that study they found that both rural and urban combined, 73% of RTA injuries involved commercial vehicle.

In Uganda a hospital-based study[33] indicated that 50% of the injuries were due to RTA and majority of the affected in RTA were students. This was contrary to Ghana[32] studies where it was the adult male population.

In another Ghana study[47] the transport related injuries in urban was 16% and 10% in rural area. The most common transport related mechanisms were either to passenger involved or pedestrian struck by the vehicle in urban and in rural area it was the bicycle crash.

In another Uganda study[34] RTA was next only to drowning with 18% in rural area and in the urban area RTA was the leading cause of injuries similar to what was reported in the Ghana study. In both the settings males were injured more than females.

Drowning

Drowning accounts for loss of many young lives[5]. In 2000, an estimated 4,50,000 people drowned, making it the second leading cause of unintentional injury death globally after road traffic injuries.[5,9, 28] These figures are an under-estimate of all

drowning deaths, since they exclude drowning due to floods (cataclysm), boating and water transport. Almost 97% of all drowning deaths occurred in low- and middle-income countries. The Western Pacific and South East Asia regions account for 60% of the mortality and DALYs. Males in Africa and in the Western Pacific have the highest drowning-related mortality rates worldwide. However, children under 5 years of age have the highest drowning mortality rates worldwide. Over half of the global mortality and 60% of the total number of DALYs lost due to drowning occurs among children aged between 0 and 14 years.[3] A death caused by drowning is the second most important category in the developing countries.[4] Ponds, rivulets, irrigation canals and open wells represent the danger of drowning for young children.

During 2000, injuries accounted for over 9% of total global mortality[48]. Of these injury-related deaths, 8% were from unintentional drowning. Of these unintentional drowning deaths, 97% occurred in low-and middle-income countries.[48] Drowning death rates in Africa are more than eight times higher than those of the United States and Australia[48].

Both the United States and Australia have higher drowning mortality rates among indigenous populations compared with white mortality rates. The rate of submersion resulting in hospitalization is approximately double the mortality rates from drowning in both countries

Local studies and reports from the countries of the SEA Region indicate that drowning is also one of the causes of deaths and injury in the Region.[24] Bangladesh and Maldives have identified drowning as the most common cause of accidental deaths.[5]

In Asia, deaths due to drowning was responsible for 48% in male and 44% in female of unintentional injuries.[5] In India drowning was noted as one of the three methods for of suicide. According to Government report, 1976, accidental loss of life accounts for 23% of deaths from injury with an annual rate of 4/100000.

As per one Indian study[4] the burden of drowning was 8.5% in India, 13.2% in China, 7,5% in developing countries and 4% in developed countries. Similarly in

developing countries the burden is 10.2% in male and 10.3% in female, where as in developed countries it was 9.2% and 8.5% respectively

A study conducted In Uganda [34] in rural setup, identified that the leading cause of fatal injuries was drowning (27%).

Fires and Burns

Burn is one of the leading causes of death. Female is the most vulnerable group.[5] Globally some 238, 000 deaths occurred worldwide due to burns.[28] Half of the total number of DALYs lost due to burns were among 0-15 year age-group. [5] The incidence increases with age increases, attain maximum at 15 and begin to decline after 15 years. A study by Gumber [4] showed that the burden of injury due to burns was 4.3% in developed countries 4,1% in developing countries, and 5.8% in India[4]. The mortality due to burns between male and female was 2.1 and 3% in developing countries, 1.9 and 3% in developed countries.

An estimated two-thirds of the global burden of burn mortality among females was from South-East Asia[24] and an estimated 1,28,000 persons died of burn injuries in 2000. This burden accounts for more than half of the global burden of fire related burns. In fact, two-thirds of the global burden of fire-related burns among females [5,24] was estimated to have occurred in South-East Asia. Burns often rank as another major source of morbidity and mortality after traffic injuries, falls and drowning. The majority of burns occur at home.

The impact of burns, especially severe ones, is worse in the SEA Region compared to that in high-income countries because of infections and lack of adequate physiotherapy.[24] Therefore, prevention and adequate treatment of burns must be an important part of injury control activities

A study in Indian citifies showed that 15-45% of all deaths in hospitals[5] were due to burns. Another Indian study in Allahabad, India among Government employee households showed that burns were the second largest cause of any injuries at home. A study at Punjab rural area by Gordon[10] showed a mortality rate of 14 per 100, 000 population due to burns.

