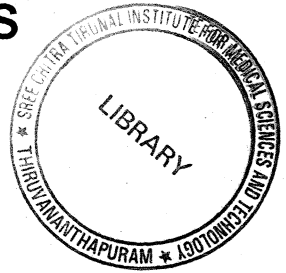


FIELD PROJECT REPORTS

BY

M. M. Lakhani

MAE – FETP Scholar, 2007-2008



**SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF APPLIED EPIDEMIOLOGY (M.A.E.)**

OF

**SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND
TECHNOLOGY, THIRUVANANTHAPURAM – 695011, INDIA**

**THIS WORK HAS BEEN DONE AS PART OF THE TWO YEARS FIELD
EPIDEMIOLOGY TRAINING PROGRAMME (FETP)**

CONDUCTED AT

**NATIONAL INSTITUTE OF EPIDEMIOLOGY
(INDIAN COUNCIL OF MEDICAL RESEARCH),**

R-127, Tamilnadu Housing Board Phase I and II, Chennai, 600 077

January 2009

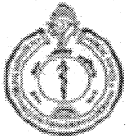
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Technology,**
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National Institute of Epidemiology,
(Indian Council of Medical Research),
R-127, Tamilnadu Housing Board Phase I and II,
Ayapakkam, Chennai, 600 077

January, 2009

CERTIFICATION

This is to certify that all the field projects submitted in this Bound Volume are original work done by Dr. M. M. Lakhani during the first 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, in part or whole, for any other (Publication or degree) purpose.



Director

National Institute of Epidemiology

Dated: 30/1/17

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deputation in time. He always guided and facilitated my work in field postings at Valsad. Dr. Vikas Desai, additional director (FW) has been my teacher and guide for more than a decade. She has been an inspiring source for my work. Dr. S.J. Gandhi, Dy. Dir, Epi. Cell, Gandhinagar for all his support in my project works. Dr.M.K.Gajera, chief district health officer, Valsad always helped me in carrying out my studies in Valsad. He facilitated my work by providing facilities in office and field areas. His advice and suggestions helped me a lot to improve my work. Dr.Trivedi, HOD of Medicine, Dr.Somaiya Mulla, HOD of Microbiology,. Dr.Godara, Asst. Prof. PSM, Govt. Medical College, Surat, Dr.B.K.Panchal, RCHO, Valsad, Dr.Vaidya, CDHO, Ahmedabad, Dr.Kulkarni, Dr.Tejas of Municipal corporation , Ahmedabad for their help in my MAE-FETP works. All block health officers, medical officers and staff of health department, Valsad for the support in my all project works. All my family members for providing me encouragement and comfort to work. My two cute nieces miss Alisha and Muskan for their help.

Date : 31 /12/2008

Dr. M. M. Lakhani

Place: Chennai

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SECTION 1:

FIRST FIELD POSTING

Situational analysis of present public health scenario, Valsad, Gujarat, India, 2007

Dr.M.M.Lakhani, MAE-FETP Scholar, VII Cohort, NIE, Chennai, India.
Mentor: Dr.R.Ramakrishnan, Dy dir, NIE (ICMR), Chennai

1. Background:-

I was district Epidemic Medical Officer and district surveillance officer (DSO) at Valsad, Gujarat before I joined MAE-FETP Course. My major job functions were as follows:

1. Prevention and control of epidemic prone diseases in the district.
2. Prevention and control of leptospirosis in the district.
3. Help in Sickle Cell Anaemia Project.
4. Monitoring of working of Comprehensive mobile health care units.
5. Monitoring of School Health Programme.
6. To help Chief District Health Officer (CDHO) in administration.
7. To send the weekly, monthly reports of IDSP and other programme to the state and regional authorities.
8. To liaison with the district, region and state health authorities.
9. To implement the orders issued by the higher authority.

To describe
I did situational analysis of public health scenario of Valsad district with the objectives to know 1) The general description and population 2) The laboratory resources 3) Major public health priorities 4) The organization of the health system 5) The progress of public health in terms of Indicators towards the millennium development goals. The situational analysis of the district will help me in future to carry out further studies.

2. Methodology

For situational analysis I relied on personal interviews, records of the various departments and review of literatures from various books as well as internet websites. In Valsad district, I visited district health office and met the chief district health officer(CDHO), district reproductive child health officer(RCHO), additional district health officer(ADHO), district tuberculosis officer(DTO), district leprosy officer(DLO), district malaria officer(DMO) discussed with them to obtain information. I visited block health offices and Primary Health Centres and interviewed the Block Health Officers (BHO), Medical Officers (MO), Laboratory Technicians (LT), Block Public Health Visitor (HV), Block Sanitary Inspector (SI), Health Supervisors (MPHS) and multipurpose health workers (MPHW).

To know the laboratory resources of district, I met the District Hospital Pathologist and observed all the facilities as stated in the table 1 also visited department of statistics, animal husbandry, agriculture integrated child development scheme and obtained information about population, agriculture and animal herding occupations.

To ^{identify} know the major public health priorities and ^{describe} Organization of the health system in Valsad District, the progress of public health in terms of Indicators towards the millennium development goals in Valsad District, I reviewed records of health department. I reviewed the annual reports of national health programmes sent to state health authority. I studied the action plans of RCH, epidemic preparedness, leptospirosis and National Vector Borne Disease Control Programme (NVBDCP). I studied IDSP guideline and reviewed the weekly reports. I also visited the health Commissionerate office at Gandhinagar and obtained information from in charge officers.

3. Result

3.1 General description:

Geographically, Valsad district is located in southernmost part of Gujarat state. On the west is the Arabian Sea; on the north is the District Navsari. On the east and south direction is the Maharashtra state. The location of the district is Latitude 20, 21 and longitude 72, 73. The district has area of 2927 sq. kms. Valsad has 5 Taluka comprising of total 470 villages and 5 municipalities. The 2001 census population was 14, 10,680 with proportion of urban 27%. Average annual rainfall is 200 cms and temperature ranges from minimum 12-15 to maximum 40-42 centigrade. 1. Summer from March to June 2. Rainy from July to October and 3. Winter from November to February. The district has hilly and forest area in Kaparada taluka and forest area in dharampur taluka. The area under forest is 943.9 Sq. Km. The rest of the district area is plain. The soil of this district is very fertile. Paddy, wheat, sugarcane and pulse grains are main crops of this district. Net cropped area is 172,142 sq. kms Trees are in abundance in all parts of the district. Economically the district is rich. It has fertile land with good harvesting. Sugarcane, rice are produced in abundance. Mango and Chicoo is famous and are also exported. Vapi, gundalav and ATUL are big Industrial areas. Many industries are there manufacturing dyes, colors, insecticides, pesticides, medicines, fertilizers, sugar, cotton cloth, paper, leather, steel. Famous Zandu and ATUL companies are situated here.

3.2 Population

Valsad is a tribal district. Age groupwise 46% population belonged to 15-45 years. The proportion of urban population was 27%. Proportion of ST/SC was 57%. All over 919 females per 1000 males and in urban area it was 828 female per 1000 males. All over literacy rate 69%. (Table 1)

3.3 Laboratory resources

Valsad district has laboratories in the government sector as follows:

1) First Level laboratories of primary health centre	39
2) Referral laboratories of community health centres	10
3) Second Level Laboratory of District Hospital, Valsad	1

I visited laboratories and discussed with the laboratory technicians, MO and pathologist and got information about facilities available (Table 2).

3.4 Major public health priorities in Valsad District, Gujarat, India

As per records and annual reports of reproductive child health, epidemic control and tuberculosis control programme of the health department acute diarrhoeal diseases, leptospirosis, and tuberculosis are major public health priorities in Valsad District. (Table 3)

3.5 Organization of the health system in Valsad, Gujarat, India

The CDHO is controlling and monitoring officer of health department. He works under District Development Officer (DDO) in District and the state Commissioner of Health, Medical Services & Medical Education (Health Services), Gujarat. At the Commissionerate, there are deputy, joint and additional directors for implementation of national health programmes. In the district, the CDHO supervises and monitors National Health Programs

(NHP) with the help of ADHO, RCHO, DTO, DMO, EMO, DLO and district health staff. At the block level BHO supervises and monitors NHPs with help of block health staff. At primary health centre (PHC) the MO is all over responsible for health care of primary health centre area. MSI, SI, MPHS (M/F) and MPHWS (M/F) worked under MO.

Under the National Rural Health Mission District health society (DHS) has been formed. Other programme societies are 1. District Reproductive Health Society 2. District National Vector Borne Disease Control Programme Society 3. Integrated Disease Surveillance Programme Society. 4. District Leprosy cum Tuberculosis Society. For administration of District Health Society Governing body and executive committee have been formed.

Integrated Disease Surveillance Programme (IDSP) was launched in Gujarat in 2005. The CDHO is the nodal officer of IDSP. EMO is working as District Surveillance Officer (DSO). District Surveillance Unit (DSU) has been formed in the district and Video Conferencing room is undergoing development. There are 50 reporting units under IDSP inclusive of 39 primary health centres, 10 referral hospitals, 1 district civil hospital and municipal hospital. Online reporting is done from district to state and central level every week. All the 5 block health officers, all medical officers have been trained in IDSP. All doctors are also trained in leptospirosis, tuberculosis, vector borne disease control programme and reproductive training programme. Valsad was first district in Gujarat to start training of Integrated Management of Neonatal Childhood Illness (IMNCI). UNICEF

supported the training and all the medical officers, multipurpose health supervisors (F), ANM/FHW and angan wadi workers are trained.

There is district training centre (DTT) in the district. Senior medical officer is conducting trainings. Aangan Wadi training centre is situated at Pathri village of Valsad.

Chief District Medical Officer (CDMO) cum Civil Surgeon looks after Medical services of District Hospital, CHCs and Urban areas. In urban areas of Valsad and Vapi city there is an urban health officer. Community based health volunteers (CBHV) also provide health services. The population of urban area is 27 %, but the infrastructure of health is inadequate. Vapi is a big industrial area with heavy population immigration from states of Uttar Pradesh, Bihar, Orissa, Maharashtra, and Rajasthan. The population of Vapi town has exceeded 1.5 lacs. Pollution, scarcity of drinking water, inadequate sanitation facility are problems.

The CDHO holds monthly meeting of MOs regularly. The meeting of health supervisors is held at Block level every month. Medical officer conducts monthly review meeting of PHC staff. MO PHC investigates every infant death and maternal death. 20 Non- government organizations are working in the field of health. BIAF, ANARDE and ATUL RURAL DEVELOPMENT PROGRAMME are well known.

4. Discussion

The following are the strengths of health department of Valsad district

Strengths:-

District is having good infrastructure, good officers and staff position. There were 39 PHCs, 10 CHCs and district hospital with adequate medical and laboratory facility. District is in phase –II for IDSP and District Surveillance Unit is under progress. IDSP is working well. We observed good electronic communication system, good reporting system. All the PHCs and CHCs had adequate laboratory equipments and reagents. IDSP and RCH technical staff were trained in IDSP and RCH and IMNCI. All the health officers and staff were trained in leptospirosis. Higher proportion of Institutional deliveries was recorded. Training of all birth attendants was completed.

Challenges: -

There is inadequate involvement of Private Practitioners in IDSP. Pollution in the Vapi city is a big challenge for the district. As district is situated at sea coast, there is risk of natural calamity like cyclone.

Weakness: -

Hilly and forest area in the Dharampur and Kaparada blocks are obstacles for development. Inadequate man power at grass root level due to vacancy of MPHW males was a problem. Illiteracy and poverty in tribal areas were constrains. Sick cell disease is a health problem among them. Workload and excessive reporting due to number of health programme were troublesome for the staff. Poor infrastructure in urban areas can lead to increase in health problems.

Acute diarrhoeal disease is one of the public health priorities of the district of Valsad District. Leptospirosis is occurring since 1994. The incidence and case fatality has increased during 2003 to 2007. Leptospirosis affects

the poor field laborers working in agriculture and animal herding. The health department has developed a special leptospirosis surveillance system for early case detection and prevention of death. The result achieved is good. The post of full time district tuberculosis officer has been sanctioned and filled up to manage RNTCP in Valsad.

Limitations:-

Few data were not available in the district pertaining to the health related millennium goals indicators which are shown in the table by NA.

1. Target of Goal 4 is to reduce the under-five mortality rate by two-thirds, which is two third of 123 per 1000 between 1990 and 2015. As per available data, in Valsad under-five mortality rate is 2 per 1000 which is much less than national level in the year 2003. *check this?*

2. Goal 5 target: To reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio. Regarding this indicator state level figure 29 per 1000 live births *maternal* is much less than the national level. *is very much more than the national average.* Though the district level figure is very low (70) but the probable reason could be underreporting of maternal death.

3. Proportion of tuberculosis cases detected was 70 % and cured under DOTS was 87 %. This is more than state and national level.

4. Proportion of people with uncomplicated malaria getting correct treatment at the health facility and community levels within 24 hours of the onset of symptoms was 98.5 % in the district and 70 % in state which are higher than national figure of 56 %.

Usually maternal mortality Ratio is expressed per 100,000 live births and not per 1000 !!

Conclusion

Morbidity due to acute diarrhoeal disease, tuberculosis and leptospirosis are priority health problems in Valsad District. Case fatality in leptospirosis was high. The health officers and health staff were trained in RCH, IDSP, T.B. and NVBDCP. IMNCI training of all the staff was completed. In the district level some data pertaining to the indicators of millennium development goals were missing.

Recommendation:

1. The district health authority should identify the possible gaps and should take appropriate actions to bring down the morbidity due to acute diarrheal disease. *Specify the action required.*
2. The district health authority should find out reasons for low Maternal Mortality rate. *check if it is low.*
3. The district should generate data to compare the indicators of millennium goals.

Reference:

1. District Statistical Hand Book 2001.
2. Census Data: Census of India 2001
3. Directorate of Agriculture, and State Forest Department, Govt. of Gujarat. (year)
4. SRS, Department of Family Welfare, Government of India (year)
5. Gujarat Human Development report, 2004
6. NFHS 2 Report (year)
7. Health on the March, 2002-2003
8. Records of Office of the Chief District Health Officer, Valsad District (year)
9. Records of Office of the Additional District Health Officer, Valsad District, 2004.
10. Millennium development goals, India country profile, World Bank. (year)
11. Annual Report (Up to 31st July 2006), National AIDS Control Organization, Ministry of Health and Family Welfare, GOI.
12. HNP at a glance : India (year)
13. The World Health Report 2003 , annexure 7
14. Book of PSM by Park 2006 — which chapter — etc
15. GOI, Annual Report 1999-2000, MHFW, New Delhi.
16. GOI (2003), Health information of India 2000 and 2001

Figure 1 Valsad district map, and location in Gujarat, India.

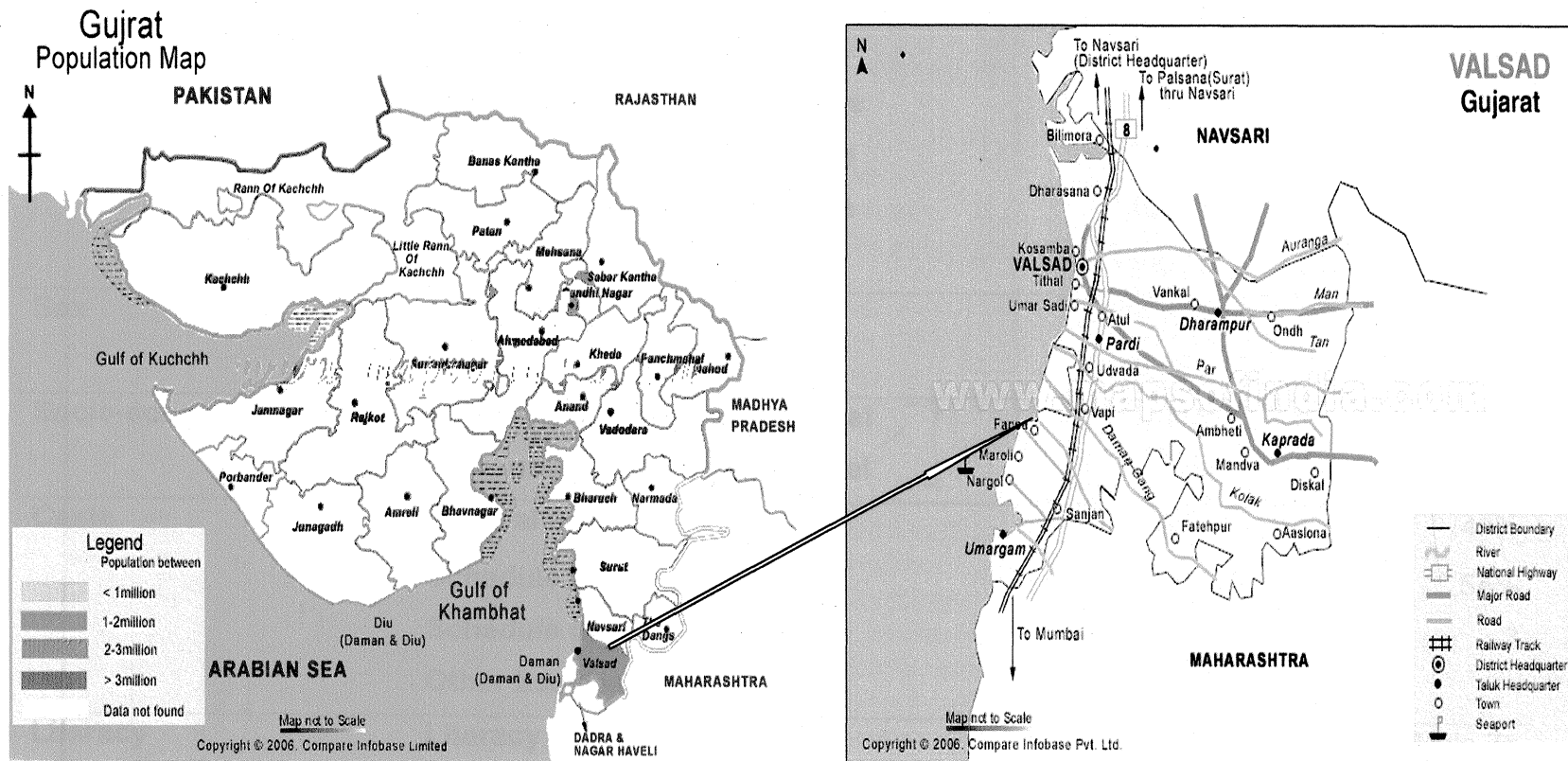


Table 1 Characteristics of the population of Valsad district, Gujarat, India, 2001.

