FIELD PROJECT REPORTS

Dr. Tapas Kumar Sen

(MAE- FETP Scholar 2003-2004)

National Institute of Epidemiology

(Indian Council of Medical Research)

Mayor V.R. Ramanathan Road, Chetput, Chennai-600 031.

DECEMBER 2004

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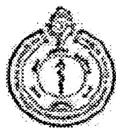
By

Dr. Tapas Kumar Sen

(MAE-FETP Scholar 2002-2003)

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

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(Indian Council of Medical Research),

Mayor V.R. Ramanathan Road, Chennai-600 031

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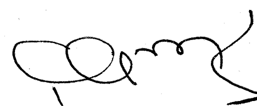
CERTIFICATION

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



DIRECTOR

Date 27.12.04 **National Institute of Epidemiology (NIE), Chennai**

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SECTION.1

FIRST FIELD POSTING

Situation analysis of the North 24 Parganas district, West Bengal, India, 2003

1. Introduction

The District of North 24 Parganas is the highest populated district among the 19 districts of West Bengal. More than 50% of the population of this district lives in the urban area in 27 municipalities. There are 22 Community Development Blocks where almost 43 lakhs of the population reside. Density of the population is the second highest, next to Kolkata. In essence, it is a district having both urban and rural area, strong and extensive municipal infrastructure and wide coverage of community development blocks. Considering the high population load and typical urban rural mix, this district has a definitive influence on the public health status of West Bengal.

In this context, the review of the existing surveillance system and epidemic preparedness of the district is highly pertinent. Before doing it, we conducted a situation analysis of the district with the following objectives.

2. Objectives

1. To describe and analyze the characteristics of North 24 Parganas district in terms of geographic, demographic, health and socio-economic related parameters.
2. To describe the institutional linkages in relation to availability of health care, surveillance of diseases and epidemic preparedness.
3. To analyze the strengths and weaknesses of the institutional linkages in relation to availability of health care, surveillance of diseases and epidemic preparedness.

3. Methods

We visited offices of district magistrate, chief of district local self-government (Sabhadhipati, Zilla Parishad), district literacy committee under National Literacy Mission, meteorological department, bureau of applied economics and statistics, departments of public health engineering and education and collected information on geography, demography, socio-cultural, economic and occupational pattern of the population are collected. We collected health related data from the offices of chief medical officer of health (CMOH), deputy CMOH II & III, and offices of the assistant CMOHs of the sub-divisions. Different tiers of health facilities at various corners of the district are visited to collect the information. Information on health infrastructure from district head quarter to peripheral sub-centers, latest health statistics available on morbidity and mortality trend and pattern, listing of diseases under surveillance and horizontal and vertical national health programs, listing of diseases of outbreak potential were done. Brief description of the recent outbreaks was made. Information on other linked sectors e.g. water and sanitation, waste disposal, educational opportunity was collected. Participation of non-governmental organizations (NGO) and private sector involved in health programs was done.

Formats were designed to record relevant data. We crosschecked the available data, wherever it was possible. Data sources were identified.

Data were described by geographical maps, organograms of administrative structure, tables, flow chart of information and response from periphery to district headquarter and feed back in relation to surveillance and epidemic preparedness. Accepted indicators like rates, ratios and proportions were used to analyze the data.

4. Results

4.1. Introducing the District

The North 24 Parganas district came into existence on 1st March 1986. The parent district of 24 Parganas was divided into north and south. It borders Bay of Bengal in the

south, Bangladesh in the east, Nadia district in the north and Hooghly River in the west bordering Howrah, Hooghly, Kolkata and South 24 Parganas districts. Interspersed with good number of rivers and rivulets in their way to Bay of Bengal and made up of alluvial soil of Gangetic delta, it is one of the most agriculturally fertile and industrialized districts of West Bengal.