Identified risk factors for injuries

Risk factors for injuries may vary from one country to another and the risk group may not be same. For example the pedestrian death rate in Reo de Janeiro was about four times that of Baltimore.[5]

Personal characteristics

Age and sex

Age and sex are important risk factors for many injuries and will vary within the specified injuries.[5] In developed countries, the highest rates of serious injuries occur in elderly particularly in women. Gordon and colleagues[10] indicated that injury mortality was high among elderly in developing countries also. Little data by age and sex are available, particularly in least developed countries.[5] As much as 50% of all deaths in the age-group 10 - 24 years are due to injury.[49]

Injuries are not random events; they occur in patterns that are predictable[3, 4,24] They are based on the age and sex of the individual, the time of day and the season of the year. For example, infants are more likely to drown in bathtubs than older children, males are at higher risk for injuries than females and bicycle-related and other injuries increase during the spring and summer.

Alcohol

It is risk factors for many injuries. The importance of alcohol and other drugs in relation to injuries has been described in developing countries. Wyatt [5] found that in Papua New Guinea, 40% of those who died in RTA were related to alcohol and one study by Sathiyasekaran in India also had history of alcohol related to injuries[17] but no other studies were found documenting the role of alcohol in other injuries.[5]

Other risk factors

Other factors related to injury include poverty, residence in rural area and race. These factors have all been shown to be major factors in causing injuries in industrialized countries[24,49] but few studies were available in developing countries. Poverty may be risk factors but evidence is not available in developing countries. One study in Brazil [5] using the educational status of head of households as proxy

for socio-economic status showed that in households with low education the injuries in children 2.9 times was high than highly educated households.

According to Gumber [4] certain risk factors specific for Indian conditions in addition to sex, age, include marital status, socio-economic status including education whether covered under Employees' State Insurance (ESI) or other health insurance scheme, type of state, season, whether the village is located in an urbanized zone, and whether the urban patient is resident of a town/city.

Physical factors

Factors like visual acuity, Vitamin A deficiency and epilepsy are playing important role in causing injuries.[5]

Environmental risk factors

The people's customs and high-risk environment must be reason for the high incidence of animal and insect bites in developing countries especially in rural areas. This has been observed in the case of animal and insect bites. [5]

Consequences of injuries

Premature death and disability

An analysis of the leading causes of death shows that in most countries, irrespective of their level of development, accidents are among the top five leading causes of death. [29,50]

In addition to causing premature death, injuries are a significant cause for disability or time lost for normal activities and permanent crippling.[3] Around the world, almost 16, 000 people die from injuries every day and for every person who dies of injuries, several thousand injured persons survive, but many of them are left with permanent disabling sequelae. Although mortality is a cardinal indicator of the magnitude of injuries as a worldwide health problem, it is important to emphasize that for each death from injury there are many more injuries that result in hospitalization, treatment in emergency departments, treatment by general practitioners or other health personnel, or no treatment at all. In many cases these injuries cause permanent disability. Disability-adjusted life years (DALYs) take account of this issue by combining the number of years of life lost from premature

death with the loss of health from disability among persons with nonfatal injuries[3]. One DALY is 1 lost year of healthy life.

The RTA forms 22% of burden of injuries of DALYs lost followed by falls (11%), drowning (7%), fires (6%)poisoning (5%)among the unintentional injuries

According to WHO's Global Burden of Disease estimates, accidents as the cause of death and disability adjusted life years (DALY) will dramatically rise in the next 20 years.[1,3,50]

Cost of medical care and loss of productivity

The cost of medical care and loss of productivity due to injuries of all kinds globally, resulting from violence is almost US$ 500 billion annually [50] Globally 3% of GDP is lost due to road traffic injuries alone. In United States[49] an annual cost due to injury is of $210 billion to the nation. Injury caused the loss of thousands billion US dollars (accounting for 5% -6 % Gross National Product [GNP], 1993). [3,49]

Psychological problem

The consequences of accidents and violence extend far beyond physical injury. They include profound psychological implications for their victims [45,50]
The impact of socio-economic loss to individuals, households, society and infrastructure is very high.

Preventive strategy

Decreasing the burden of injuries is among the main challenges for public health in the next century—injuries are preventable, and many effective strategies are available. Public health officials must gain a better understanding of the magnitude and characteristics of the problem, contribute to the development and evaluation of injury prevention programs, and develop the best possible pre hospital and hospital care and rehabilitation for injured persons [51]

According to Centers for Disease Control and Prevention, "Injury is probably the most under recognized major public health problem facing the nation today, and the study of injury presents unparalleled opportunities for realizing significant savings in both financial and human terms—all in return for a relatively modest investment."[51]

While most countries have recognized the high burden of morbidity and mortality resulting from injuries, it is only recently that injuries have been recognized as a public health problem in many countries around the world.[49]

Injuries are not random events.[3,4] They are preventable[24]. The use of seat belts; child car seats; helmets; designated drivers; flame-resistant clothing; smoke detectors; fencing around areas of water; and separate, locked storage of firearms and ammunition are among the measures that have contributed to decreasing injuries.