Population group		Population size	Proportion of total
Age	Population 0-4 years of age	157996	11
	Population 5 – 9 years of age	177746	13
	Population 10 -14 years of age	167871	12
	Population 15-44 years of age	650323	46
	Population 45-59 years of age	146711	10
	Population 60 + years of age	110033	8
Sex	Male population	7,34,729	52%
	Female population	6,75,951	48%
Socio-economic status	Population above poverty level	NA	NA
	Population below poverty level	NA	NA
Caste	General caste	6,00,950	43%
	Schedule caste	7,72,405	54%
	Schedule tribe	37,304	3
	Other backward caste	-	-
Literacy	Literacy rate		Male 78
			Female 60
Total population size (2001)		14,10,680	100%

Source:

available in
15 minutes
Indira bho

Table 2 Laboratory resources at each level, district, Valsad, Gujarat, India, 2007

Name of the Unit	Man Power			Equipments	Reagents	Tests done
	Pathologist	Medical Technologist	G.D.A			
PHC 39	Nil	One in each PHC	NIL	Microscope -2 Centrifuge machine -1 Colorimeter -1	Adequate	Blood for M.P., Urine for Routine examination, Stool for Routine examination, Sputum for AFB
CHC 10	Nil	One	Nil	Microscope -2 Centrifuge machine -1 Colorimeter -1	Adequate	Blood for TC, DC, Hb, ESR, Platelet, M.P., Sugar, Urea, Creatinine, Uric acid, Liver function test, Urine for Routine examination, Stool for Routine examination
District Hospital, Valsad 1	One	One regular, Two on contract base	Two	Semi auto analyzer-1 Centrifuge machine – 3 Colorimeter 3, Hot air oven -3 Microscope - 6	Adequate	Blood for TC, DC, Hb, ESR, Platelet, M.P., Sugar, Urea, Creatinine, Uric acid, Liver function test, Lipid profile, Urine for Routine examination, Stool for Routine examination, Lepto, Dengue Rapid Tests.

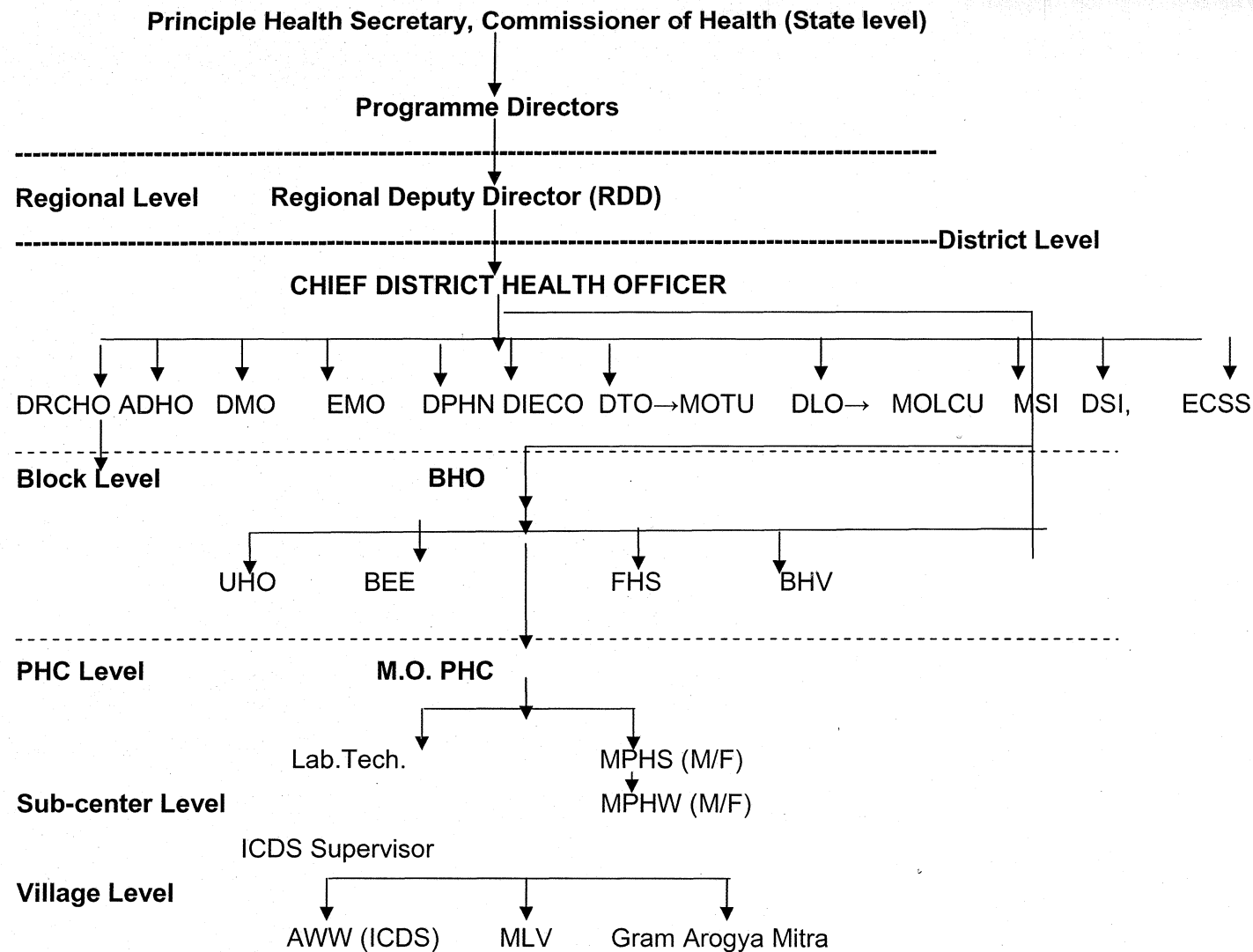
Source : ?

Table 3: Key public health priorities in Valsad, Gujarat, India, 2006

Public health priority	Key elements	Ongoing prevention and control programmes
Acute Diarrhoeal Disease	• An estimated 39,315 episodes of diarrhea occurred in 0-5 year group in 2006 • No death due to acute diarrhea	1. Appropriate clinical management by, a) Oral rehydration therapy b) Appropriate feeding c) Chemotherapy 2. Better M.C.H. care practices: a) Improvement of prenatal nutrition b) Promotion of breast feeding c) appropriate weaning practices d) Supplementary feeding 3. Preventive strategy; a) Sanitation b) Health education c) Immunization against measles.
Tuberculosis	• Case detection rate 70% • Cure rate 87 % • 43 re-treatment cases • 3 deaths amongst them	1. Passive case detection at health facilities. Present achievement of 70 % case detection of target. 2. Treatment by DOTS 87% achievement
Leptospirosis	1. Since 1994 occurred. 2. Total 338 cases, 46 deaths during 2000 to 2006 with average incidence rate 3.25/1, 00,000 population and case fatality 18 %. 3. Productive age group 15-45 yrs affected more.	1. Special surveillance system for early detection and treatment of cases established. 2. Chemoprophylaxis and chemotherapy with Cap. Doxycycline is given. 3. Intensive IEC activities done.

Give Source(s) of data for each of the above data provided

Figure 2 Organogram of District Health System in Valsad District, Gujarat, India.



Source?

: ABBREVIATIONS FOR ORGANOGRAM:

DRCHO: District R.C.H. Officer,

ADHO: Additional District Health Officer.

DTO: District T.B. Officer,

DLO: District Leprosy Officer.

DMO: District Malaria Officer,

EMO: Epidemic Medical Officer.

BHO: Block Health Officer,

DPHN: District Public Health Nurse.

DIECO: District IEC Officer,

MOTU: Medical Officer TB Unit.

MOLCU: Medical Officer Leprosy Control Unit.

MSI: Malaria Surveillance Inspector. **DSI:** District Sanitary Inspector.

ECSS: Epidemic cum Sanitary Supervisor.

UHO: Urban Health Officer.

MO: Medical Officer.

BEE: Block Extension Educator.

FHS: Female Health Supervisor.

Lab. Tech.: Laboratory Technician.

MPHS: Multipurpose Health Supervisor.

MPHW: Multipurpose Health Worker.

AWW: Anganwadi Worker.

MLV: Malaria Link Volunteer.

Table 4 Showing Health Manpower in Valsad District, Gujarat, India, 2006

Sr. No.	Name of Post	Sanctioned	Occupied	Vacant
1	Chief District Health Officer	1	1	0
2	Additional District Health Officer	1	1	0
3	District RCH Officer	1	1	0
4	Epidemic Medical Officer	1	1	0
5	District IEC Officer	1	1	0
6	District Malaria Officer	1	1	0
7	District T.B. Officer	1	1	0
8	District Leprosy Officer	1	1	0
9	Block Health Officer	5	5	0
10	Block IEC Officer	6	4	2
11	Medical Officers PHCs	39	34	5
12	Medical Officers CHCs	20	10	10
13	District Sanitary Inspector	1	1	0
14	School Health Assistant	1	1	0
15	Multi Purpose Health Supervisor (M)	49	28	21
16	Multi Purpose Health Supervisor (F)	45	40	21
17	Multi Purpose Health Worker (Male)	209	137	72
18	ANM / FHW	330	286	87
19	Pharmacist	39	12	27
20	Laboratory Technician PHCs	39	23	16
21	Driver all	39	7	32

Source:

Table 6 Indicators of progress for the health related millennium development goals, Valsad, Gujarat, India, 2005

Goal	Indicator	Value of the indicator		
		Valsad (Year)	Gujarat (Year)	In India (Year)
Goal 1	Percent of children under three years underweight	47		47.0 ⁶ (1998)
	Proportion of population below minimum level of dietary energy consumption	Not available	Not available	21(2001)
	Percentage of children 12-36 month of age who received one dose of vitamin A in the past 12 months	55.84 % (2006)	31.7 %	29.7 ⁶ (1999)
	Percent of children under age 0-6 months on exclusively breast fed	53 % (2006)	11.1 %	55.2 ⁶ (1999)
Goal 4	Under-five mortality rate per 1000 children	2	15	87.0 ¹⁰ (2003)
	Infant mortality rate per 1000 live birth	10.9	62 (2000)	67 (2002)
	Measles immunization among children under one	87 %	65.2 %	67.0 ¹⁰ (2002)
Goal 5	Maternal mortality ratio per 1,00,000 live birth	70	29 (1997)	540 ¹⁰ (2001)
	Proportion of births attended by skilled health personnel	94.72 %	62 %	42.5 ¹⁰ (2001)
	Eligible Couple protection rate	74 %	52.8 %	46.2 % park (00)
	Percentage of women receiving antenatal care (three ANC)	56 %	61.4 %	41.3 ⁶ (98 – 99)

	Indicator	Valsad (Year)	Gujarat (Year)	In India (Year)
Goal 6 (HIV)	HIV prevalence among 15-24 years old pregnant women (15 – 24 yrs all women)	NA	NA	0.7 ¹⁰ (2001)
	Condom use rate of the contraceptive prevalence rate	NA	4.8 %	7.2 ⁶ (98 – 99)
	Number of children orphaned by HIV/AIDS	NA	NA	Not found
	Percentage of people using a condom during most recent higher risk sexual encounter	NA	41 %	49.3
	Percentage of STI clients who are diagnosed and treated according to guidelines (in Family Health Awareness Campaign 2003)	NA	40 %	89 % ¹¹ (2003)
	Percentage of HIV-positive women receiving anti-retroviral treatment during pregnancy to prevent mother to child transmission of HIV- January 2003 to June 2004	NA	NA	84.5 % ¹¹ 2003 Denominator = Total live birth to HIV +ve women. Numerator = Total HIV +ve mother received Nevirapine

Source of all data should be given below the table

Table: - 7 Potential topics for the various field MAE – FETP assignments.

Assignment	Potential topic
Description and Evaluation of Surveillance system	Leptospirosis surveillance system in Valsad district
Secondary data analysis	Leptospirosis data of Valsad district, Gujarat
Programme evaluation	Leptospirosis control programme, Valsad
Dissertation	Factors associated with leptospirosis in Valsad district, Gujarat

Secondary analysis of leptospirosis surveillance data, Valsad district, Gujarat, India.

Dr.M.M.Lakhani, MAE-FETP Scholar, VII Cohort, NIE (ICMR), Chennai

1. Introduction:-

Leptospirosis is an acute disease caused by infection with spirochetes belonging to the genus leptospira^{1,2}. It can involve kidney, liver, heart, lungs, brain, haematological system leading to various complications and death. The case fatality is known to be in range of 5-40 %. It has a wide geographical distribution and people living in all the countries except North America and Europe can be considered at risk. Cases have occurred in Nicaragua, Salvador, and Rio de Janeiro¹. The incidence is increasing in the developed countries. Globally, an average of 10,000 severe cases requiring hospitalization is reported annually.

In South East Asia Region leptospirosis is endemic disease as the economies of these countries are predominantly agricultural and more than 922 million people are engaged in agriculture. Rice is the major food grain cultivated in this region. Most of these countries have heavy rainfall resulting in water logging. Leptospirosis has high epidemic potential. Leptospirosis outbreak has occurred in India, Thailand, Brazil and Indonesia.

In India epidemics have occurred in Orissa, Gujarat, Maharashtra, Kerala and Andaman Islands etc. In Gujarat in 1994, Leptospirosis occurred in Valsad for the first time. Subsequently Surat and Navsari reported cases. Now it has become an endemic disease in the South Gujarat Region. 1.6 million People are living in the high risk in Valsad district. It affects agricultural field laborers and persons in contact with cattle and rodents. We analyzed the secondary data of leptospirosis in Valsad district.

The objectives of the secondary analysis of leptospirosis surveillance data were to (1) Estimate the burden of leptospirosis (2) To know time, place, person distribution of cases and environment factors

2. Methods

Study design

Descriptive study based on secondary data

Study population

The population of the Valsad district, Gujarat.

Operational Definition

Leptospirosis, diagnosis and management guideline, Commissionerate of Health, Medical Services and Medical Education, Dr. Jivraj Mehta Bhavan, Gandhinagar had defined the operational case definitions for suspected and confirmed case of leptospirosis by modifying WHO Faine's scoring for diagnosis of leptospirosis⁴. The Clinical definition for suspected case of leptospirosis used in south Gujarat districts of Surat, Navsari and Valsad was "Any case of fever with two of the following 1. Myalgia 2. Conjunctival suffusion and 3. Agricultural Worker or history of contact with animals."

This operational definition is used by the health workers in the field for active surveillance. In 2001, a different case definition was used.