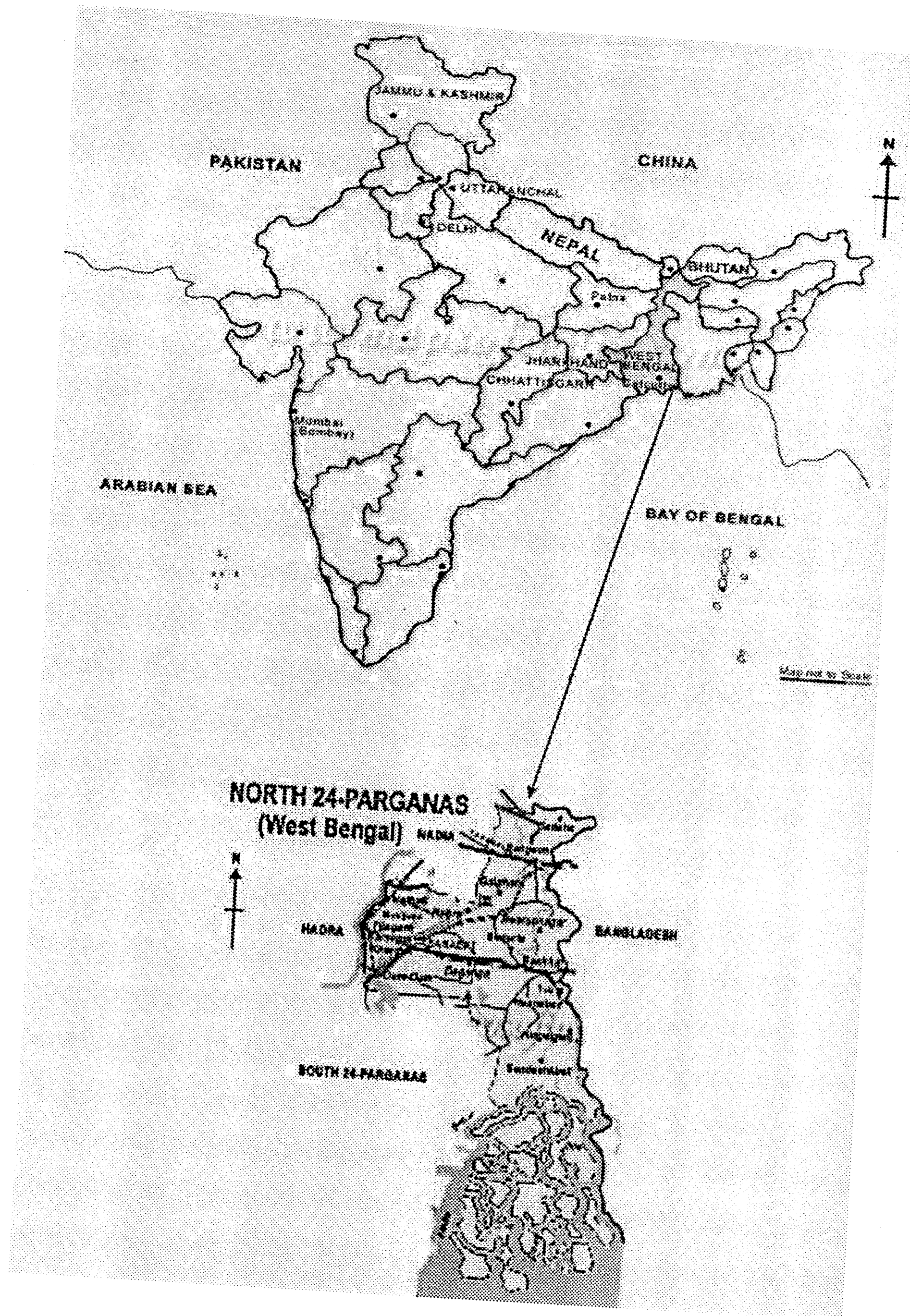
It has a rich heritage. The reference of this district was found in 'Aine-E-Akbari' of Mughal emperor Akbar. In 1757, Mirzafar, who assumed power of Bengal, Bihar and Orissa in connivance with British East India Company, after defeating Nawab Sirajuddoullah at the Battle of Palashi, gifted the district to Robert Clive of East India Company as a token of gratitude. In 1824 and 1857, two armed uprisings in this district shook the throne of British rulers. The 1857 uprising lighted the torch of first Indian war of independence, commonly called as Sepoy Mutiny. In 1830-31 the famous 'Titumir Revolt' took place in this district.

It is one of the first districts from where the modern era of industrialization started its journey in India. The first jute mill of India started functioning in this district. Barrackpore sub-division became the cradle modern industries since pre-independence time. It is a district with high agricultural output. The southern part is covered with part of biggest mangrove forest of the world, Sundarban, famous for Royal Bengal tigers and Crocodiles.

This district contributed a lot in the cultural and literary activities of Bengal since pre-independence era. Many famous writers like Bankim Chandra Chattopadhyay, Parry Charan Sarkar, Kalikrishna Mitra and others, who initiated the renaissance of Bengal, were born and worked in this district. Many of the literary figures of the present time hailed from this district. This district is the birth and work place of many of the famous religious reformers of Bengal. Vaishnava and Sakta streams of Hindu religion and Sufi stream of Islam religion developed in this district and cast a definitive impact on the religious life of the population. Ramkrishna Paramhansa, Swami Vivekananda first preached their philosophy here and Ramkrishna Mission was first founded in this district.

With such a rich background and history, this district still plays a decisive role in the development of the state of West Bengal.

Figure 1: Political map of North 24 Parganas, West Bengal, India



4.2. Geographical Characteristics

The main geographic features are summarized in the map and tables 1 and 2.

Table 1: Geographic Location of North 24 Parganas District

Latitude		Longitude	
N	S	E	W
23^0 15' 22" (N)	22^0 11' 6"	89^0 5' (E)	$88^0$22'
(N)		(E)	

Source: District Census Handbook, 1961

Table 2: Total rainfall, Maximum and minimum temperature, North 24 Parganas

Year	Rainfall (in mm)	Maximum temperature (in ^{0}C)	Minimum temperature (in ^{0}C)
1996	1634	40	9
1997	1482	39	8
1998	1636	42	9
1999	1545	40	9
2000	1514	38	8

Source: Meteorological department, Govt. of India

Area of the district: 4094 sq. km.