Prevention strategies need not be expensive.[24] Some strategies that have proven to be cost-effective in high-income countries can be adapted in low and middle-income countries. Examples include passing and enforcing seat belt and motorcycle helmet laws, and promoting safety equipment such as protective eyewear for certain types of jobs. For violence-related injuries, examples include mentoring programs for youth at risk of violence, school policies which favor non-violence, and home visitation by community social activists.
New strategies are also being devised in low and middle-income countries. These include the design and manufacture of motorcycle helmets appropriate to warm climates, the painting of bicycles in highly visible colors and the production of safer stoves and fuels.

Injury predictable and preventable

Just as the occurrence of an injury requires the interaction of several factors, preventing one may require a mixture of countermeasures or interventions.[24]
Injuries are predictable events and, as such, provide an opportunity to design interventions at many points prior to, during, and after the event to reduce the risk or severity of injury. Using the available science of injury control, we can begin to identify effective strategies for specific injury problems

According to WHO- SEARO, "Injuries have causes -- they do not simply befall us from fate or bad luck. To prevent injuries it is necessary to have information about the factors that contribute to their occurrence. With this information we may understand the options for prevention. Effective injury prevention requires a multifaceted, multidisciplinary approach[24]"

WHO recognizes that injuries cannot be effectively addressed by one sector alone. [24] With the public health sector acting as a convenor, experts from the fields of medicine, education, transportation, sociology, criminology, justice, urban planning and communications can play a crucial role in creating safe and healthy communities. This requires a commitment at the international, national and community levels to document the problem; craft, test and evaluate comprehensive solutions; and disseminate lessons learned.

Deaths and disabilities due to injuries have declined markedly in countries where such prevention efforts are established. A host of strategies at the individual, family and community levels have also shown promise in reducing violence-related injuries. These include substance abuse programmes, family counseling and school-based violence prevention initiatives. Prevention efforts need to go global. There is urgent need to adapt lessons learned to local realities to develop appropriate, cost-effective measures.[9]

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4. Appendix

1.1 Definition of Injury

An injury is a bodily lesion at the organic level, resulting from acute exposure to energy (mechanical, thermal, electrical, chemical, or radiant) in amounts that exceed the threshold of physiologic tolerance. In some cases (e.g., in drowning, strangulation, or freezing), the injury results from an insufficiency of a vital element.

1.2 Classification of injuries

The external causes of injuries are often categorized as unintentional or intentional.

Unintentional

Traffic injuries, fire-related injuries, falls, drowning, and Poisonings are classified as unintentional injuries

Intentional

Injuries due to assaults, self-inflicted violence, and war are classified as intentional injuries

1.3 Type of injuries

Road Traffic Accidents: A traffic injury is any vehicle injury occurring on a public highway (i.e. originating on, terminating on, or involving a vehicle partially on the highway).

Falls: A falls is an event, which results in a person coming to rest inadvertently on the ground or floor or other lower level. Within the WHO database falls-related deaths and non-fatal injuries exclude those due to assault and intentional self-harm. Falls from animals, burning buildings and transport vehicles, and falls into fire, water and machinery are also excluded

Animal and insect Bite[59]

Animal and insect bites are defined under two different categories, namely dog and other bites.

Dog bite: Injury caused by a dog bite. This category does not include injury from other animal bites

Other bite / sting: Injury from a poisonous or non-poisonous bite or sting through the skin, other than a dog bite. This category includes human bite, cat bite, snake or lizard bite, insect bite, stings from coral or jellyfish, or bites and stings by other plants and animals.

Drowning: Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid. Drowning outcomes are classified as death, morbidity and no morbidity. Agreed terminology is essential to describe the problem and to allow effective comparisons of drowning trends. Thus, this definition of drowning adopted by the 2002 World Congress on Drowning should be widely used

Fires and burns : Burn or thermal injuries occur when hot liquids (scalds), hot solids (contact burns) or flames (flame burns) destroy some or all of the different layers of cells, which form the human skin. For traditional reasons, skin injuries due to ultraviolet radiation or radioactivity, electricity and chemicals, as well as respiratory damage resulting from smoke inhalation, are considered as burns, poisonings

Other minor injuries: (This classification is intended for the purpose of the present study; It is not mentioned in ICECI) Injuries classified as "other minor injuries" include injuries from cutting and piercing injuries, by use of sharp instruments like knife, hand tool, crowbar, blade, fall of objects like stone, bricks, metal, hit by objects, farm implements, thorn, finger nails, kitchen appliances and furniture, occupational related, household activities related injuries, leisure activities related injuries, adverse effects to medication, as well as a miscellaneous group and other unintentional injuries not specified in other groups

1.4 Classification of injury according to severity

Hospitalization

Number of days the person is hospitalized/ admitted in a hospital due to injuries for treatment.