The medical officer used case definition as per WHO guideline of Faine S. to report case as suspected leptospirosis. They filled up the WHO criteria scoring form and a suspected case of leptospirosis was reported when score was 21 or more. For confirmation of the cases two blood samples were collected from the suspected case of leptospirosis fourteen days apart. The definition for the confirmed case used was "Any suspected case of leptospirosis that is laboratory confirmed "

The laboratory criteria for diagnosis: - They were as follows

1. Positive serology, preferably Microscopic Agglutination Test (MAT), Supportive serological findings of a leptospirosis agglutination titer of > 200 in one or more serum samples or four fold rise in the paired sera sample taken fourteen days apart."
2. Isolation of organism from blood or CSF during first week of illness and from urine after 10 days. In Valsad the first laboratory ELISA and MAT tests was used in practice.

Sampling procedure

We included all available secondary data of leptospirosis from 2000 to 2006 for rural and urban areas of the district, Valsad.

Data collection procedure

We visited the chief district health officer's office, Valsad to collect data from the records and reports. We explained the purpose of our exercise and got a verbal permission, and then we proceeded with the data collection. For the data at community block level we collected it from the office of block health officer. For the denominators we used data available

in the block health office, district health branch and district statistical branch, Valsad, Gujarat State Demography & evaluation cell of Health department, Gandhinagar.

We collected data on demographic characteristics, epidemiological data and meteorological data on rainfall from 2000 to 2006. We collected data of total leptospirosis cases and death from the records and reports from the chief district health office, Valsad. For the data at block level, we obtained from five block health offices.

Data Analysis

We entered the data in excel sheet. We used excel and SPSS softwares to analyze the data and display results. We used total number of annual cases of leptospirosis as numerator. For the denominators, we used census data and data available in the annual health reports of District Valsad. We divided the total number of cases by population of respective years to calculate annual incidence of leptospirosis in Valsad from 2000 to 2006. We also calculated age and sex specific incidence of leptospirosis. We compared incidence of leptospirosis yearwise. We used total number of deaths in case of leptospirosis as numerator and total number of confirmed cases of leptospirosis in the same year as denominator to find case fatality rate. We calculated case fatality rate from leptospirosis in the district for different years.

We calculated blockwise incidence to identify high-risk Blocks. We also calculated case fatality in different blocks. We compared case fatality yearwise and blockwise to know change in the gravity of the disease. To know seasonal trend of leptospirosis we used month wise epidemiological

data from 2000 to 2006. We plotted on a graph incidence of leptospirosis and case fatality by years to get disease trend and case fatality changes over the years. Then, we did smoothening of the data of monthwise cases from 2000 to 2006 by stepwise averaging of every six months in the series and plotted them to get time trend. We did correlation analysis in SPSS software by entering monthwise cases and available rainfall data of 2003 to 2005 to know whether there is any relationship between rainfall and occurrence of leptospirosis.

3. Results:-

Leptospirosis occurred for the first time in Valsad in 1994 and became endemic disease in Valsad. Except 2001 leptospirosis cases occurred in all the years. Every year the disease expanded to more number of PHC and villages (Table 2).

3.1 Disease burden:-

The annual incidence of leptospirosis in Valsad district was 0 per 1,00,000 in 2001. The incidence increased to 1 per 1,00,000 populations in 2002 and attained peak of 6 per 1,00,000 populations in 2004 and 2005. The incidence of leptospirosis declined to 2 per 1, 00,000 in 2006(Figure 1).

3.2 Age and sex distribution:-

The highest incidence rate of 5 per 1, 00, 000 population was in the age group of 15-44 years. The lowest incidence rate was 0 per 1, 00,000 among the 0-14 yrs. The incidence by sex indicated higher incidence rate among male than female (5 versus 1 per 1, 00,000 population) (Table 1).

3.3 Seasonality:-

Leptospirosis cases occurred only during monsoon months. The cases started occurring in July, attained peak during August and declined after October. The averaged monthly incidence was 0.37 per 1,00,000 in July, 1.44 per 1,00,000 in August and 0.08 per 1,00,000 in November. Cases occurred in month of November only in the year 2006. The time series analysis showed increasing trend from 2001 to 2005 (Figure 2).

3.4 Geographical distribution

Valsad and Pardi blocks accounted for 74 % of total leptospirosis cases in last 7 years. Valsad block alone contributed 47.6 % of cases of the district. Valsad block had average annual incidence of 5.67 and Pardi block 3.02 per 10,000 population as compared to Kaparada block with lowest incidence of 0.80 per 1,00,000 population (Figure 3).

3.5 Correlation with rain:-

The Pearson correlation coefficient of monthly occurrence of cases and rainfall from 2003 to 2005 was 0.487 with significant (2 tailed) 0.003.

3.6 Case Fatality:

Case fatality due to leptospirosis was 0 % in 2001 and 2002 year in the district as a whole. There are increases in case fatality rate from leptospirosis in 2003 and 2004 and highest 18 % in 2006. Seven year's averaged case fatality of the district was 11.47 % (Figure 1). Blockwise, 7 years average case fatality was highest (26.67%) in Dharampur block and lowest of (5.49 %) in Pardi block.

3.7 Positivity of cases:

12(100%) of 12 suspected leptospirosis cases were laboratory confirmed in 2002 and lowest seropositivity (29%) was in 2003.

Analysis of year 2006 showed as followed:-

Total 40 cases of leptospirosis and 7 deaths amongst them are reported during monsoon period from July to September, 2006 in the Valsad. Total 31 villages and 1 urban area was affected. Total 16 PHC were affected. The incidence of leptospirosis cases was 2 /1, 00,000 population. The male: female ratio of cases was 5.6: 1. The all over case fatality rate was 17.5 % .Highest case fatality 26 % was found in Pardi block. Lowest proportion of cases was in age group 0 to 14 years(2.5 %) and highest proportion of cases was 57.5 % in age group 26 to 45 years.34 cases (85 %) and 7 deaths (100 %) are in agricultural workers. Hilly area of Kaparada had only two cases. The epidemic peak with 15 cases was in August 2006 whereas heavy rainfall was in September 06. 24 cases were detected and treated by Government health facilities whereas 16 were treated by non-government health facilities. The referral service included 25 by Government facilities 8 had gone for referral by themselves and 7 were referred by private practicenors and Non-government organizations. As the duration between onset and referral increased death increased. No death was reported in 10 cases which were referred on same day or within 1 day. 2 deaths occurred in 6 cases referred 5 days late.

4. Discussion:-

Occurrence of leptospirosis every year since 1994 indicates long term endemicity of leptospirosis in Valsad district. Lowest incidence was in 2001 and 2002 and the highest incidence was in 2004-05 (Figure 1). The

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4. Discussion:-

Occurrence of leptospirosis every year since 1994 indicates long term endemicity of leptospirosis in Valsad district. Lowest incidence was in 2001 and 2002 and the highest incidence was in 2004-05 (Figure 1). The

record indicated that the decline in the incidence in 2001 was not real but due to change in the case definition. The incidence was nil till June when rainfall in district was low. With the start of rainfall from July incidence increased, reached at peak during August, September. We calculated Pearson's correlation coefficient in SPSS software to know relationship of leptospirosis with rain, which was positive and statistically significant. This indicates the relationship of rain and rainfall in Valsad district. Other studies in other parts also indicated such relationship.

Distribution of leptospirosis in the district is restricted mainly in 4 community blocks. The geographical distribution indicated that leptospirosis is a focal phenomenon in the district. It is practically restricted to plain area blocks of Valsad and Pardi having predominant agriculture and animal herding occupation. These blocks accounted for 253 of the total 340 leptospirosis cases in seven years and 20 of total 39 deaths due to leptospirosis. As Kaparada is hilly area water logging is not found and hence the cases are minimal.

The difference in incidence among various age groups is similar to that observed in endemic areas of other south Gujarat districts and other countries. The risk of leptospirosis infection in the district increased as the age progress from childhood to adulthood. Male sex had more incidence rate of leptospirosis than female sex as they have occupational exposure to agriculture and more access for diagnosis at health facilities. A study for Clinical characteristics and risk factors of human leptospirosis in Argentina (Vanasco NB, et al, 1999-2005) stated that confirmed cases were predominantly adults and males. A study by Kawaguchi L, et al,

Department of International Health, Nagoya University School of Medicine, Nagoya, Japan indicated that independent risk factors for the infection, identified by multivariate logistic regression, were male sex (odds ratio [OR], 1.92; 95% CI: 1.24-2.98). Thus the secondary data of leptospirosis in Valsad are consistent with other studies.

We observed overall low leptospirosis specific mortality rate in Valsad district in the analysis as compared to reported mortality in other countries (Ref). Theoretically, taking in account case fatality of 20-40 % with an average of 53 annual leptospirosis cases we expect average 11 to 22 deaths per year due to leptospirosis in Valsad. Whereas average 8 deaths per year had occurred in 7 years. The possible explanations for low mortality could be under-reporting, less adult death in long endemic areas, doxycycline prophylaxis in high risk groups, early diagnosis, prompt referral and better case management with dialysis and ventilators facilities at specialized medical centres. Increase in case fatality in the 2006 could be attributed to complicated cases involving lungs and deaths due to acute respiratory distress syndrome (ARDS).

5. Limitations of the study:-

This study was based on the surveillance data available with the health administrations. We did not examine the completeness of the data, functioning of surveillance system, operational issues related to leptospirosis control and quality control mechanism. We did not validate the secondary data of leptospirosis. So it may or may not tally with the actual leptospirosis situation in terms of distribution and magnitude of

leptospirosis disease. The actual incidence of leptospirosis and case fatality due to it could vary.

6. Conclusion:

Leptospirosis has become endemic in Valsad district. The incidence and case fatality has been increased from 2003 to 2006. Increasing numbers of villages were affected every year. The productive age group of people were affected more. Males were affected more but the case fatality was almost equal. The Valsad and Pardi blocks were affected most whereas the hilly block Kaparada was affected least. There is seasonal trend of leptospirosis occurring in monsoon. The occurrence of leptospirosis is positively related with rainfall. The sero-positivity of cases was good except in 2003.

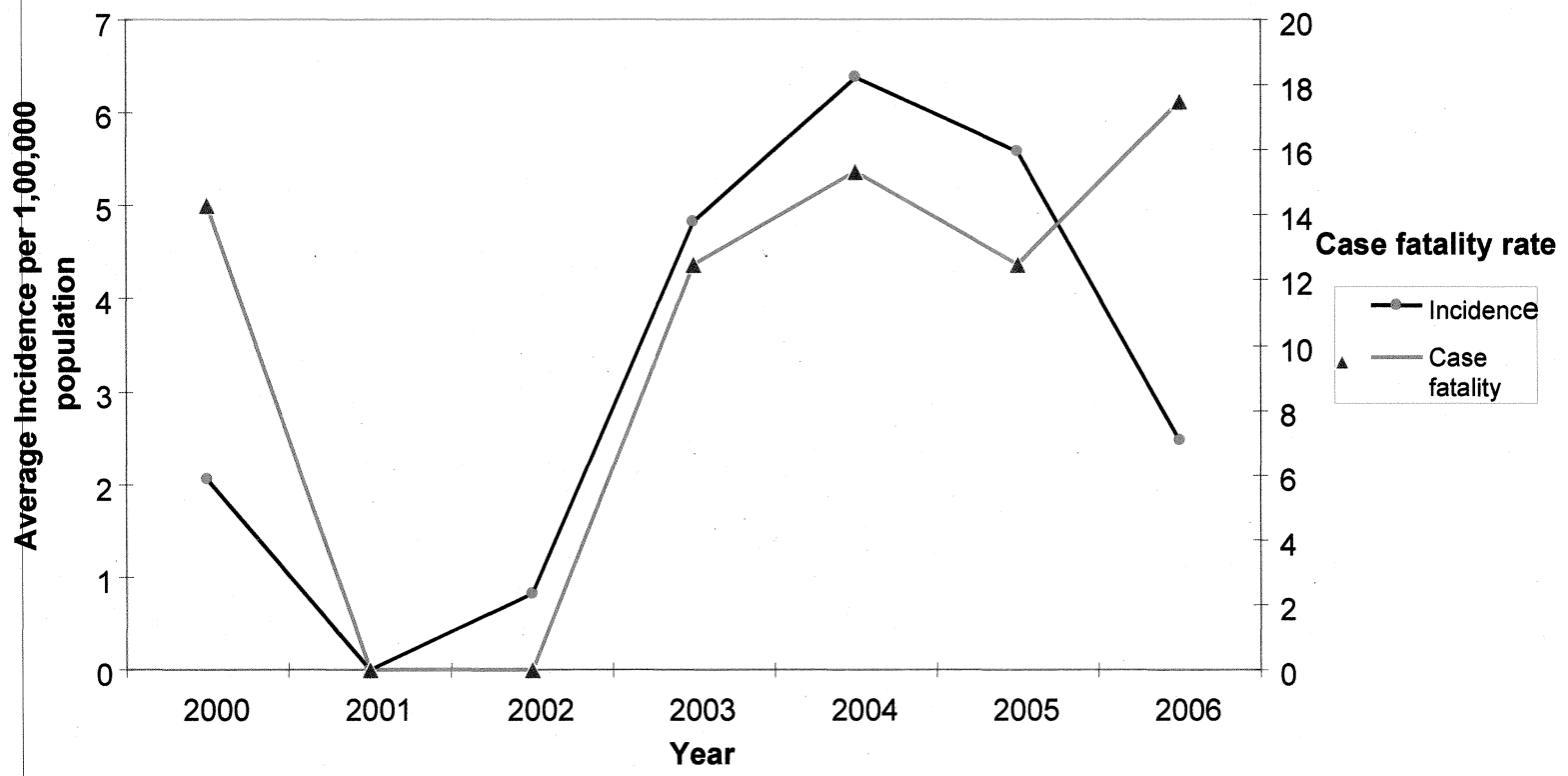
7. Recommendation:

In order to validate secondary data analysis report we recommend to conduct an evaluation of leptospirosis surveillance system in Valsad district based on various attributes. We also recommend considering the issues of geographical distribution, seasonality for planning of preventive and control measures of leptospirosis. We also suggest for collecting weekly data on rainfall in the district. The health authority need to address the issue of high fluctuation in the sero-positivity of cases in different years. The sample collection, storage, transportation and time to analyze need to be monitored. We suggest to check the possibility to create facility of serum sample testing for ELISA and MAT tests at the district level.

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Figure 1 Graph showing Incidence & case fatality rate of leptospirosis, Valsad, Gujarat, 2000-2006



Source:

Figure 2 Time series of smoothened data on leptospirosis cases, Valsad, Gujarat, India, 2000-2006

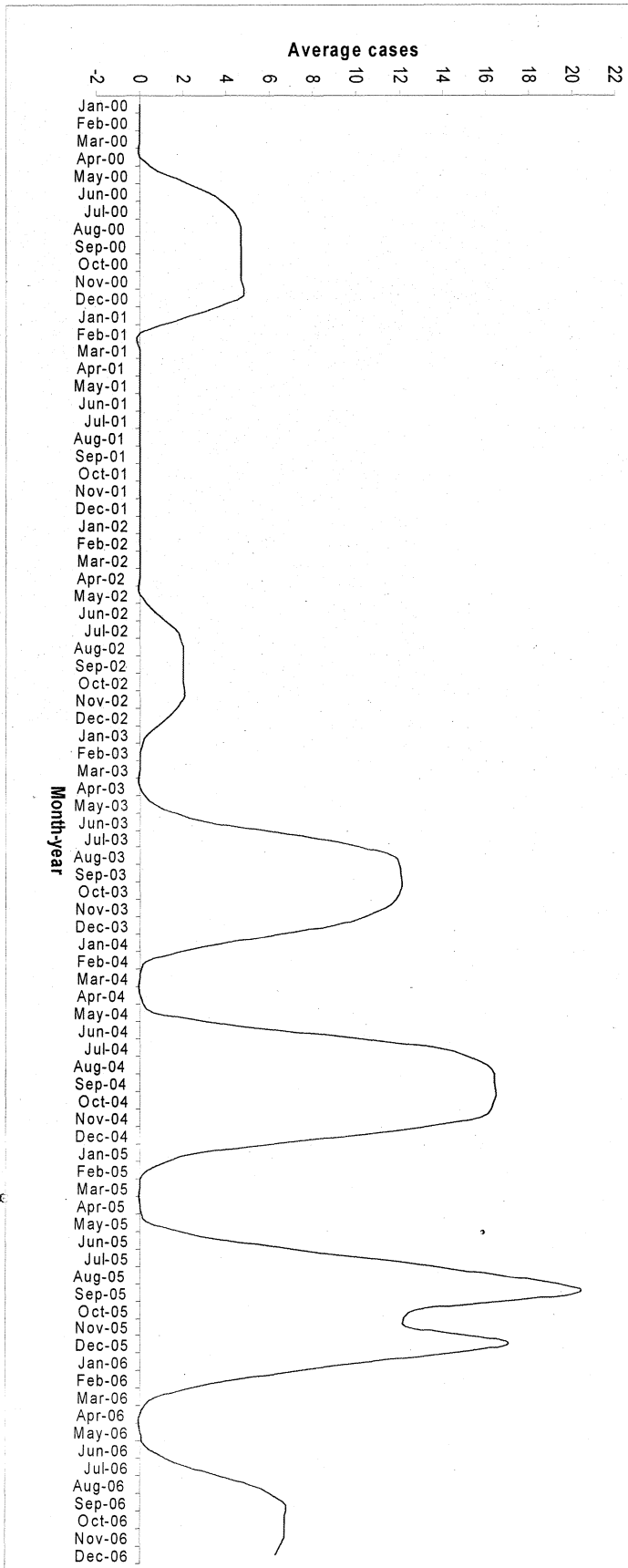


Figure 3 Block wise distribution of averaged leptospirosis. District Valsad, Gujarat, India, 2000-2006