Total sub-divisions: 5 (Barasat, Basirhat, Bongaon, Barrackpur & Bidhannagar)

Number of blocks: 22 (Barasat - 7, Basirhat - 10, Bongaon - 3, Barrackpur – 2)

Number of Gram Panchayet: 200; Number of Village: 1851

Number of Municipality: 27 (Barasat - 6, Basirhat - 3, Bongaon - 1, Barrackpur – 17)

Number of Cantonment board: 1

Number of ICDS blocks: 20; Number of PHCs with tribal population: 10

Number of Tribal blocks: 4 (Haroa, Bagda, Sandeshkhali I, Sandeshkhali II)

Number of Forest blocks: 5 (Haroa, Bagda, Sandeshkhali I, Sandeshkhali II & Minakhan)

Number of Civil registration unit: 228

4.3. Demographic Characteristics

The main demographic characteristics are summarized in the tables 3 to 8.

Table 3: Area and population, North 24 Parganas, 2001 census

District / State	Area (esq.)	Population			% of total state population	% of land area of the state
		Male	Female	Total		
North 24 Pgs.	4094	4635262 (51.9%)	4295033 (48.1%)	8930295	11.13	4.61
West Bengal	88752	41487694 (51.71%)	38733477 (48.29%)	80221171	100	100

Source: Census of India, 2001, Provisional Population Total

Table 4: Scheduled Caste and Tribe population, North 24 Parganas, 1991 Census

District / State	Scheduled Caste		Scheduled tribe	
	Population	% of total population	Population	% of total population
North 24 Pgs.	1564689	21.48	169831	2.33
West Bengal	16080611	23.62	3808760	5.99

Source: Final Population Totals, Paper 1, 1991 Census

Table 5: 0-6 years age population by sex, 1991 and 2001 Census

District / State	Population, 2001			% Compared to total population	
	Male	Female	Total	1991	2001
North 24 Pgs.	520778	500590	1021368	15.13	11.44
West Bengal	5671152	5461672	11132824	16.98	13.88

Source: Census of India, 2001, Provisional Population Total

Table 6: Decadal variation (%) in population, 1901 to 2001, North 24 Parganas, 1991-2001

District / State	Percentage of Decadal Variation									
	1901-11	1911-21	1921-31	1931-41	1941-51	1951-61	1961-71	1971-81	1981-91	1991-2001
North 24 Pgs.	14.78	6.31	9.53	26.07	23.50	47.94	34.52	31.42	31.69	22.64
West Bengal	6.25	-2.91	8.14	22.93	13.22	32.80	26.87	23.17	24.73	17.84

Source: Health on the March, Government of West Bengal, 2001

Table 7: Sex Ratio, 1901 to 2001, North 24 Parganas

District / State	Sex Ratio (Number of Females / 1000 Males)										
	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
North 24 Pgs.	918	881	855	849	826	846	834	862	891	907	927
West Bengal	945	925	905	890	852	865	878	891	911	917	934

Source: Census of India, 2001, Provisional Population Total

Table 8: Density of population, Urban & Rural, North 24 Parganas, Census 2001

District / State	Density of population		Population			% of total population	
	1991 yr.	2001 yr.	Urban	Rural	Total	Urban	Rural
North 24 Pgs.	1779/sq.km	2181/sq.km	4849218	4081077	8930295	54.30	45.70
West Bengal	767/sq.km	904/sq.km	22486481	57734690	80221171	28.03	71.97

Source: Census of India, 2001, Provisional Population Total and 1991 Census Report

4.4. Socio-economic characteristics

The salient socio-economic characteristics are summarized in the tables 9 to 18.

Table 9: Literacy Rate by sex, North 24 Parganas, 1991 & 2001

District / State	Literacy rate in 1991 (%)			Literacy rate in 2001 (%)		
	Male	Female	Total	Male	Female	Total
North 24 Pgs.	74.7	58.0	66.8	84.35	72.13	78.49
West Bengal	67.8	46.6	57.7	77.58	60.22	69.22

Source: Census of India, 2001, Provisional Population Total and 1991 Census Report

Table 10: Literacy Rate by sex and urban/rural breakup, North 24 Parganas, 2001

District / State	Literacy rate in urban area (%)			Literacy rate in rural area (%)		
	Male	Female	Total	Male	Female	Total
North 24 Pgs.	89.93	80.51	85.45	77.20	61.71	69.69
West Bengal	86.49	76.14	81.63	73.75	53.82	64.06

Source: Census of India, 2001, Provisional Population Total

Table-11: Population by Religion, North 24 Parganas, 1991

District / State	Hindu (%)	Muslim (%)	Christian (%)	Others (%)	Not stated (%)
North 24 Pgs.	75.46	24.17	0.20	0.167	0.003
West Bengal	74.72	23.61	0.56	1.095	0.015

Source: Final Population Totals, Paper 1, 1991 Census

Table 12: Distribution of population (%) according to different categories of workers, North 24 Parganas, 1981 & 1991

Year	Cultivator	Agri. Laborer	Household industry, manufacturing	Other workers	Total main workers	Marginal worker	Not worker
1981	5.11	4.93	0.62	16.28	26.94	0.76	72.30
1991	4.82	4.85	0.63	17.90	28.20	0.58	71.22