Disability/prevented from usual work

A **disability** is something, which has a serious, and lasting effect on a person's ability to do everyday tasks like looking after them self or doing a job of work.

SECTION 5:

PAPER PRESENTATIONS

5.1. Outbreaks of cholera in two villages, Tamil Nadu, 2002: Lessons for integrated surveillance

Introduction

Between May and June, 2002 outbreaks of acute diarrhoeal illness were reported from two villages in central Tamilnadu. This provided a challenge for the MAE- FETP Scholar to identify and network with resources available in the district for outbreak response. The objectives were to investigate the outbreak and institute control measures immediately.

Methods

The investigation team consisted of members from health services and local medical college. The team identified all cases that occurred in these villages by house-to-house survey. Risk factors were assessed using a questionnaire. Environmental and laboratory investigations were done.

Results

The overall attack rates were 3.4% (n=58) and 7.9% (n=155) in the affected villages. Age specific attack rates were very high for those aged 50 years. Two patients were below 5 years of age. Two died due to the illness. Fourteen (67%) of 21 stool specimens were positive for Vibrio cholerae non-01. Leakages in water pipes coupled with poor environmental sanitation were identified as reasons for contamination of drinking water. Health education, immediate repair of leaking pipes and chlorination of water supply led to an early control of the outbreak.

Discussion

The outbreaks were due to *V.cholerae.* The village leaders helped the investigation team in instituting standard hygienic measures for containing the outbreak immediately. In the process of investigation the MAE- FETP Scholar developed network in the field posting area for outbreak response. This included the local medical college and community leaders of the affected villages.

(Presented at Joint Annual conference of the Indian society for malaria and other communicable diseases and the Indian association of epidemiologist, New Delhi: 8- 11,November, 2002)

5.2. Outbreaks of cholera Central Tamil Nadu, 2002

Introduction

Cholera and other water borne diseases of epidemic potential continue to be public health problem for India and these outbreaks are rarely investigated. As FETP Scholar during the first field posting came across an outbreak of ADD in a village near Thuraiyur. In order to identify the risk factors and other environmental factors, this investigation was undertaken alongwith control measures.

Methods

A retrospective cohort study was designed by the investigation team to go for house-to survey to identify all the affected case and to identify the environmental risk factors. Water and stool samples were sent for analysis to identify the causative organism. The investigation team consisted of members from health services and local medical college. The team identified all cases that occurred in these villages by house-to-house survey. Risk factors were assessed using a questionnaire. Environmental and laboratory investigations were done.

Results

Overall attack rate was 3.4% (n=58). Age specific attack rate was very high for those aged above 20 years. Two patients were below 5 years of age. Two died due to the illness. (Case fatality 3%). Stool specimens were positive for Vibrio cholerae non-01. The risk of occurrence of cases was three times high for people receiving water from the unused well water without treatment as compared to those who receive water from the other well. This indicated the potential source of the outbreak. Appropriate control and preventive measures ended the outbreak.

Discussion

The outbreak was due to *V.cholerae.* The village leaders helped the investigation team in instituting standard hygienic measures for containing the outbreak immediately. In the process of investigation the MAE- FETP Scholar developed network in the field posting area for outbreak response. This included the local medical college and community leaders of the affected villages.

(Presented at first MAE-FETP annual conference at Chennai, 1-2, January, 2003)

5.3. Evaluation of mass DEC Programme Tiruchirappalli, 2003

Introduction

The most neglected disease but causing permanent disability, lymphatic filariasis remains a public health problem in India. About 40% are living in endemic area. The only cost effective method to eliminate lymphatic filariasis is single dose annual mass DEC drug therapy. It depends on high coverage and consumption. There is a gap between reported coverage and consumption. If information were available regarding this gap, it would be useful to the programme.

Objective

To assess coverage and consumption level in an endemic district of Tamilnadu during 2003 mass DEC treatment, a cross sectional study was undertaken involving rural and urban areas.

Methodology

Eight Primary health centres in rural area and two census units in an urban area were selected randomly for this study after stratification. Using semi-structured questionarriae involving both the consumer and providers collected the data

Results and conclusions

Totally 838 households spread over 8 villages and 2 urban wards were surveyed. The overall coverage was 71% of which actual consumption was 49%. The proportion of not consumed was 22% and not received was 29%. The adverse reaction was minimal and no severe adverse reaction due to consumption of DEC drug was seen. Problems due to logistic or shortage of manpower were not seen. The performance was low in urban area than rural area in all activities of programme.

These study findings were consistent with other studies in the concept but inconsistent with proportion. It needs further larger sampled studies to confirm these findings.

(Presented at second MAE-FETP annual conference at Chennai, 14-15, October, 2003)