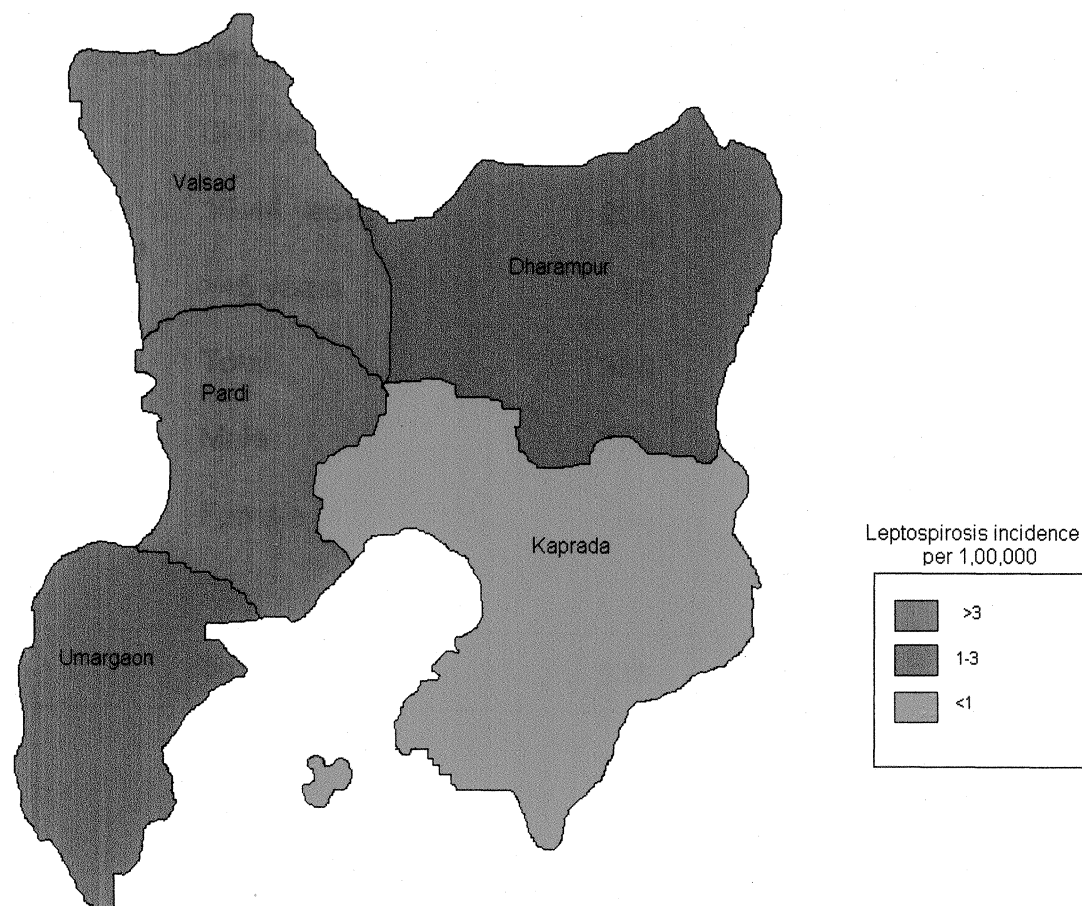


Table 1: Distribution of leptospirosis cases by age and sex, Valsad District, Gujarat, India, 2000-2006

Demographic characteristics		Cases	Midyear population 2003	Average annual incidence per 1,00,000
Age Group	0-14 years	6	563848	0
	15-44 years	254	712876	5
	>45 years	78	259647	4
	Total	338	1536371	3
Sex	Male	274	798913	5
	Female	64	737458	1
Total		338	1536371	3

Table 2 Showing number of blocks, phc, villages affected by leptospirosis, Valsad, Gujarat, 2000-06

Year	Block	PHC	Villages	No of cases	Serum Samples	Positive	Sero-Positivity %
2000	5	15	28	28	26	14	54
2001	0	0	0	0	0	0	0
2002	4	7	11	12°	12	12	100
2003	5	21	56	72	72	21	29
2004	5	17	70	98	96	64	67
2005	5	24	58	88	82	53	65
2006	5	17	34	40	40	37	93
Total	5	39	470	338	328	201	61

Description and evaluation of the leptospirosis surveillance system, Valsad district, Gujarat, India, 2007

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A. A1Introduction:-

Leptospirosis is an acute disease caused by spirochetes belonging to the genus leptospira. It can involve vital organs of kidney, liver, heart, lungs, brain and complications like kidney failure, acute respiratory distress syndrome, haemorrhage in brain, lungs can lead to death. It is known to have case fatality rate of 05-40 % in leptospirosis disease¹. The standard prevention and control measures mainly include minimizing contacts with contaminated water with leptospira in the field, preventing infection from cattle to human, care of cuts and furrows in the legs and hands of field laborers^{3, 4}, chemoprophylaxis with Cap. Doxycycline, early diagnosis and treatment of the cases and there by preventing complications and deaths, creating awareness in people and antirodent activities by chemical rodenticides. For the entire preventive and control measures information about various studies pertaining to leptospirosis is required. For action information about the environmental, socio-economic and health seeking behavior of the community is and surveillance system is needed.

Globally, it has a wide geographical distribution and people living in all the countries except North America and Europe can be considered at risk. Leptospirosis outbreaks have occurred in Nicaragua⁵, Salvador, and Rio de Janeiro. The incidence is increasing in developed countries. Globally an average of 10,000 severe cases requiring hospitalization occurs annually all over the world⁶.

In South East Asia Region It is endemic disease as the economies of these countries are predominantly agricultural and more than 922 million people are engaged in agriculture. Leptospirosis is known occupational hazard of agricultural laborers. Rice is the major food grain cultivated in this region. Most of these countries have heavy rainfall resulting in water logging which predispose to occurrence of leptospirosis. It has high epidemic potential. Leptospirosis outbreaks have occurred in India^{7,8}.

In India epidemics have occurred in Orissa, Gujarat, Maharastra, Kerala and Andaman Islands⁸⁻¹¹. In Gujarat in 1994 Leptospirosis occurred in Valsad for the first time. Subsequently Surat and Navsari reported cases. 1360 villages were affected in the 3 districts of south Gujarat region during 1994-2004. The case fatality was 7.6 % in 1994 with a peak of 22.5 % in 1996. Average case fatality was 11.4 % in this region. Now leptospirosis has become an endemic disease in the South Gujarat Region. The cases of leptospirosis are occurring every year in Valsad district since 1994. The secondary data analysis of leptospirosis in Valsad district indicated that during 2000-2006 the average incidence was 3.5 per

1,00,000 population and the case fatality 11.5 %. The highest incidence rate of 5 per 1, 00, 000 was in the age group of 15-44 years. As compared to 2006, in 2007 the incidence increased from 2.5 to 6.38 per 1, 00,000 population and the case fatality increased from 17.5 to 24 %.

Public health surveillance is defined as the ongoing, systematic collection, analysis, interpretation and dissemination of data about health-related events for use in public health action to reduce morbidity and mortality and to improve health. There are existing surveillance systems in Valsad for National health programmes, epidemic prone communicable diseases and IDSP. But due to need for newly emerging disease of leptospirosis a specialized leptospirosis surveillance system was established in the district in 1996 which developed over last 10 years. We examined the surveillance system with the objectives 1) To describe the existing leptospirosis surveillance system in Valsad district and involvement of NGO 2) To assess various attributes for evaluation of the leptospirosis surveillance system 3) To know the strengths and weaknesses of the surveillance system.

identify

B. Methods:-

Description of surveillance system

B1.Study design

Cross sectional study in Valsad district, 2007.

B2.Population under surveillance

We examined the surveillance reports of the district to know what population was examined by the surveillance system in the Valsad district.

B3.Case definition

We used the training module to obtain the case definition used for surveillance in the district.

B4.Data collection

To describe the leptospirosis surveillance system, we collected information about who did the surveillance, where was it done, how the surveillance data was collected, when and where and how the data were transmitted, who compiled and analyzed the data and where were sent. We also collected information that what actions were triggered as a response to the data information. To collect the data, we reviewed the records of district health branch, Valsad, block health offices of Valsad and Pardi and primary health centres of the blocks. We interviewed and discussed the health officers, block health officers, medical officers and health staff to obtain the information. To know about the leptospirosis surveillance system and its objectives we reviewed the action plan of the Valsad district, technical surveillance guideline and training modules of leptospirosis^{12,13,14}.

B5.Type of the system:

The action plan describes the operation of the surveillance system. It states about how the surveillance is done by the health staff of the primary health centres of the district. We referred the programme guidelines to know what kind of surveillance is done at which level.

B6. Data structure:

We obtained the records and reports of the surveillance and observed them to understand the data structure of the system.

B7. Indicators:

To find how the data is analyzed and what indicators are calculated for the leptospirosis surveillance we used the reports sent to the state commissionerate, deputy director, epidemic cell, Gandhinagar, Gujarat and regional levels of deputy director health and medical services, Surat.

B8. Feedback

We met the chief district health officer, epidemic medical officer, block health officers of Valsad, Pardi, medical officers of primary health centres and health staff to know about feedback given for the data sent. We also reviewed the proceeding of the meetings for leptospirosis, written letters sent to primary health centres to know what kind of feed back was provided.

B.9 Actions taken:

The block health officers, medical officers and multipurpose health supervisors and health workers told in the discussion and interview about the actions taken in response to the feedback received from district health officers.

B.10 Analysis of the surveillance system:

To evaluate the leptospirosis surveillance system we prepared data collection instruments in form of questionnaire and interviewed multipurpose health workers, supervisors, medical officers, block health officers of Valsad and Pardi blocks and district health officers at district head quarter, Valsad. We used the daily and monthly reports sent to the state head quarter and laboratory report to evaluate sensitivity and positive predictive value. We assessed simplicity, sensitivity, flexibility, acceptability, timeliness, positive predictive value, representativeness, cost and usefulness of the leptospirosis surveillance system of Valsad .

C. Result:-

C.1 Description of surveillance system

C.1.1 Objectives of system under description

The main objectives of the leptospirosis surveillance system were

1. To generate surveillance data for actions to prevent death by early case detection, referral and prompt treatment of cases of leptospirosis.
2. To use the surveillance data to reduce disease burden in the community by preventive and control measures.

C.1.2 Population under surveillance

The surveillance report of the district indicated that the entire population of the Valsad district, Gujarat was under leptospirosis surveillance system.

C1.3 Case definition

We obtained the case definition from the training module on leptospirosis.

The Clinical definition used for suspected leptospirosis case in south Gujarat districts of Surat, Navsari and Valsad area was "Any case of fever with two of the following 1. Myalgia 2. Conjunctival suffusion and 3. Agricultural Worker or history of contact with animals."

The definition for the confirmed case used was "Any suspected case of leptospirosis that is laboratory confirmed "

C.1.4The laboratory criteria for diagnosis:

1. Positive serology, preferably Microscopic Agglutination Test (MAT), Supportive serological findings of a leptospirosis agglutination titer of > 200 in one or more serum samples or four fold rise in the paired sera

sample taken fourteen days apart.” In Valsad, the cut off point for MAT and ELISA titre used for single sample were 1:80 and 1:40 respectively.

2. Isolation of organism from blood or CSF during first week of illness and from urine after 10 days.

C.1.5 Type of system:-

The leptospirosis surveillance system of Valsad was active as well as passive. During monsoon season from June to October the leptospirosis surveillance system was stimulated by day to day surveillance in whole district area. All the multipurpose health workers did house to house surveillance for detection of suspected leptospirosis cases. The data was reported to medical officer. The MO used WHO scoring form for diagnosis. A case having > 20 scoring was included in the report. BHO after verification gave a unique line listing number (LL No.) to the case. MO PHC and CHC and civil hospital detected leptospirosis cases in OPD by passive surveillance. The health supervisor or MO PHC collected data of leptospirosis cases from selected sentinel private practitioners of their area daily. The BHO included the data in the report after verification.

C.1.6 Data Structure:-

The surveillance reports of the department indicated that the data were aggregated as well as individual. A daily surveillance report was sent from periphery to district health office in a prescribed form (annexure). The MO

also sent a line listing report. The reports were in physical format. The district prepared an electronic data version in computer.

C.1.7 Data Collection:-

The multipurpose health workers male and female collected the data during their house to house survey everyday in their allotted villages. The MO PHC collected the data of his area, verified and reported to the BHO. The BHO verified the data and reported to CDHO.

C.1.8 Data Compilation: - Every day after completion of the surveillance work all the MPHWS gathered at the sector or PHC, whichever is more convenient. The sector supervisors collected the survey report from them, checked the data, compiled and reported to MO. The PHC medical officer verified the data and prepared a report.

C.1.9 Data Transmission: - The special messenger from the PHC handed over the report to the supervisor at the block. The BHO checked it and prepared consolidated reports of the block. The reports were handed over to the district health department on the same day. At the CDHO office the EMO and Epidemic cum sanitary supervisor (ECSS) and a supervisor on special duty verified them and prepared the district reports. The CDHO finally checked and signed the reports. Then the reports were faxed to the state deputy director, epidemic branch, office of the commissioner of health, medical services and medical education (health branch), Gandhinagar, Gujarat. Another copy was faxed to the Regional Deputy Director, health, medical services, Surat. A copy of the report is given personally to the District Development Officer and the Collector and

district Magistrate, Valsad. The CDHO and the EMO kept a copy in their file. A master record copy was also kept in the department.

C.1.10 Data Analysis:-

The MO PHC analyzed the data for time, place and personal characteristics of the cases. The BHOs analyzed the data for completeness and timeliness. The CDHO and EMO analyzed the data for time, place and person distribution of the cases in the district. They prepared a graph for timeline, spot map for distribution of the cases and age-sexwise distribution of the cases. At regional level, the deputy director (RDD), health and medical service and the deputy director of epidemic (Dy.Dir. Epi) analyzed the data of whole regional for time, place, personal distribution of cases and complications in the cases. Moreover the professor and head of the department (HOD) of preventive and social medicine (PSM) and medicine were assigned the duty of detailed analysis by the state health department. The head of department of microbiology analyzed the data for seropositivity.

At state Dy.Dir, Epi. and state epidemiologist, Gandhinagar analyzed the data for whole state for time, place and personal characteristics. Computer facility was available at block, district and state levels for the analysis. Finally the state commissioner (H, Med. Ser. And Med. Edu.) checked the data analysis and guided all the officers below him.

C.1.11 Indicators:-

The CDHO, EMO and ECSS calculated indicators of leptospirosis cases per PHC and per block and compared with different years and areas.

They calculated annual incidence in Valsad from 2000 to 2006 and calculated age and sex specific incidence of leptospirosis using denominators provided by the block and district health administrations. The district worked out seasonal trend of leptospirosis episodes from month wise epidemiological data from 2000 to 2006. They identified endemic block of Valsad, Pardi, Dharampur and Umergaon using. They also identified high-risk PHC. The villages having cases in previous 3 years were considered as high risk and cap. Doxycycline chemoprophylaxis was given. They identified cases occurred in persons identified for chemoprophylaxis. District health authority calculated case fatality ratio due to leptospirosis in different years and blocks.

C.1.12 Feedback: -

The commissioner, health, Med. service and Med. Edu. and the deputy directors give feed back to the district health department by informal telephone and fax regarding high risk areas of district and surveillance done. They also reviewed leptospirosis work in the state and regional meetings. They give feed back to EMOs in monthly meeting held at state level. They guided regarding timeliness of case detection, referral, delay in treatment if any and the completeness and timeliness of the reports sent to state level. The RDD and HOD of PSM gave feed back about data quality and coverage of surveillance, referral and coverage of chemoprophylaxis. Microbiology department provides data of results of serum samples and information about quality of the samples to district health authority. The district development officer conducted combined meeting of health, agriculture and veterinary departments every week in

his chamber. He reviewed the work, guided and gave feedback to district and block health officers. The CDHO gave feedback pertaining to surveillance done, population coverage, chemoprophylaxis given, results of the samples and administrative aspects, to BHO and MOs by written letters, during field visits and weekly and monthly meetings at district. The MO similarly, gave feedback to MPHSSs and MPHWS of PHC in meeting and field visits.