Source: Census of India, 1991

Table 13: Educational Institutions by type, North 24 Parganas, 1996 to 2001

Institution	1996-97	1997-98	1998-99	1999-00	2000-01
School	4696	4718	4650	4660	4800
a) Primary	3734	3733	3659	3659	3799
b) High & HS	962	985	991	1001	1001
College	30	30	37	37	37
Prof. & Tech. Inst.	16	16	16	16	16
Total	4742	4764	4703	4713	4853

Source: DI of school (PE) & (SE), WB

Table 14: Status of institutions, students & teachers, North 24 Parganas, 2000-01

Service criteria	Educational Institutions			
	Primary	Middle	High	Higher Secondary
Institution	3799	163	510	328
Student (S)	722345	30221	344464	346835
Teacher (T)	12943	1001	7480	8742
S -T ratio	55.8:1	30.2:1	46:1	39.7:1

Source: DI of school (PE) & (SE), WB

Table 15: Public libraries, Newspaper & Periodicals and Cinema houses, North 24 Parganas, 1996-2001

Year	Public library	Newspaper / Periodical	Cinema houses
1996-97	221	31	89
1997-98	219	21	87
1998-99	218	21	84
1999-00	221	25	90
2000-01	221	26	72

Source: District Information & Cultural officer, North 24 Parganas

Table 16: Registered factories and related employment, North 24 Parganas, 1997-2001

Sectors / Years	1997	1998	1999	2000	2001
Factories registered under factory act	5256	5332	5486	5596	NA
Average daily employment	401020	404988	405878	408982	NA
New factories registered with directorate of cottage & small scale industries	1881	2151	1697	1136	997
Average daily employment	11171	12468	10220	7881	7504
Small industrial units registered with directorate of cottage & small scale industries	32881	35052	36729	37865	38862
Employment	201834	214302	224522	232403	239907

Source: Chief Inspector of factories, WB & Dte. of cottage and small scale industries

Table 17: Coverage of population with safe drinking water sources under P.W.S as on 30 June 2003

Rural

Total block: 22

Total population of the blocks: 3585601

Population exposed to arsenic pollution: 1242392

Total number of arsenic free spot sources created: 10752

Number of piped water supply scheme: 102

Coverage of population exposed to arsenic: 962321 (68.59%)

Total population covered: 2712502 (75.86%)

Urban

Number of municipalities: 7

Number of piped water supply scheme: 7

Present population served: 486131

Table- 18: Area & Production of principal crops, North 24 Parganas, 1996-2001

Year	Food grains		Oil seeds		Fibre		Miscellaneous	
	Area (1000 Hectors)	Production (1000 Tonne)	Area (1000 Hectors)	Production (1000 Tonne)	Area (1000 Hectors)	Production (1000 Tonne)	Area (1000 Hectors)	Production (1000 Tonne)
1996-97	307.7	700.6	38.5	34.2	50.4	762.4	10.5	174.4
1997-98	322.8	703.5	42.1	31.8	53.2	684.2	10.5	151.6
1998-99	353.3	887.4	38.8	30.6	59.7	826.2	12.0	194.9
1999-2000	348.3	852.7	42.1	37.8	57.7	798.0	12.7	225.0
2000-01	300.4	685.2	48.5	45.7	56.8	785	12.7	257.1

Source: Bureau of Applied Economics and Statistics, North 24 Parganas

4.5. Major health indicators

Important health related indicators are summarized in the tables 19.

Table 19: Important Health indicators, North 24 Parganas, 2001

Indicators	North 24 Parganas
Crude birth rate	20.7
Crude death rate	7.1
Natural growth rate	13.6
Infant mortality rate	52
Life expectancy at birth	66.1 (M), 69.3 (F)
Children completely immunized	86.8
Girls marrying below 18 years	48%
Birth of order 3 & above	19.53
Safe deliveries	80.65%
Institutional delivery	53.55%
Couple protection rate (in blocks)	56.7%
Male having knowledge of AIDS	73.4%

Source: CMOH office, North 24 Parganas

4.6. Health Facilities

Village level: There are 690 sub-centers (602 sanctioned) supposed to be manned by 1 HA (M) and 1 HA (F), 43 charitable dispensaries, 13 homeopathic dispensaries and 51 Primary health centers manned by 1 Medical officer.

Block level: There are 15 Block primary health centers and 7 rural hospitals functioning as block headquarters of 22 community development blocks. Total bed capacity of these facilities is 418 beds.

District and sub-division level: At this level, there are 1 district hospital situated at Barasat, the district headquarter, 4 sub-divisional hospitals and 8 state general hospitals. Total bed capacity of these hospitals is 2076 beds. Apart from these, there are 12 chest clinics, 16 dental clinics, 9 postpartum units, 12 clinics under two zones of Kolkata Metropolitan Urban Health organization (KMUHO), 1 police case hospital, 1 Brigade hospital and 4 Blood banks.

Private sector: There are 235 Nursing homes, 489 Laboratories and other clinical establishments, licensed to function as per Clinical establishment act. 53 NGOs are enlisted at the office of CMOH, who serve in the health sector.

Table 20: Staff position in secondary tier health facilities, North 24 Parganas, June 2001

Category of staff	Sanctioned	At position	Variance
Medical officer	330	372	+42
Nurse	528	601	+73
General Duty Assistant	710	589	-121
Sweeper	202	227	+25
Clerk	80	72	-8
Pharmacist	47	44	-3
X-ray Technician	27	26	-1
Lab. Technician	46	40	-6
Ward master	36	33	-3
Store keeper	36	27	-9
ECG technician	5	5	0
Social Welfare officer	30	21	-9
Driver	32	26	-6

Source: CMOH office, North 24 Parganas

Table 21: Staff position in BPHCs and PHCs, North 24 Parganas, June 2001

Category of staff	Sanctioned	At position	Variance
Medical officer	121	98	-23
CHSO	22	12	-10
Nurse	286	225	-61
Clerk	44	39	-5
Pharmacist	68	49	-19
Ophthalmic Assistant	29	29	0
Driver	28	18	-10
GDA	469	302	-167
Sweeper	178	119	-59

Source: CMOH office, North 24 Parganas

Table 22: Staff position in Sub-centers (690) and Sectors (117) for public health work, North 24 Parganas, June 2001

Category of staff	Sanctioned	At position	Variance
1st tier supervisor	132	85	-47
2nd tier supervisor	66	36	-30
3rd tier supervisor	234	162	-72
Health assistant (M)	691	432	-159
Health assistant (F)	691	702	+11

Source: CMOH office, North 24 Parganas

Table-23: Status of Public sector health facilities, North 24 Parganas

District/state	No. of facility per 100 sq. km. (1993)	Bed-population ratio (1991-92)	% of bed in the rural area (1992)
North 24 Pgs.	2.4	1846	19.1
West Bengal	9.8 (excluding Kolkata)	1018	29.4

Source: Bureau of Applied Economics and Statistics, WB & Health on the March 1991

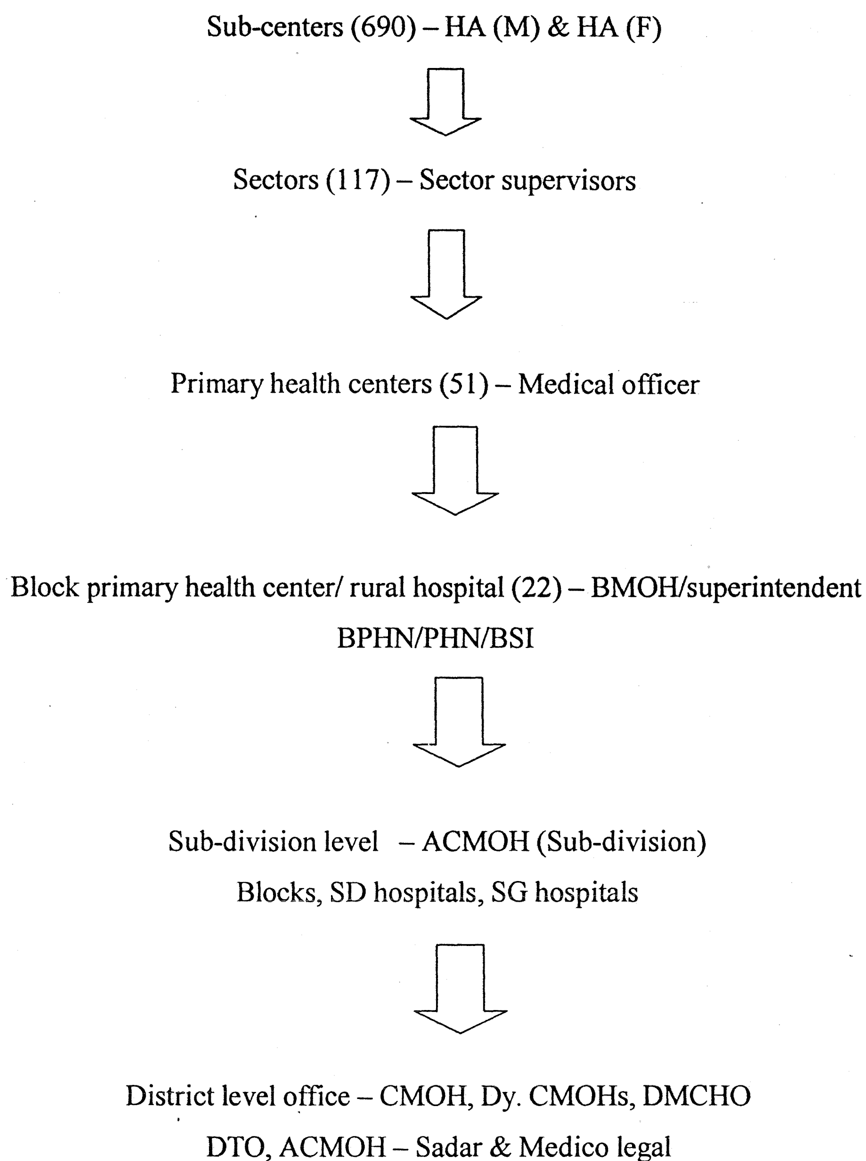
4.7. Organizational set up

690 sub-centers serve as the grass root level health care facilities manned by HA (M) and HA (F). The sub-centers are distributed under 117 sectors in 22 blocks. 1st, 2nd and 3rd tier supervisors in charge of sectors supervise these. At PHC level, Medical officer in charge of Primary health center look after the sectors under his/her PHC. BPHC/Rural hospital acts as nodal center for implementation and assessment of programs and all health related activities at each block level. Reports from sub-centers are routed through the sectors and PHCs to block headquarter. The first Saturday of every month is fixed for monthly review meeting at block level by government order. Sector level meetings commence on rest 3 Saturdays.