C.1.13 Action taken:-

When the suspected case was confirmed by the dept of microbiology, Surat, it informed the CDHO. CDHO informed the MO who searched for more cases in the concerned area again. Second serum sample was collected from the patient and sent to the civil hospital Valsad. The samples were transferred to the microbiology department of medical college, Surat. Intensive behavior change communication (BCC) activities were done in the affected area.

C.2 Evaluation of the surveillance system:-

C.2.1 Methods:-

To evaluate the leptospirosis surveillance system, we reviewed the surveillance reporting forms and reports for clarity, length, simplicity, timeliness and cost. We verified from the record number of cases detected by the surveillance system and confirmed by laboratory to calculate sensitivity and predictive value positive. We visited PHCs, BHO and district offices and interviewed BHO, MO, MPHSSs, MPHWS and district supervisors and district health officers during May to July 2007.

We asked them whether they find the system simple, acceptable and representative. To know whether the objectives of the system were met or not, we evaluated various attributes as stated below:-

D. Result;-

The data indicated that 35 of total 40 cases (87.5 %) were referred and admitted in higher treatment centre within 5 days. No death occurred in the 10 cases referred and admitted within 1 day. There were 4 deaths in 15 cases (Case fatality ratio 27%) which were referred and admitted on 4 and 5th days. Data on rain were inadequate.

D1.1 Sensitivity: - It is the proportion of cases in the community that are captured by the surveillance system. The record indicated that 24 of total 40 leptospirosis case were captured by the public health system in 2006. Hence, the proportion is $(24 \times 100)/40 = 60\%$ was, sensitivity of surveillance by health department alone. 16 cases were detected and reported by sentinel private practitioners and newspaper media. The system captured all the cases in the district. Hence, the sensitivity of leptospirosis surveillance system was 100 %.

D1.2 Timeliness: - The reporting frequency was daily during whole monsoon period from June to October. 39 PHCs were reporting units in the district. All the reporting units 39/39 (100 %) reported daily in time to the health authority of the district. The median time interval between case detection and reporting was one day. Reporting had completeness of 39/39 (100%). The district sent all the daily reports 138/138(100%) timely

to state head quarter and regional deputy director. Information on timeliness of reports from private practitioners was not available.

D1.3 Simplicity: - 29/34 (85 %) of interviewed health staff perceived that the surveillance system was simple.

D1.4 Positive predictive value: - It is proportion of reported cases that are real cases meeting the case definition. 37/40(92.5 %) cases were confirmed by laboratory test. Proportion of health care workers aware and using the case definition were 34/34(100%).

D1.5 Representativeness: - The cases were from all area of Valsad. 24 health staff 40(85%) considered the surveillance system representative.

D1.6 Acceptability: - The proportion of the health care workers willing to participate in the surveillance system was 33/34(97%).The proportion of health care facilities submitting the reports was 39/39.

D1.7 Usefulness: - All the 34/34(100%) interviewee considered the leptospirosis surveillance system useful for early detection of cases and prevention of deaths.

D1.8 Cost: - Last year Rs.7, 23,355/- was spent for leptospirosis surveillance system in Valsad district. 40 cases were detected and 7 deaths were reported. The cost per case was Rs.18, 084.

E. Discussion:-

Over all data impresses that the leptospirosis surveillance system was working well in Valsad district as the value of the indicators were 85 to 100 %. We have to specifically see that whether the objectives of the system are met or not?

The main objectives of the system were to generate and use surveillance data for actions to prevent leptospirosis cases and death. For that we need to look at the timeliness and completeness of the data generated and actions taken. The timeliness and completeness of reports were good as all the 39 reporting units sent reports daily in time to the district health department. The district health department also sent 100% reports daily by fax to regional and state level. The supervision, monitoring and feedback in the surveillance system were satisfactory. The actions taken in response to feedback were prompt and adequate. Still the case fatality could not be reduced. The information that the cases referred and admitted early in the hospitals had lower case fatality could be useful for further actions to refer cases promptly. The strengths of the surveillance system were the trained health staff, stimulated active surveillance, help of sentinel private practitioners in the system, support of the regional and state health experts and political will.

The data on timeliness of reporting from private sentinel centres was not available. The system need to get this information and analyze for improvement. There are opportunities to involve more private practitioners in the system. The problem of leptospirosis can not be attributed to surveillance system. There may be some components in the leptospirosis control programme or any factors associated with leptospirosis.

F. Limitations:

The limitation of our study is that we evaluated the leptospirosis surveillance system by studying two health blocks. The reason was that these were the most affected blocks in the district. We did not survey the community to find any unreported cases of leptospirosis.

G. Conclusions and Recommendations:-

The evaluation indicates that the leptospirosis surveillance system in Valsad is 100% sensitive to capture leptospirosis cases. It is simple, acceptable, flexible and with good positive predictive values. The timeliness of reporting is excellent. It is useful for early detection of cases which can prevent complications and deaths. It is costly (Rs.18084 per case) but cost-effective for morbidity and mortality prevention.

H. We recommend:

1. To collect detailed data on rainfall at least weekly bases.
2. To get information on the time of reporting from private practitioners.
3. Train the private practitioners for reporting the data. Provide them facilities of internet or fax for prompt transmission of the data. IDSP resources can be used for this.

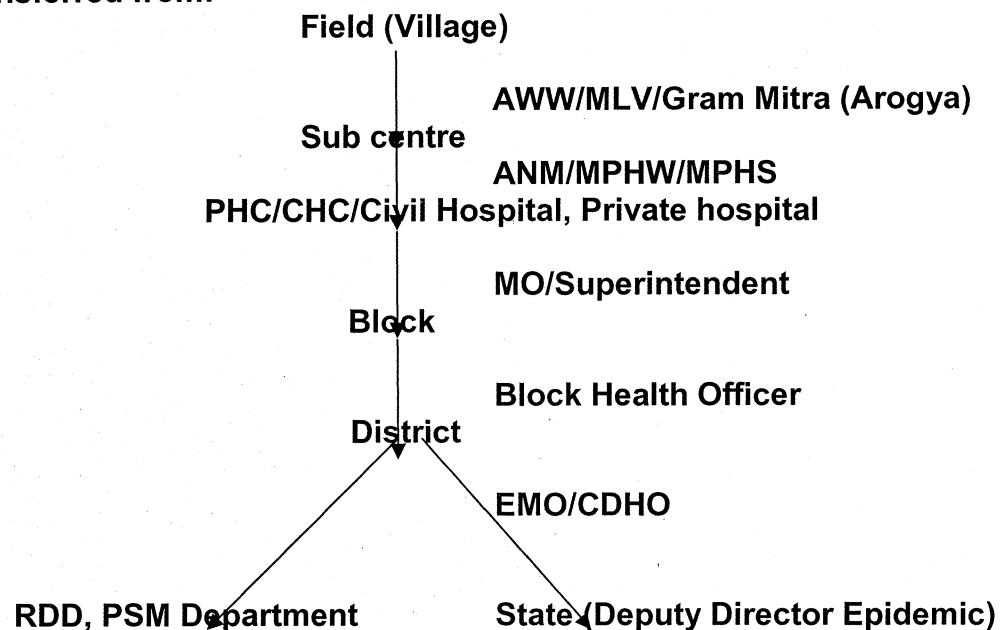
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Table 1 Showing response of health staff for various attributes for evaluation of leptospirosis surveillance system, Valsad, Gujarat, India (n=34)

Name of Attribute	Positive Response	Proportion (%)
Simplicity	29	85
Acceptability	33	97
Flexibility	26	76
Representativeness	29	85
Usefulness	34	100

Figure 1 Showing data transmission of leptospirosis surveillance system
Data are transferred from:



AWW: Anganwadi worker
 MLV: Malaria Link Worker
 ANM: Auxiliary Nurse Midwife
 MPHW: Multi Purpose Health Worker
 MPHS: Multi Purpose Health Supervisor

MO: Medical Officer
 EMO: Epidemic Medical Officer
 CDHO: Chief District Health Officer
 RDD: Regional Deputy Director
 PSM: Preventive & Social Medicine

Table 3 Showing daily reporting format for leptospirosis surveillance activities district Valsad, Gujarat

Daily Reporting format for Leptospirosis Surveillance activities District : Valsad

Surveillance Date : **Reporting Date :-** **Sub centre level**

To,

Medical Officer PHC.....

Name of Sub centre

PHC Block District

[illegible][illegible]

SECTION 2:

SECOND FIELD POSTING

Evaluation of the leptospirosis control programme, Valsad district, Gujarat, India, 2007

Dr.M. M. Lakhani, MAE-FETP Scholar, VII Cohort, NIE (ICMR), Chennai

1. Introduction:-

Leptospirosis is an acute bacterial infection caused by spirochetes belonging to family leptospiraceae^{1,2,3,4,5}. It is a zoonosis of worldwide distribution, endemic mainly in countries with humid subtropical or tropical climates and has epidemic potential⁶. Heavy rain, hot and humid environment favors the survival of the leptospire organisms^{1,2,3,10}. In the developed world, most cases are associated with recreational exposure to contaminated water^{2,7,9}. The incidence is increasing in developing countries. It is an occupational hazard in the south east asia region (SEARO) for the people working in the agriculture, animal herding, forest and sewer cleaning, abattoir, mine works⁸. Thailand has recorded increase in incidence¹⁷. The incidence of leptospirosis is very high in tropical and subtropical countries. It ranged from 18-128 per 100,000 in Barbados¹⁸. In a study the incidence of leptospirosis in Seychelles was found 40-60 per 100,000¹⁰. On an average 10,000 severe cases requiring hospitalization occur annually all over the world¹⁹. Outbreaks have been reported in other countries of Nicaragua²⁰, Argentina²¹, Brazil²², Thailand²³, Colombia²⁴, Guana²⁵, Japan²⁶, Mexico²⁷, Bangladesh²⁸, Vietnam²⁹, Cuba³⁰ and India^{31,32}.

Leptospirosis is an emerging disease in India³². In India epidemics have occurred in Andaman Islands³⁴, Gujarat³⁵, Maharashtra³⁶, Kerala³⁷, Tamilnadu³⁸ and Orissa³⁹. Some outbreaks were due to natural calamities such as post cyclone outbreak in Orissa³⁹ and post flood in Mumbai³⁶.

In Gujarat in 1994 leptospirosis occurred in Valsad for the first time. Subsequently Surat and Navsari reported cases. In Gujarat Valsad, Navsari and Surat are districts endemic for leptospirosis^{13, 35}. 1360 villages were affected in the 3 districts of south Gujarat region during 1994-2004. The case fatality was 7.6 % in 1994 with a peak of 22.5 % in 1996. Average case fatality was 11.4 % in this region^{13, 35}.

Valsad district has 5 talukas. There are forests area in Dharampur and Kaparada blocks. The fertile alluvial plain of other blocks are growing chiefly rice paddy, sugarcane, groundnut, millets and cotton. The livestock population includes bullocks cows, buffaloes, sheep, goats, horses, pigs and poultry birds. Preventive and control measures in these area includes chemoprophylaxis by Cap.Doxycycline, creating awareness in people by health education, antirodent activity by chemical rodenticides, early case detection, diagnosis and prompt treatment. A doxycycline prophylaxis campaign targeting persons working in agriculture and animal herding is done between June and October. Creating awareness amongst high risk group by intensive behavior communication campaign is key preventive measure. For that traditional drama, personal contacts, orientation training camp, handbills distribution and modern media of miking, TV, cable broadcasting are used. Moreover minimizing contact with

contaminated water can decrease risk of leptospirosis. The constraints in the preventive and control measures include tribal population with low literacy, agricultural and animal herding works, poor socioeconomic status of the people and suspected low immunity in the tribes.

There is existing National health programme for control of epidemic prone communicable diseases. As leptospirosis is an emerging disease government of Gujarat launched a specialized leptospirosis control programme in the district of Valsad, Navsari and Surat. No specific goals or targets were fixed in the programme. The aims of the programme were to reduce morbidity and mortality due to leptospirosis by early case detection and prompt treatment. We did evaluation of leptospirosis control programme with the objectives of (1) To describe and evaluate the programme in terms of input, process, output, outcome (2) Formulate recommendations for improvement in the programme.

*describing & evaluating are 2 diff objectives
they have to be spelt out separately
what are your objectives for
evaluation?*

2. Methods:

Study design

We conducted a cross sectional survey in Valsad and Pardi blocks of the Valsad district during December 2007–March 2008.

Population under surveillance

We examined the population of most affected 2 blocks 1. Valsad and 2. Pardi of Valsad district, Gujarat.

1. Description of the Programme:

We used the centre for disease control (CDC)'s Framework for Programme evaluation, Atlanta⁴⁰ for our study. To describe the programme we a).Interviewed stakeholders b). Reviewed the record of health department.

Engaging stakeholders :-

We considered four standards of utility, feasibility, propriety and accuracy for effective evaluation and identified the following stakeholders:

Category		Stakeholders
1	Those served or affected by the programme	Patients, persons working in agriculture and animal herding, community leaders, sirpanch, elected members of district Panchayat, Taluka Panchayat, village Panchayat, cable and print media.
2	Who are involved in the programme operations	Directors of health and medical services, Chief district health officer(CDHO), chief district medical officer and civil surgeon, physician, microbiologist, resident medical officer, epidemic medical officer(EMO),block health officers(BHO), medical officers(MO), health supervisors, health workers, agriculture officer, information officer, veterinary officers.
3	Those who are intended users of the evaluation findings	Health minister, Commissioner of health medical services and medical education, additional health director of health, deputy director of epidemic, regional deputy director of health and medical services, district panchayat president and executive body, general public.

We met the CDHO, in charge EMO, BHO, MOs and health staff and discussed the programme. We prepared formats and designed checklists to record data. We interviewed health staff at the district and blocks for knowing their role, awareness and their impression about the control programme. We checked their reporting format and frequency of sending. We verified from the office for the completeness and regularity of sending such reports. We enquired about the constraints they were facing. We also enquired about what samples did they collect and what did they do for laboratory testing. We assessed their awareness about definitions of suspected and confirmed case of leptospirosis and whether they used the definitions for detection and confirmation of the leptospirosis cases. We got information about epidemic preparedness and response system of the district from the action plan. We discussed with peripheral health workers about their action in need at institution and community level. We also inquired about feed back system and actions taken based on it by health officers and health staff.

Evaluation of the programme:

To evaluate leptospirosis control programme, we reviewed action plan, guidelines and reports of health department^{41,42,43}. We interviewed officers of health and agriculture departments. We used data collection instruments to gather credible evidences. We selected various input, process, output and outcome indicators for evaluation of programme. We identified the data need for each of the indicators (Figure 1).

To evaluate leptospirosis control programme, we surveyed 16 PHC of two blocks Valsad and Pardi. We interviewed 92 multipurpose health workers from 75 subcentres. We calculated sample size for the survey using right size software for study population 6.9 lacs of two blocks for 95% confidence coefficient, 10 % confidence interval and considering 50% proportion of population exposed to awareness. The sample size was 97. We interviewed 97 adults from 92 villages at random with help of trained health staff. We used pre-structured questionnaire in local language Gujarati to know awareness of people about leptospirosis.

3. Results:

Description of the programme:-

The main objectives of the leptospirosis control programme of Valsad district are

1. Early case detection and prompt treatment of leptospirosis cases to reduce case fatality.
2. Reduce morbidity in the community due to leptospirosis by preventive and control measures.

Need for the programme:-

Leptospirosis occurred first time in 1994 in Valsad district. In the subsequent years, the disease spread to adjacent districts of Navsari and Surat. The incidence and case fatality rate increased each year. Hence, the routine surveillance found to be insufficient to address the problem. Hence the government of Gujarat launched leptospirosis control programme in 1996.

Target group:-

The various audience that the programme needed to move into action in order to make progress on this public health problem were department of health and medical services, department of agriculture department of animal husbandry, department of tribal sub plan, department of information, media, community volunteers and leaders, eligible families involved in agriculture and animal herding,

Outcome:-

The leptospirosis control programme envisaged the outcome as no death from leptospirosis and reduction in incidence rate upto a level where it is not a public health problem. No specific goal or targets were set for the programme. The earlier outcome desired was to increase participation and awareness of people about the disease. The intermediate outcome expected was change in social environment and environment receptive to disease. This included adoption by the community at risk, the practices of creating surrounding environment safe to reduce occurrence and transmission of leptospirosis.