BMOH/Superintendent of the rural hospital used to compile the block level report every month and send it to CMOH of the district. He is responsible for all the surveillance, epidemic control and curative activities within the block under his jurisdiction.

In the district, there are posts of Deputy CMOH – I, II, III, who are the program officers of the district under CMOH. DY. CMOH-I is responsible for procuring and supplying drugs, equipments and vehicles of the district. DY. CMOH-II is responsible for surveillance and epidemic control and related National programs excepting RNTCP, RCH and Family welfare. DY. CMOH-III is responsible for RCH, Family welfare and UIP. District MCH officer helps him/her in this regard. There is a separate post of District TB officer who is assigned to look after RNTCP. There are Assistant CMOHs, one for each sub-division and ACMOH (Medico legal) in the district. ACMOHs look after the activities of the respective sub-division. ACMOHs (sadar and medico legal) help CMOH in the inspection of the clinical establishments and issuing of licenses. District sanitary inspector posted under Deputy CMOH II helps him in implementing and monitoring all the national programs under his/her jurisdiction and in surveillance and epidemic control activities.

Figure 2: Flow chart of organizational set up



4.8. Disease burden

Morbidity and mortality of some of the important diseases are summarized in tables 24 to 37.

Table 24: Diarrhoeal diseases in North 24 Parganas, 1996 to 2002

Year	Cases (OPD+IPD)	Death	Incidence (Per 1000)	Case fatality ratio (%)
1996	67932	32	9.33	0.05
1997	76778	43	10.54	0.06
1998	70465	78	9.68	0.11
1999	68256	28	9.37	0.04
2000	44878	65	6.16	0.14
2001	145462	72	16.29	0.05
2002	138684	84	15.53	0.06

Source: Dy.CMOH II office, North 24 Parganas

Table-25: Status of ARI, Measles and Enteric fever, North 24 Parganas, 2000-2002

Year	ARI				Measles				Enteric fever			
	Cases (OPD+ IPD)	Incidence rate in 1000	Death	CFR in 100	Cases (OPD+ IPD)	Incidence rate in 1000	Death	CFR in 100	Cases (OPD+ IPD)	Incidence rate in 1000	Death	CFR in 100
2000	17472	2.4	4	0.02	1351	0.18	0	0	2091	0.29	0	0
2001	92628	10.37	9	0.01	3045	0.34	0	0	4425	0.49	1	0.02
2002	102016	11.42	114	0.1	1055	0.12	1	0.09	1566	0.17	1	0.06

Source: Dy.CMOH II office, North 24 Parganas

Table-26: Status of Tuberculosis, North 24 Parganas, 1-4-2000 to 28-2-01

Total TB patients: 23457

1. Pulmonary: 20193
2. Extra pulmonary: 3264

Sputum positive cases: 5781

Sputum negative cases: 17676

Patients completed treatment: 19588

Table-27: Status of Tuberculosis (RNTCP), North 24 Parganas, 1-3-2001 to 31-12-02

Year	Total NSp+ case	Annualized case detection rate of Nsp+ cases (per 100000 pop.)	Total case detected	Annualized case detection rate of all cases (per 100000 pop.)	Sputum conversion of Nsp+ cases	Cure rate of Nsp+ cases
2001	2095	28.15	5420	72.83	80.91%	79.7%
2002	2901	32.49	7364	82.46	90.1%	--

Source: District TB Center, North 24 Parganas

Table-28: Status of Malaria (excluding KMUHO zones), North 24 Parganas, 1996 to 2002

Year	P. Vivax	P. Falciparum	Total	Death
1996	414	55	469	0
1997	405	49	454	0
1998	449	58	476	0
1999	436	40	476	0
2000	267	33	300	0
2001	180	21	201	0
2002	119	20	139	0

Source: Dy.CMOH II office, North 24 Parganas

Table-29: Status of Leprosy, North 24 Parganas, 1999-2003

Time	Prevalence rate (in 10000)
Before MDT	5.24
31-3-2000	2.44
31-3-2001	1.17
31-3-2002	1.5
28-2-2003	1.0

Source: Zonal Leprosy office, North 24 Parganas

Table-30: Status of Poliomyelitis, North 24 Parganas, 1996-2003

Year	% of immunization target achieved	Number of Polio cases
1996-97	104.2	NA
1997-98	101.3	2 (1998)
1998-99	110.1	2 (1999)
1999-2000	97.8	0 (2000)
2000-01	99.9	0 (2001)
2001-02	101.2	2 (2002)
2002-03	87.9	3 (2003)

Source: Dy.CMOH III office, North 24 Parganas

Table-31: Status of Dog bite and Rabies, North 24 Parganas, 1996 to 2002

Year	Dog bite cases treated	Number of Rabies cases
2000	1153	0
2001	3668	11
2002	5589	3

Source: Dy.CMOH II office, North 24 Parganas

Table-32: Status of Kala azar, North 24 Parganas, 1996 to 2002

Year	Cases	Death
1996	420	9
1997	308	1
1998	219	3
1999	384	6
2000	243	5
2001	193	0
2002	182	1

Source: Dy.CMOH II office, North 24 Parganas

Table-33: Status of Chronic Arsenicosis, North 24 Parganas, 1991 to 2002

Year	New case			Death
	Male	Female	Total	
1991	11	5	16	5
1992	33	10	43	0
1993	39	8	47	1
1994	26	6	32	1
1995	31	18	49	3
1996	92	51	143	1
1997	15	10	25	2
1998	42	26	68	2
1999	95	83	178	4
2000	12	8	20	1
2001	7	17	24	2

Source: Dy.CMOH II office, North 24 Parganas

Table-34: Status of Blood safety program, North 24 Parganas, 1999 to 2003

Test	Year				
	1999	2000	2001	2002	2003
HIV	28 (0.4%)	29 (0.5%)	44 (0.4%)	31 (0.25%)	7 (0.2%)
VDRL	28 (0.4%)	111 (1.9%)	12 (0.1%)	7 (0.06%)	3 (0.07%)
HBV	225 (3.23%)	67 (1.15%)	85 (0.7%)	178 (1.46%)	47 (1.14%)
Total blood collected (in bottles)	6967	5819	12303	12217	4114 (upto March)

*Incidence of positive tests in parenthesis

Source: Dy.CMOH II office, North 24 Parganas

Table-35: Distribution of cataract operation cases, North 24 Parganas, 1996-2002

Year	Number of operation
1996-97	6276
1997-98	9531
1998-99	11135
1999-00	15583
2000-01	18432
2001-02	18384

Source: Dy. CMOH I office, North 24 Parganas

Table 36: Accidents on the roads, North 24 Parganas, 1996-2000

Year	No. of accidents occurred	No. of persons injured	No. of persons killed
1996	962	1011	318
1997	988	1001	321
1998	1068	1079	350
1999	1114	1163	370
2000	1146	1030	398

Source: Superintendent of Police, North 24 Parganas

Table 37: Different classes of offense, North 24 Parganas, 1996-2000

Classes of offense	1996	1997	1998	1999	2000
Murder	175	184	230	219	245
Dacoity	66	34	37	40	26
Robbery	94	74	65	83	79
Burglary	134	108	58	49	51
Rioting	689	628	674	505	357
Theft	2327	2314	2222	2197	2115
Minor offenses	4488	4325	1452	1237	1757
Offenses against women	NA	NA	NA	905	842
Others	NA	NA	4861	3064	3616
Total	**7973**	**7667**	**9599**	**8299**	**9088**

Source: Superintendent of Police, North 24 Parganas

4.5.4. Outbreak reports

A summary report of the outbreaks during 1st January,02 to 31st March, 2003 is shown in the table below. It clearly shows the high outbreak potential of the diarrhoeal diseases in this district. However, other data shows that ARI is also highly prevalent.

Table-38: Episodes of outbreaks, North 24 Parganas, 1-1-02 to 31-3-2003

Sl.no	Location	Disease	Population at risk	Total attack	Total death	Total admitted	Index case	D/O 1st attack	D/O last attack	Probable source of infection	Remark
1	Mangalganj, Bagda Block	Food poisoning	NA	62	0	26	Not identified	5-1-02	6-1-02	Puja prosad	Nil
2	Kadambagachi, Barasat block I	Diarrhoea	300	22	0	12	Not identified	4-5-02	20-5-02	Infected pond water	Nil
3	Nayabasti, Barakpur	Food poisoning	110	104	0	33	Not identified	20-5-02	20-5-02	NA	Nil
4	W 9,11,14 Bhatpara Municipality	Diarrhoea	30000	306	3	99	Identified	11-5-02	20-5-02	Pipe water	El tor 01 in stool coliform in water

Sl.no	Location	Disease	Population at risk	Total attack	Total death	Total admitted	Index case	D/O 1st attack	D/O last attack	Probable source of infection	Remark
5	W 23,24 Kanchra para Mu.	Diarrhoea	10000	349	1	77	Identified	13-5-02	20-5-02	Pipe water	El tor 01 in stool coliform in water
6	W 13 Gobardanga Mu.	Food poisoning	100	10	2	3	Identified	21-5-02	22-5-02	Food	Nil
7	Prithiba GP, Habra I	Diarrhoea	1200	227	0	24	Do	31-5-02	18-6-02	Unknown	Nil
8	Bahera, Barasat I	Food poisoning	67	60	0	2	Not identified	2-6-02	2-6-02	Lunch at marriage	Nil
9	W 6,27 Rajarhat Mu.	Diarrhoea	2000	115	0	82	Identified	25-6-02	29-6-02	Pipe water	coliform in water
10	Mathurapur, Habra I	Diarrhoea	600	16	0	10	Do	24-6-02	28-6-02	Pond water	Nil
11	W 20,21,35 Panihati Mu.	Diarrhoea	500	43	0	5	Do	1-7-02	6-7-02	Pipe water	Nil
12	W 26,29 North Dumdum Mu.	Diarrhoea	2000	118	1	30	Do	27-7-02	10-8-02	Pipe water	coliform in water