Activities:-

These are the actual actions mounted by the programme and its staff to achieve the desired outcomes in the target groups. In leptospirosis control programme the following activities were identified

Action plan:

The district health authority had prepared an action plans for leptospirosis in beginning of 2007. The MOs had prepared action plans for their PHC.

Training:

The district health authority had given training health staff during May, 2007. Experts from medical college, Surat and state health officers gave training of district health officers, block health officers during May, 2007.

Meetings:

CDHO arranged monthly, fortnightly and weekly review meetings at district and block levels. At district head quarter, a combined meeting of health, agriculture and animal husbandry was conducted by district collector or district development officer every fortnight during June to October, 2007.

Surveillance:-

Health staff did daily house to house active surveillance to detect cases during monsoon season in all the 470 villages of district. The medical officers identified cases at all the government health facilities.

Establishment of control room:-

A round the clock control room was established at each primary health centre and district head quarter from 15th June, 2007. The control rooms had a telephone facility. The district had fax and computer facilities.

Information, education and communication activities:-

For creating awareness amongst population special campaign of IEC was done during May to October, 2007. This included distributing handouts, displaying

posters, orientation training camps for public at village level, displaying health messages on TV cable network and newspapers.

Chemoprophylaxis:

Chemoprophylaxis by 200 mg Cap. Doxycycline weekly for 6 weeks was given to agriculture workers of identified high risk areas (Table 1).

Treatment protocol:-

Standard treatment protocol was prepared by the head of department of medicine, government medical college, Surat based on technical guideline by WHO and NICD, New Delhi. This was distributed to medical officers during training held in May, 2007^{13,35}.

Referral of cases:-

The MOs referred cases of leptospirosis to civil hospital, Valsad. The civil surgeon referred serious patients to new civil hospital of medical college, Surat. These set up were provided with specialist and equipments for blood transfusion, dialysis, ventilators and medicines.

Sero-surveillance:

The health staff collected two sera-samples from every suspected case of leptospirosis. The civil surgeon sent the samples to microbiology department of Surat medical college which tested samples by ELISA and MAT tests.

Antirodent activity:

The health department provided fund and the agriculture department conducted antirodent activity in 130 high risk villages during May, 2007.

Monitoring and surveillance:-

The CDHO, EMO and BHOs monitored and supervised the activities.

Involvement of non-government organization (NGO):-

The CDHO trained the private practitioners in a seminar in May, 07. The private practitioners referred suspected cases to civil hospital, Valsad.

Community participation:

The village leaders arranged for vehicles to transfer cases to civil hospital.

Reporting:

During monsoon period the medical officer of the primary health centre sent daily report the CDHO. The CDHO sent daily report by fax to the state health control room, regional deputy director of health and medical services, Surat.

Outputs:-

Awareness in people about leptospirosis, knowledge of the health staff, coverage of chemoprophylaxis, coverage by presumptive treatment, rodents fall, leptospirosis cases found, serum sample results, referral time, treatment completion were outputs (Table 1).

Resources/inputs:-

IEC materials, medicines, fund, pesticides, training, home visits by health staff, laboratory supplies, vehicles available were adequate (Table 1).

Stage of development:-

Leptospirosis control programme was launched in 1996. In the last decade resources are provided for development (Table 1)

Context :-

Leptospirosis was affecting the poor tribal and backward people of the area. Hence, political attention was drawn towards the disease. The media also highlighted the problem. These factors supported the development of the leptospirosis control programme.

Evaluation of programme:**Input indicators:-**

34(87%) of 39 medical officers (MOs), 68(72%) of 94 health supervisors and 423(78%) of 539 multipurpose health workers (MPHW-M/F) were in position against sanctioned post. 100% medical officers and health supervisors were trained. Each of the 5 blocks were supplied 4000 handbills, 4000 folders and 1800 stickers on leptospirosis information. 100 % subcentres were supplied IEC material. 39(100%) of 39 PHC were supplied with adequate doxycycline capsules. 32(6.8 %) of 470 villages were identified for chemoprophylaxis. Total 1102934 cap. Doxycycline were given to agriculture workers as chemoprophylaxis. 330(100%) of 330 subcentres were supplied adequate medicines., Each of the PHC was given Rs. 22940 for diesel for mobility. Fund of Rs.10,00,000 was unutilized at district level for leptospirosis. 130(28%) of 470 villages were identified for antirodent activities. Rs. 5,00,000 was allotted for antirodent activity from tribal sub-plan department for Dharampur and Kaprada blocks.

Process indicators:

75 (100%) 75 of subcentres were covered by IEC activities. 3813 meetings were held for leptospirosis in the district during June to October 2007. 1,31,047 other activities including group discussions, house to house awareness campaign, handbill distribution, video CD show on cable TV were done. Leptospirosis was included as a topic in the 111 meetings organized from reproductive child health fund. Proportion of PHC utilized > 90 % of allotted fund was 39/39 (100%), 100% identified villages were covered by chemoprophylaxis and antirodent activities. 92(100%) of 92 interviewed staff knew case definition of leptospirosis.

Outcome indicators:-

Incidence of leptospirosis was 102/16,11,000 (6.4 per 1,00,000 population), case fatality due to leptospirosis was 24/102(24%) in 2007.

4. Discussion :

The evaluation result indicated that the input human resources of medical officers, health supervisor and health workers were good. The training of multipurpose health workers for leptospirosis was 86/92 (93%). Population of every village was covered by active surveillance for case detection. 80 % of the total cases were detected by the health staff of the district. 82 % of the health staff knew taking of the serum samples. Every village was covered by at least one IEC activity for leptospirosis during the year. This indicates that the inputs were adequate for the programme. The IEC activities were carried out without extra fund allotted although Rs.10,00,000 were not allotted to the health facilities

and could not be utilized for leptospirosis. Thus, the finance resources were under utilized. The reason could be that the meetings organized from RCH fund included leptospirosis as one of the topics for health education. The medicine and laboratory supports were available during year as per requirement in all the health facilities. Only 1/92 (1%) health facility was out of stock for doxycycline for more than 1 month. This indicates that there was no problem in input of supply of medicines. All the health staff knew the case definition of leptospirosis which indicates that the process component of training was effective. 90 % of the eligible targeted population was covered by, chemoprophylaxis with Cap. doxycycline during high transmission period of monsoon June to October 2007. The output was also adequate for the inputs. Rs.500,000 were utilized for antirodent activities in 130 villages of the district which had cases of leptospirosis in previous 3 years. Rs.1,50,000 were spent in the least affected block of Kaparada having average incidence of 0.8 per 100,000 population (Table 2). The agriculture officer told that it was tribal block and the money were allotted from tribal sub plan department. Agricultural consideration was also there. This suggests that output of the antirodent activity was not as per the need of programme. In spite of all the activities done in the leptospirosis control programme the incidence and case fatality increased in 2007 as compare to year 2006. This indicates that there are other factors associated with leptospirosis and its prevention. No specific goal or targets set for leptospirosis control programme. Hence, we could not compare the result to know whether the programme is achieving any target or not.

Limitation of the study: The evaluation of the leptospirosis control programme was done during January to March 2008. The cases of leptospirosis occur during June to October period in the district. Due to this the actual activities related with leptospirosis could not be observed. The training of the health staff was conducted during May, 2007. This may have recall bias. State level stakeholders were interviewed in 2008.

Conclusions:

The leptospirosis control programme is implemented well in the Valsad. The inputs of trained health staff were adequate. There was no deficiency in inputs of IEC material, doxycycline, rodenticides, laboratory supplies. The inadequate fund was allotted. The process indicators of training given, surveillance done, IEC activity done, antirodent activity coverage, serum samples collected, monitoring and supervisory visits by health officers were adequate. The output indicators of health staff knowing case definition, people knowing about leptospirosis, seropositivity of samples, ratfall due to anti-rodent activities, chemoprophylaxis coverage were good. The outcomes of incidence and case fatality were not satisfactory.

Recommendations: This evaluation allowed us to recommend measures for programme. Firstly, the available fund for leptospirosis should be allotted to the block and primary health centres sufficient and early in months of April, May for timely utilization for the programme related activities. Secondly, the anti-rodent

activities should be concentrated in the villages most affected by leptospirosis rather than using more fund in least affected block of Kaparada. Thirdly, the leptospirosis disease should be included in the IDSP report as regional priority and surveillance for the cases should be done in routine through out the year. Facility for testing serum samples by ELISA and MATS tests may be made available at the district civil hospital, Valsad for early diagnosis and management. For this the fund from IDSP may be utilized. Studies about factors associated with increase morbidity, mortalities and effectiveness of chemoprophylaxis and antirodent activities can be useful guiding tools.

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Figure 1: Logical frame indicating input, process, output and outcome indicators for leptospirosis control programme, Valsad, Gujarat, India, 2007.

leptospirosis control programme strategy				
	Case finding, laboratory and treatment	Preventive measures,		Information, education and communication
		Antirodent activities	chemoprophylaxis	
Input	• Medical officer • Health workers in position • Training • Home visit • Lab supplies • Fund	• Antirodent pesticide available • Fund	<i>Cap.Doxycycline allotted</i>	Percentage of health facility supplied IEC materials for leptospirosis Fund
Process	• Training held • Staff acquiring knowledge • Serum samples tested	Rodenticides used in live burros	• Cap Doxycycline given	• Percentage of health facility covered by IEC activities
Output	• Leptospirosis cases identified by staff • Health staff knowing taking serum samples • Treatment of cases	Rodent fall per village	• Consumption of Cap.Doxycycline	• Proportion of staff knowing case definition
Outcome	• Incidence of leptospirosis • Death due to leptospirosis • Serum sample positivity	• Incidence of leptospirosis	• Incidence of leptospirosis	• Proportion of people given health education

Table 1 Selected indicators at health facilities for leptospirosis control programme evaluation, Valsad district, Gujarat, India, 2007

Component	Indicators	n/N	%
Input	Medical officer in position	34/39 ¹	87
Staff position	Medical officer trained in leptospirosis	34 /34	100
	Health supervisor in position	68/94	72
Training	Health supervisor trained in leptospirosis	68/68	100
	M.P.H.W. (M/F) in position	423/539	78
	M.P.H.W.(M/F) trained in leptospirosis	86/92 ²	99
IEC material	Villages supplied with IEC material on leptospirosis	92/92	100
Antirodent	Villages identified for antirodent activities	130/470	28
Fund	Use of > 90% of leptospirosis fund allotted	39 /39	100
Medicine	Cap. Doxycycline stock out at SC for more than 1 month	1/75 ³	1
Laboratory	Lab supply out of stock at SC for more than 1 month	6/75	1
Vehicle	Vehicles available in health facility for referral	17 /17	100
	Chief district health officer once in a year	55/75	73
Process	Block health officer once in a quarter	75/75	100
	Medical officer once in a quarter	75/75	100
	Health supervisor once in a month	75/75	100

¹ No of PHCs in district 39

² No. of villages surveyed 92

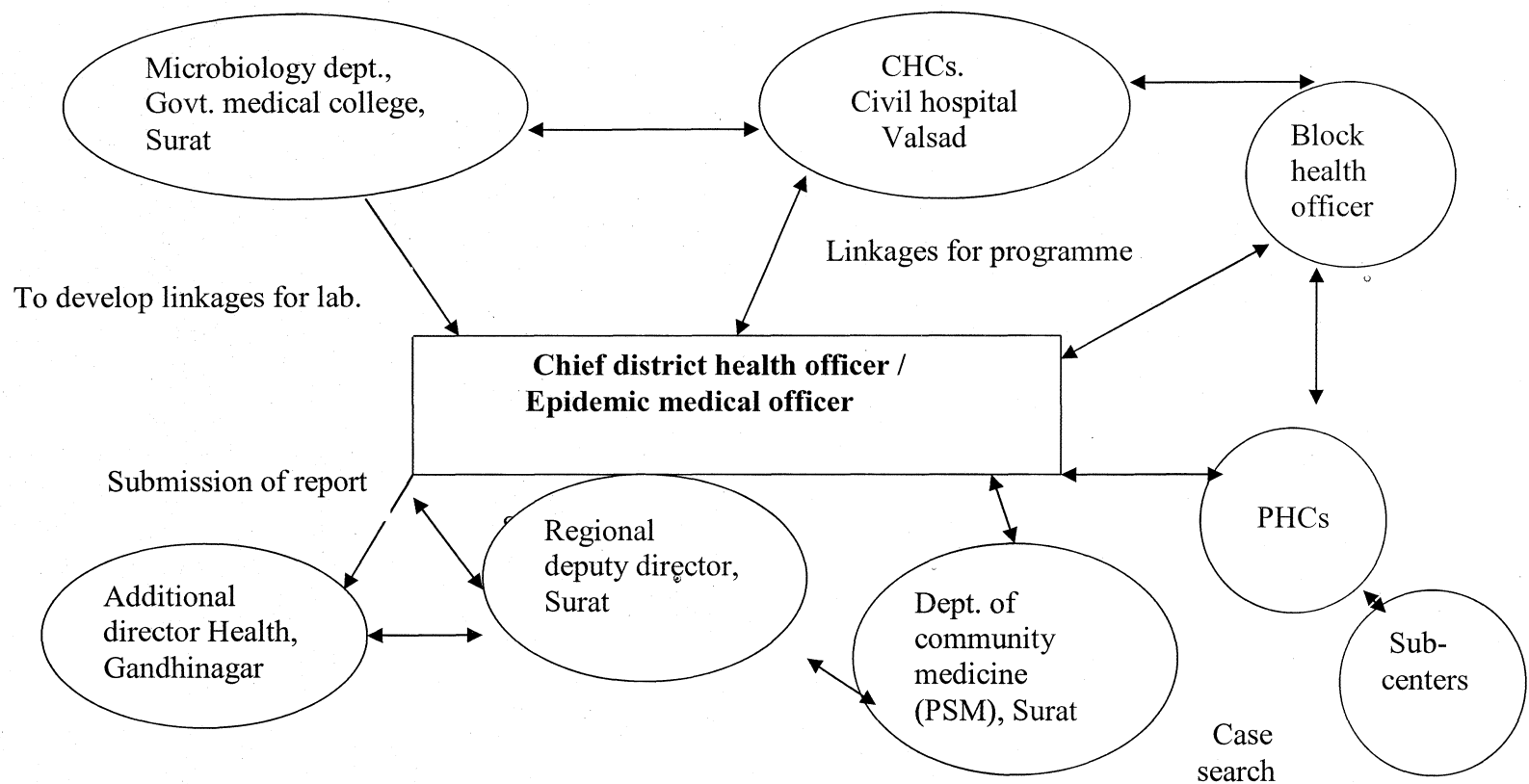
³ No. of subcentres surveyed 75

Component	Indicators	n/N	%
(Table 1 continues)			
Villages covered by	At least 1 IEC activity	92/92	100
	Antirodent activity	130/130	100
	Survey for leptospirosis	92/92	100
Serum samples taken	First from cases	102/102	100
	Second from live patients	78/78	100
Health education	Population given health education	3.4/6.9(lacs) ⁴	50 ⁴
Output	Health workers knowing case definition	92/92	100
	Health workers knowing taking serum sample	74/92	82
Proportion of	Population covered by chemoprophylaxis	73887/82474	90
	Cases identified by health staff	82/102	80
Antirodent activity	Rat fall per village	57597/130	443
Serum samples	Serum sample found positive	80/102	78
Surveillance	Sub center completed surveillance for leptospirosis	75/75	100
Awareness	People knows about leptospirosis	82/97	85
Outcome	Leptospirosis patient cured	78/102	76
	Incidence of leptospirosis per one lac population	102 /16 lac	6.38
	Case fatality rate from leptospirosis	24 /102	24%

Table 2 Showing chemoprophylaxis and antirodent activities for leptospirosis; district Valsad, Gujarat, India, 2007.

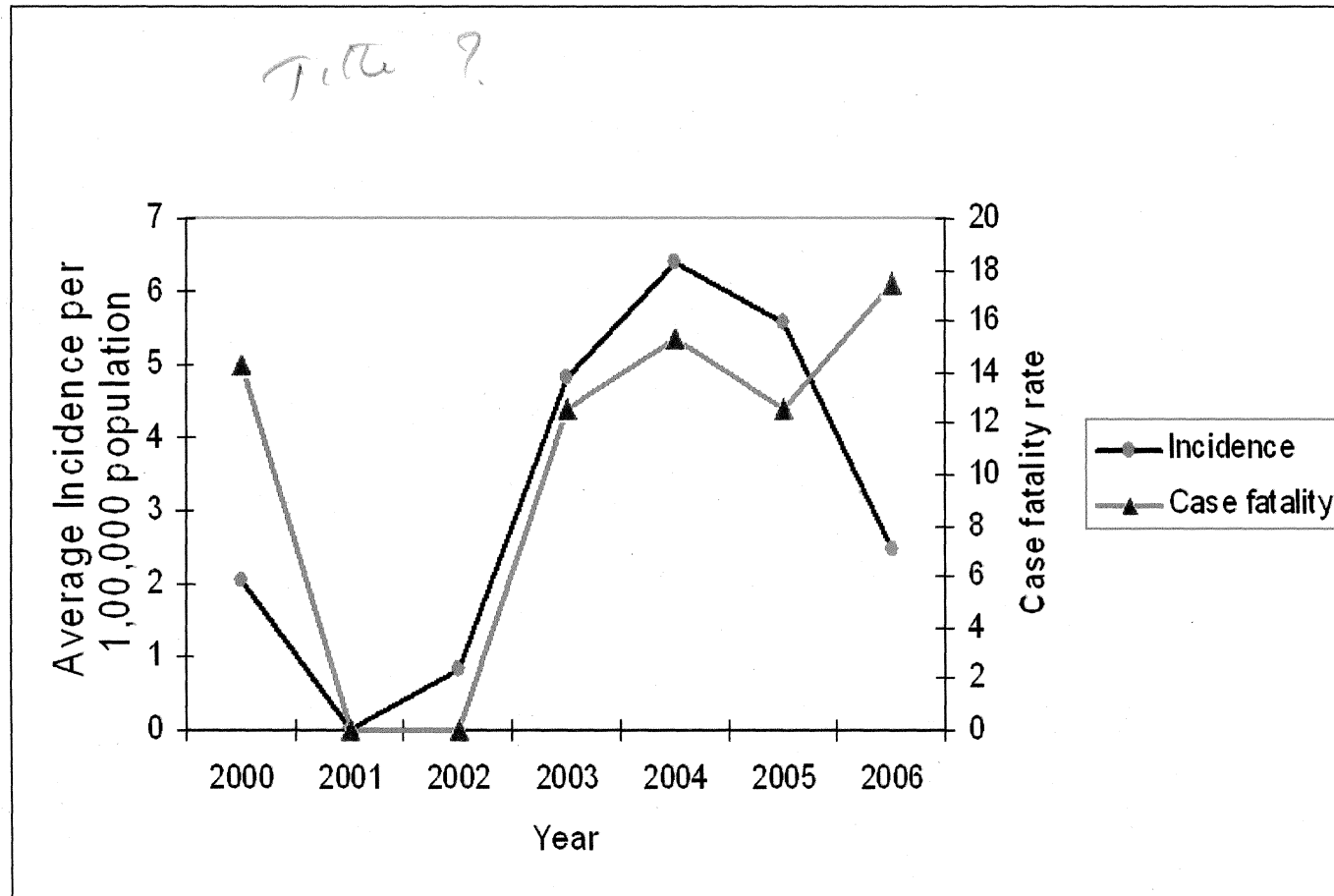
Name of block	Average incidence per 100,000 (00-06)	Villages covered # chemoprophylaxis	No. of villages covered by rodenticides	Fund utilized for antirodent activities(Rs)	Rat fall No.
Valsad	5.67	9	33	1,00,000	9,416
Pardi	3.02	15	12	75,000	5,733
Umergaon	2.57	7	22	100,000	23,316
Dharampur	2.24	1	19	75,000	4,484
Kaparada	0.80	0	44	150,000	14,648
Total	3.25	32	130	500,000	5,7597

Figure 2 District level activities for Leptospirosis control programme, Valsad, Gujarat, India, 2007*



* Ref: Gujarat document

Figure 3 Average incidence and case fatality of leptospirosis, Valsad, Gujarat, India, 2000-2006



SECTION 3:

OUTBREAK INVESTIGATION

Investigation of outbreak of hepatitis in Municipal Corporation, Ahmedabad, Gujarat, India, 2008

Dr.M.M.Lakhani, MAE-FETP Scholar, VII Cohort, NIE (ICMR), Chennai

1. Introduction:

Hepatitis is a general term meaning inflammation of the liver. Hepatitis is a disease that can be caused by a variety of different viruses such as hepatitis A, B, C, D and E¹. Since the development of jaundice is a characteristic feature of liver disease, a correct diagnosis can only be made by testing patient's sera for the presence of specific viral antigens and/or anti-viral antibodies. Hepatitis E (HEV) was not recognized as a distinct human disease until 1980. Hepatitis E is caused by infection with the hepatitis E virus. Although man is considered the natural host for HEV, antibodies to HEV or closely related viruses have been detected in primates and several other animal species⁽¹⁾. HEV is transmitted via the faeco-oral route. Hepatitis E is a waterborne disease, and contaminated water or food supplies have been implicated in major outbreaks. Consumption of faecal contaminated drinking water has given rise to epidemics. In general, hepatitis E is a self-limiting viral infection followed by recovery^{1, 6, 7, 8}.

Globally, Epidemics of hepatitis E have been reported in Central and South-East Asia⁹, North and West Africa. Outbreaks have been reported from Pakistan¹⁰, Vietnam¹¹, and Morocco¹² especially where faecal

contamination of drinking water is common. However, sporadic cases of hepatitis E have also been reported elsewhere and serological surveys suggest a global distribution of strains of hepatitis E of low pathogenicity.

In India outbreaks have occurred in Hyderabad of Andhra Pradesh^{13, 14}, Lucknow¹⁵, Chandigarh of Hariyana¹⁶, Reva district of M.P.

In Gujarat cases have occurred in Surat, Vadodara, and Rajkot.

The present outbreak occurred in Ahmedabad city. It is the largest Metro city of Gujarat situated in central part of Gujarat. It has population of 40 lacs divided into 24 wards of Municipal Corporation. The major water supply of the city is from the bed of Sabarmati River via kotarpur waterworks.

On the 27th June, 2008 daily news papers Divya Bhaskar and Gujarat Samachar reported about the outbreak of jaundice in the Girdharnagar ward of Municipal Corporation, Ahmedabad. The disease affected young and adult age groups of residents of the ward. People had complaint of getting dirty water in tap. The deputy director, epidemic (Dy.D, Epi.) in the commissionerate, health, medical services and medical education (H, MS and Med. Edu.), Gandhinagar received a fax message of the report of the hepatitis outbreak on date 30th June, 2008. We initiated the investigation of the outbreak after getting the permission of the Dy.Dir. Epi.. The honorable commissioner arranged for resources to investigate. On 1st July, 2008 I met the deputy health officer of central zone of municipal corporation, Ahmedabad who furnished me information and health scenario of the affected area. We investigated the outbreak for control and prevention of further outbreak and recommend for future prevention

2. Methods

Firstly, we determined the existence of outbreak, diagnosed the cases clinically and defined the cases. We used operational clinical case definition for hepatitis. We confirmed the cases by blood sample testing in the laboratory. We searched for cases and studied descriptive and analytical epidemiology for the outbreak.

Study design and population

We did an analytical Matched case-control study in the population of Girdharnagar ward, municipal corporation, Ahmedabad, Gujarat, 2008.

Study sample

We calculated sample size for 80% power with 95% confidence interval to detect odds ratio of 3 or more. It was 65 cases and 65 controls.

Definitions

We recruited cases randomly meeting the operational case definition. We recruited one matched control-subject among the neighbors of the same sex and in the same age (± 5 yrs)

Data collection

We prepared a standardized, closed ended questionnaire, pilot tested and used for interviewing the case-patients and control-subjects. We collected information on demographic characteristics and potential exposure factors of drinking water from the tap, contact with another case, eating outside the home and hygienic practices.

Analysis plan

We did descriptive epidemiology analysis. We analyzed the data by matched odds ratio using the method of discordant pairs.

2.1 Descriptive epidemiology

We searched case-patients by house-to-house active surveillance. We collected information from municipal urban health centre and hospitals. The team of PSM department, B. J. Medical College, Ahmedabad helped us in searching for cases from different hospitals. We line-listed all the case-patients. We counted category wise (0-5, 5-14, 15-29, 30-59 and 60+) cases and calculated age group and sex specific attack rates. We prepared a spot map and an epidemic curve and characterized the epidemic by time, place and person. Then we interpreted the epidemic curve and attack rates to generate a hypothesis.

2.2 Analytical epidemiology

We conducted an active door-to-door case search in with the help of 15 field workers of the health department. We formulated a schedule and interviewed the people and collected information regarding age, sex, date of onset, signs and symptoms and possible potential exposures. We calculated area specific and water source specific attack rates. Then we analyzed the data and estimated odds ratio of suspected causes with 95% confidence interval.

2.3 Laboratory confirmation

We collected available laboratory results from case-patients and hospitals where they were treated. We also collected blood and water samples from the case-patients and sent to the microbiology department of B.J. Medical College, Ahmedabad for confirmation of diagnosis. We did not collect stool sample because case patients were given antibiotics.

2.4 Initiation of control measure

We visited the urban health centre of Girdharnagar ward and hospitals where the case patients were admitted. We assessed their conditions and consulted with attending doctors for case management. We also consulted with concerned dy. health officer, urban health centre's medical officer and health staff about the control measure in the affected ward.

2.5 Assessment of the environment

We assessed the environment of Girdharnagar ward to identify the source of contamination.

3. Results

3.1 Descriptive epidemiology

The health department had surveyed the area since 23rd June, 2008 and they reported total 27 cases of jaundice until 30th June, 2008. Other cases were reported at private practitioners and civil hospital, Ahmedabad. First, the population of the ward of the city had not changed recently because of

massive population migration. The absence of such event reassured us about a change in the denominator. Second, we enquired about a potential recent change in the case definition or reporting mechanism. We could not find any artifact that would have lead to an increase in the numerator. Third, we enquired about the background rates of acute jaundice in the city. The health officers of the corporation told that solitary cases of hepatitis were reported during the last three years in this ward area. But in 1985-86 massive outbreak of hepatitis had occurred. On the basis of these findings, we concluded that the outbreak was real. Thus, the occurrence of the jaundice cases was clearly in excess of the normally expected suggesting that it was an outbreak of hepatitis.

We visited some of the affected case-patients in the affected ward area inquired about their illness and also saw laboratory reports they had. We learned that the patients had yellow urine or yellow sclera with anorexia, weakness, nausea, vomiting, pain abdomen or fever. The patients experienced mild to severe symptoms. No patient had signs and symptoms of fulminant liver failure. None of the patients had any history or signs of pre-existing chronic liver disease. We visited some of the doctors and discussed.

Defining cases

During the this hepatitis investigation, we define an operational case definition of hepatitis case as "Yellow coloration of conjunctiva/colored urine with any of the symptoms of loss of appetite, weakness, fever, nausea, vomiting, abdominal pain or diarrhea in resident of ward No. 18 of Ahmedabad city since 7th April, 2008".

The search led to the identification of 251 cases in population of 21798 persons. There was no death due to hepatitis. Overall attack rate (Table – 1) was 11 per 1000 population. There was no death due to hepatitis. Attack rate was highest in 15-44 years age group (19 per 1000) and lowest in 0-4 year age group (3 per 1000). Attack rate in males and in females was 15 and 4 per 1000 respectively.

3.2 Analytical epidemiology

We calculated odds ratio for the water supply and for various suspected risk factors. The OR for selected exposures eating outside [OR: 13.2, P 0.0002]; facility for hand wash [OR: 0.31, p value: 0.19] rack in house [OR: 0.19, p value: 0.027], leakage near house [OR 2.34, p 0.32]. were statistically significant. Dirty water pool near house [OR 2, p 0.06] was borderline significance.

3.3 Laboratory Confirmation

Laboratory investigations conducted among some of the patients indicated high levels of aminotransferases, Serum bilirubin, and alkaline phosphatase. Serum samples were tested for determining type of hepatitis at microbiology department, B.J. Medical college, Ahmedabad. 16 of the 18 serum samples were negative for IgM antibodies to hepatitis A virus (HAV) and to the hepatitis B virus surface antigen (HBsAg) and were found positive for hepatitis E (HEV). Moreover, to verify the diagnosis, we collected six blood specimens from case-patients and sent the sera to the microbiology department of B. J. Medical college, Ahmedabad. All the six serum samples were negative for IgM anti-HAV,

HBsAg and antibodies to HCV. However, all serum samples were positive for anti-HEV antibodies in ELISA. Thus, the diagnosis of hepatitis E was clinically and serologically established. Analysis of water samples, taken from tap water did not show any organism.

3.5 Initiation of control measure

The case-patients were treated in Girdharnagar urban health centre, civil hospital, Ahmedabad and near by hospitals and had recovered. The local health authority started control measure by daily surveillance, treatment of the patients. The deputy health officers conducted 'Information, Education and Communication (IEC)' campaign about prevention, control and management of diseases. We also educated the people of affected area regarding safe drinking water, food and hygienic practice while interviewing them and at the time of follow-up surveillance visits.

3.6 Assessment of the environment

Interviews of the case-patients did not allow identifying any common event among them, but the residents of the area and the staff of water supply department told that there were leakages in pipelines of water supply. There was overflow in the sewage system leading to dirty water pools in the areas. The area affected consisted mainly of slums.

3.7 Initiation of follow-up surveillance

We initiated follow up surveillance. We visited the area in July 3rd week. Again we did follow up visit in 1ST week of November to know the result of the various actions taken by the health department. 2 cases of hepatitis

had occurred in the area. The Municipal health officer told that they were scattered solitary cases usually found in the area.

4. Discussion

On getting information, we investigated the outbreak at municipal corporation, Ahmedabad. We determined the existence of outbreak, diagnosed the cases clinically and defined the cases.

The cases of hepatitis were reported from 7th April to July, 2008 with a peak around the 23rd June, 2008. The last case occurred on 28th July, 2008. This is rainy season in the region which increases chance of contamination of water and food. The shape of the epidemic curve suggested a persisting common source outbreak. Considering longest incubation period for HEV infection (about 9 weeks), the exposure probably occurred early in February, 2008.

The geographical distribution of the cases suggested a clustering around the leakage of water supply pumped from the Girdharnagar water pumping station. There was drainage line breakage and repairing work was done in February to March 2008. The timing of the repairing works of the municipal drainage system coincided with the probable time period during which the exposure took place. This led the team to investigate how the water supply was affected it turned out that (1) while the water pumped from Girdharnagar pumping station the drainage line water flow contaminated the drinking water at places of pipeline leakages (2) the distribution of this source of water supply corresponded to the distribution of the areas with higher attack rates.

After reviewing the clinical information, we listed the agents that could have caused this outbreak. This included viruses and toxic substances. A number of severe infections can lead febrile jaundice (e.g., leptospirosis, malaria), but the clinical picture was different in this case. The sequence of fever followed by jaundice is suggestive of viral hepatitis. Among viral hepatitis viruses, HAV is a real possibility, although high levels of herd immunity tend to make community-wide outbreaks uncommon in India. HBV or hepatitis D virus (HDV) could cause that kind of clinical picture, but large outbreaks in the community are uncommon. Acute hepatitis C virus (HCV) infection usually does not cause marked clinical symptoms and outbreaks in the community are uncommon. Hepatitis E virus infection can cause disease of that kind and may occur as large community wide outbreaks. The initial negative serological tests for HAV and HBV infection could suggest HEV as the causal agent. The laboratory tests confirmed that the outbreak was of hepatitis E. We used operational clinical case definition for hepatitis E for the study.

We examined this outbreak in the context of what is known of hepatitis E. The investigation indicated that it was hepatitis E outbreak, caused by the delivery of contaminated water to the population through the municipal water supply. Eating food outside, dirty water pool nearby house was also associated with case-patients. This conclusion is compatible with what is known of HEV, including its usual mode of transmission and incubation period. The investigation of this outbreak adds to the knowledge about HEV. First, similar infections had been reported in Ahmedabad, Gujarat.

Hence, this episode suggests that careful laboratory testing should be done during hepatitis outbreak to spot pathogens. Second, the occurrence of the outbreak one incubation period after the pipeline leakages is compatible with outbreak. HEV is not sensitive to concentrations of chlorine used in municipal water systems. Overall, the investigation brings new elements to the knowledge about epidemiology of HEV infection, as chlorination was not effective in inactivating HEV in the water supply.

Reporting the results of this investigation is important. Different audiences might need to be targeted according to the circumstances. First, we intimated report to public health managers, in the form of an oral briefing, so that the recommendations can be proposed to ensure that action is taken. Second, we reported to epidemiologist colleagues and laboratory specialist in the form of a report containing the epidemiological evidence that documents the conclusion of the investigation. Third, we reported back to political or administrative leaders through the local public health manager. This will be important for the authorities to understand that the situation is being handled, as it should. Fourth, we reported to the community through health education message to help the public in taking active steps towards prevention. However, in the case of this investigation, the evidence was generated at a time when it was too late to usefully inform the public. Finally, we shall inform the scientific community to know about this investigation through presentations and / or manuscripts containing new scientific information that may advance public health.

5. Conclusion

The outbreak of jaundice cases in Girdharnagar ward of municipal corporation, Ahmedabad was due to acute hepatitis E. The contaminated water of municipal corporation could be the cause of outbreak. Hepatitis was positively associated with eating outside food, passing drainage line and dirty water pool nearby house. Availability of sanitary latrine in house, cleanliness of latrine, washing facility in house, drying rack were found to have protective effect.

6. Recommendations:

Based on the findings, we recommended the health department to

- To ensure that pipeline leakage checking and repairing should be done routinely.
- For the medium term and long term, the health authorities should initiate a dialogue with the municipal water supply and sewage system about (1) quality assurance measures that could ensure the continuous quality of the water supply and (2) Proper disposal of sewage and waste.
- The type of minimum service can ensure food safety and promote good personal hygiene by health education
- To establish a better surveillance system to capture the outbreak earlier
- *To organize rapid laboratory testing in case of any future outbreaks.*

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Figure 1: Cases of acute hepatitis by week of onset, Ahmedabad, Gujarat, India, June-July, 2008.

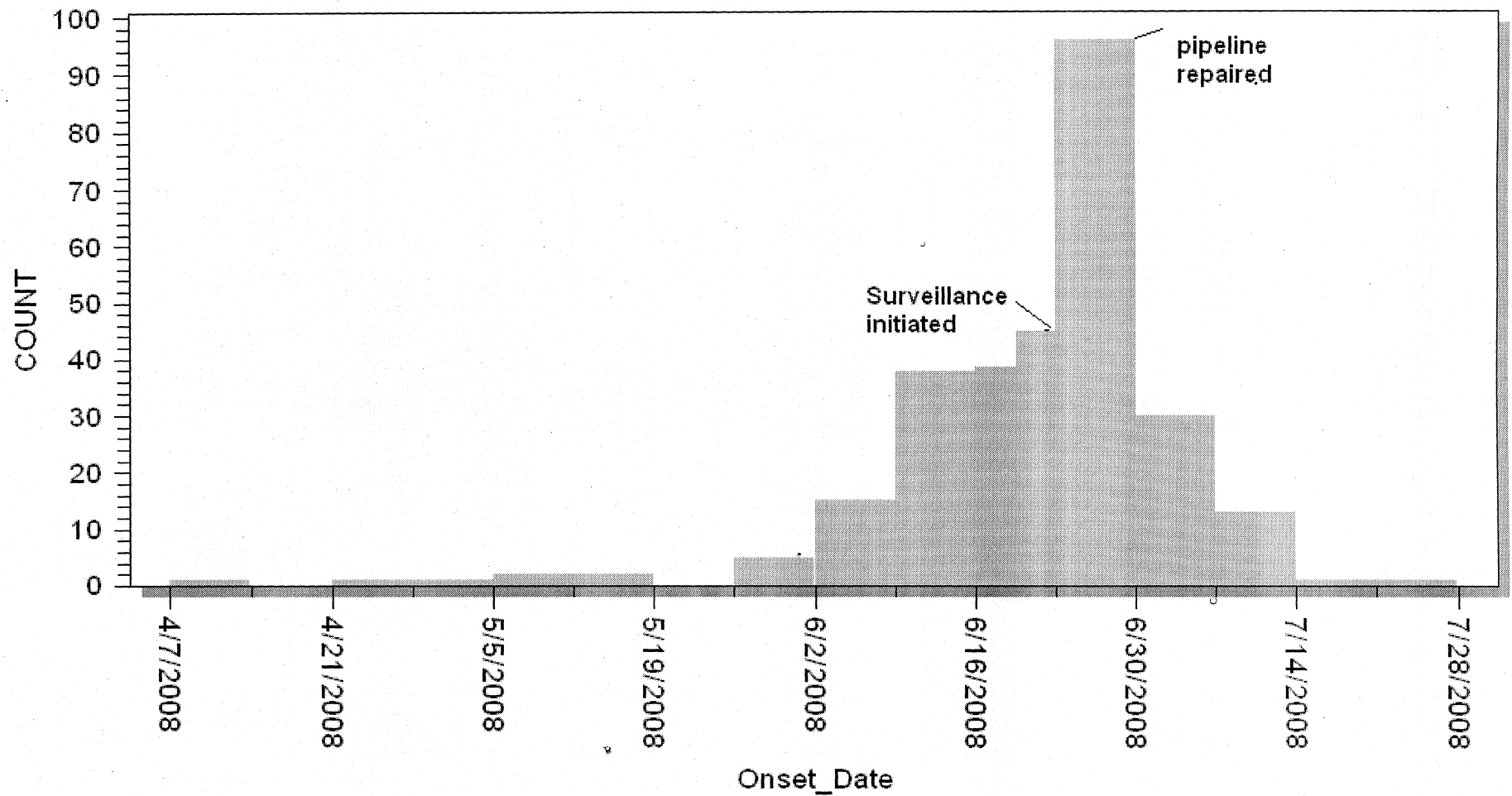
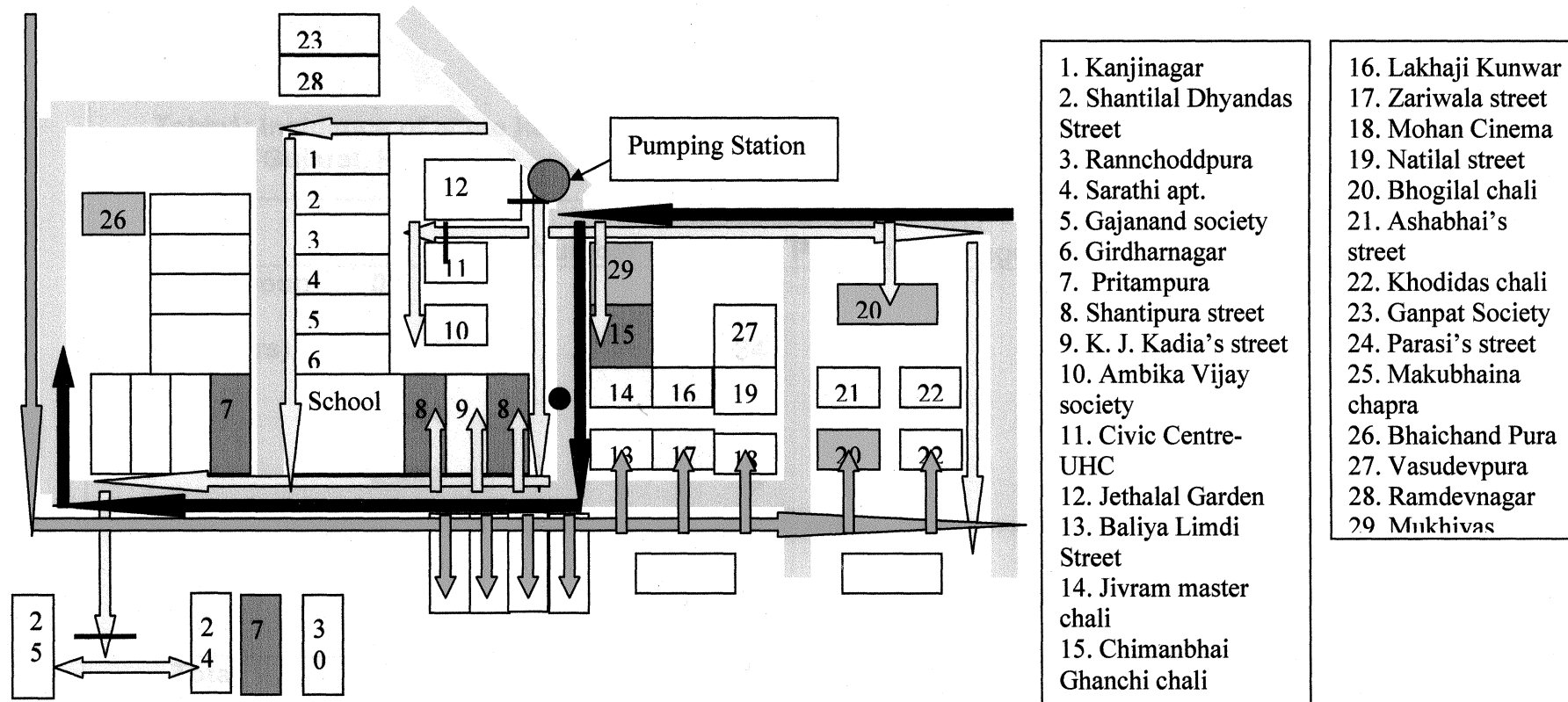


Figure 2: Attack rate of acute hepatitis in the various areas of Ahmedabad municipal corporation, Gujarat, India,



Attack rate per 1000 population						
	0-0.9	Blank		40-59.9	Red	
	1-19.9	Yellow		Drainage line		
	20-39.9	Orange		Girdharnagar water supply.		

Table1: Incidence of acute hepatitis by age and sex, Ahmedabad Municipal Corporation, Gujarat, India, 2008.

		Number of cases	Population of age group	Attack Rate per 1000
Age Group (in years)	0-4	7	2638	3
	05-14Y	34	5276	6
	15-44	191	9892	19
	45-99	19	4177	5
Sex	Male	167	11431	15
	Female	84	10551	8
Total		251	21982	11

**Table 2: Attack rate in areas supplied by two different water supplies,
Ahmedabad, Gujarat, 2008.**

	No. of cases	Population	Attack rate
Area supplied by Girdharnagar pipeline	139	9464	15
Area supplied by Dudheshwar pipeline	112	12518	9
Total	251	21982	11

Table 3 Showing risk factors of hepatitis E in Ahmedabad, Gujarat, India, 2008 (n=65)

Risk factor	Cases	Controls	OR(95% CI)	P Value
Eating Outside	65	23	13.2	0.0002
Contact with patient	31	30	1.06(0.5-2.0)	0.86
Injection	9	5	1.9(0.60-6.01)	0.26
Availability of sanitary latrine in house	38	47	0.54(0.25-1.1)	0.097
Cleanliness of latrine	34	40	0.5(0.2-1.3)	0.2
Use of tap water	52	48	5.4(0.6-48.0)	0.09
Boiling water			1.5(0.6-3.5)	0.29
Using Tab. Chlorine	29	29	1.02(0.51-2.06)	0.7
Facility of hand wash	49	59	0.31(0.11-0.85)	0.019
Using soap to wash hand	43	49	0.3(0.1-1.2)	0.8
Rack in house	56	63	0.19(0.04-0.95)	0.027
Cleanliness of house	33	40	0.5	
Drainage line near house	42	41	1.06(0.52-2.18)	0.85
Dirty water pool near house	27	17	2.00(0.95-4.20)	0.06
Leakage near house	24	13	2.34(1.06-5.15)	0.032

SECTION: 4

Critical Evaluation of Research Publication

Critical Evaluation of Published Research

Title of the paper: Cassia Occidentalis as the probable cause of Hepatomyoencephalopathy in children in western Uttar-Pradesh

Authors: V.M. Vashistha, Amod Kumar, T.jacob.John, N.C. Nayak.

References: Indian J Med Res 125, June 2007, pp 756- 762.

Introduction:

Thousands of research papers are published every month in different journals. Every article or study may not be standard and guiding. That why peer view and journal critique are the tools to identify useful information from scientific studies. I did the critical study of the research study with the objectives to identify the strength and weakness of a research publication so as to ensure that patients or community receive assessment and treatment or intervention based on the best available evidence.

Methodology:

We used the standard check list of questions while reviewing the article.

General information of the study: There was an outbreak of acute encephalopathy among children in western part of Uttar-Pradesh due to intoxication of some phytotoxin which caused Hepato-myoenkephalopathy, a syndrome which is fatal. Such outbreaks were affecting the young children since many years in many districts of western Uttar Pradesh, India. Rural children with poor socio-economic background were mostly vulnerable. The authors learned from the parents about incidents of young, poorly supervised children eating weedy plants and their fruits. The authors suspected the illness was due to fatal hepato-myeloencephalopathy syndrome caused by some phytotoxins of cassia occidentalis. They did a case control study to investigate the risk. Eighteen cases of acute hepatomyeloencephalopathy

syndrome were admitted in a hospital in Bijnor district of western Uttar Pradesh in 2005. The researchers selected 3 age matched (± 1 year) controls, sharing same house cluster and similar socio-economic conditions for each case. They gathered information from the parents by interview with a semi structured questionnaire with 59 variables. The natural cycle indicated seasonality of the disease. The case control study indicated that odds of exposure to eating the Cassia beans was 12.89 times higher in cases than controls. The study indicated an association of Cassia occidentalis with the acute hepatomyelencephalopathy syndrome.

General narrative comments: The selection of the topic was correct and useful. The system of write up was proper. Authors had followed the method of case control study. The background was sound with basic information. Authors gave objectives. They described the method of study, selection of cases and controls but did not give information how the 3 controls were selected from neighborhood, randomly or systematically. They gave 2 tables but no graph. Confidence interval was given. They discussed the issues stepwise and concluded. They had given recommendations. The drawback of the study was that the authors did not follow systematic stepwise outbreak investigation procedure. They did not include all available cases in the study. They calculated odds ratio for various exposures but did not calculate the population attributable fraction. My other observations are as follows:

Table 1. Overall assessment of the paper

Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
	1	2	3	4	5	
The background provides a description of the public issue at the global and local levels and logically introduces the need to answer a specific research question.			✓			The background did not provide information of the problem at the global and national levels but introduces the need to answer a specific research question.
The methods section provides sufficient information on the methods used, including the type of study, the sampling strategy, the case definitions, the data collection and the data analysis.				✓		The method section provided information on method used, sampling strategy and case definition. The case definition was incomplete. The data collection & analysis plan was appropriate.
The results reports sound scientific results that meet the study's objective and the research question. They are presented with sufficient details and adequate statistical information (e.g., Confidence Intervals).					✓	The result section explained the odds ratio, 95% confidence interval and p value. These values are important to show the association and strength of association.
The discussion summarizes and interprets the results, discusses the findings in view of what is already known, frames what the results of the study can support, defines the limitation of the work and suggests next steps in terms of (1) intervention and (2) research.					✓	Discussion summarised and interpreted the result.

Table 2. Methods of outbreak investigation

Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
	1	2	3	4	5	
The study design is adequate to meet the objective.					✓	Case control study is appropriate.
The study population is well defined and relevant to the research question		✓				The age of the children was not mentioned. Place and time were given. Community based study population.
Definitions are specified, sound and based upon standardized criteria when available.		✓				The definition was not standardized
Sampling methods are statistically sound and adapted.					✓	Sampling was correctly done from neighborhood and relatives sharing the same demographic & socioeconomic criteria.
The sample size was estimated beforehand appropriately.					✓	Sample size is justified. Controls 3 times the number of cases as number of cases was small.
The study is exempt from bias.				✓		Age matched- no confounding and no selection bias. There may be information bias.
The data that were collected are well described and relevant.					✓	Data collection was relevant
The data collected was of sufficient quality.			✓			Not sufficient

The analysis is thought beforehand and appropriate.			✓			Age and sex distribution analysis lacking.
The indicators generated are appropriate and well calculated.			✓			Demographic and socio- economic indicators were lacking
The statistical tests used are appropriate and well computed.				✓		Statistical tests used are well computed except Population attributable fraction
Appropriate attention has been given to human subject protection issues.	✓					Ethical issues were not mentioned.

Table 3. Writing of outbreak investigation report

Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
	1	2	3	4	5	
The content is well distributed by chapters and sections.		✓				Outbreak investigation was not followed step by step
The language is simple and clear. The word count is < 3000.				✓		Yes, the language is simple and clear. But the word count is more than 3000.
The writing is sequential, going from one point to the next.					✓	The introduction section contains background, case definition was given in Methods and there was result section and discussion.
The active voice is used throughout.			✓			There was mixture of active and passive voice
The vocabulary is precise, consistent and standardized.			✓			There was repetition of statement.

Table 4. Comments on tables and figures

Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
	1	2	3	4	5	
There are no more than five tables and or figures. All are needed.					✓	There were 2 tables and 1 figure. All needed.
The choice of graph or table to display information is judicious.					✓	The choice of tables were judicious
The tables are clear, exact and the totals add up.					✓	Yes, the tables are clear, exact and the totals add up.
The graphs are effective, appropriate and understandable.	✓					As there was no epidemic curve, whether it is point source or multiple exposures, cannot be concluded.