Sl.no	Location	Disease	Population at risk	Total attack	Total death	Total admitted	Index case	D/O 1st attack	D/O last attack	Probable source of infection	Remark
13	Dhabdhara, Habra I	Food poisoning	500	6	0	6	Do	12-8-02	13-8-02	Food	Nil
14	W 18, Barasat Mu.	Diarrhoea	2500	191	0	37	Do	15-8-02	20-8-02	Pipe water	coliform in water
15	W 16, Bhatpara Mu.	Diarrhoea	6000	168	1	74	Do	29-8-02	8-9-02	Pipe water	El tor 01 in stool
16	Amdanga GP, Amdanga block	Diarrhoea	650	18	0	5	Do	24-9-02	26-9-02	Pond water	Nil
17	Khandasasari, Amdanga block	Diarrhoea	500	21	0	9	Not identified	31-8-02	4-9-02	Pond water	Nil
18	W 16,17,18 Barasat Mu.	Diarrhoea	25000	1500	1	199	Identified	22-9-02	31-9-02	Pipe water	El tor 01 ogawa in stool coliform in water
19	Sigunapara, Barrackpore I	Diarrhoea	800	14	0	4	Do	2-10-02	5-10-02	Well water	coliform in water samp

Sl.no	Location	Disease	Population at risk	Total attack	Total death	Total admitted	Index case	D/O 1st attack	D/O last attack	Probable source of infection	Remark
20	Laxmipur, Habra I	Diarrhoea	700	72	1	14	Do	17-10-02	29-10-02	Pond water	Nil
21	Mochpole Barasat I	Diarrhoea	60	10	0	8	Do	2-10-02	6-10-02	Pond water	Nil
22	Iswaripur Barrackpore II	Diarrhoea	650	86	0	18	Do	20-10-02	30-10-02	Well water	coliform in water
23	Danga gajipara Amdanga	Diarrhoea	1200	44	0	28	Do	11-10-02	30-10-02	Well water	coliform in water
24	W 19,25 Bhatpara Mu.	Diarrhoea	7000	213	0	59	Do	20-10-02	30-10-02	Pipe water	El tor 01 in stool
25	Ganthi/Rajarhat Mu.	Diarrhoea	250	48	1	8	Do	9-11-02	12-11-02	Pipe water	coliform in water
26	Laxmipur, Habra I	Diarrhoea	1000	8	0	8	Do	10-11-02	12-11-02	Pond water	Nil
27	Ward 3,4,5,6,7,10, Garulia	Diarrhoea	2000	302	2	26	Do	13-11-02	5-12-02	Pipe water	Report NA
28	Ward 19,20,21 Bhatpara	Hepatitis E	1000	83	0	2	Do	2-11-02	29-11-02	Pipe water	Report NA

Source: Dy. CMOH II office, North 24 Parganas

5. Discussion

Geographical characteristics show that it is a district of urban-rural mix with two out of five sub-divisions covering the extensive urban area. Out of 10 blocks of Basirhat sub-division, eight blocks are in the difficult to access riverine area.

The demographic data shows that 11.13% of the state population resides in an area, 4.61% of the whole state. About 51.9% of the population is male and 48.1% female. Density of population is very high, 2181 persons/sq. km. area, which is next to Kolkata. Sex ratio is 927/1000 males; slightly less than the state average i.e. 934/1000 males. Scheduled caste population is considerable, about 21.48% and that of scheduled tribe is 2.33%. 0-6 year age population has decreased from 15.13% (1991) to 11.44% (2001). Population decennial growth rate has also decreased from +31.69% (1981-91) to +22.64% (1991-2001). However, this growth rate is higher than the state average. One of the major causes of the increase of population load in this district is the migration of people from Bangladesh crossing the border illegally. About 54.3% of the population of this district resides in the urban area, which is pretty high in comparison to state average of 27.48%.

Total literacy rate (78.49%) is higher than the state average (69.22%). Female literacy has increased from 58.0% (1991) to 72.13% (2001).

Population is predominantly Hindu by religion, about 75.46% with considerably high Muslim population, about 24.17%. The relation between the believers of the two principal religious groups is harmonious.

There is mild degree of increase in the educational institutions in the previous years, mainly in the primary section. However, teacher-student ratio in all tiers of institutions is not satisfactory.

Vast area of the district is arsenic affected. 102 safe water supply schemes are going on in 22 blocks and 7 going on in municipalities. There are more things to do in this respect.

Data on employment in industry sector shows that the improvement was very sluggish over the period of last 5 years. Similar picture is in the small scale and cottage industry sector.

Data on area and production of principal crops shows that there is a considerable increase in food grain production up to year 2000. However, in year 2001 oil seed, fibre and miscellaneous crop production has increased with simultaneous decrease in area of cultivation and production of food grain.

Data collection of vital statistics is very irregular. There is gross weakness in collection and timely sending of reports from Gram panchayet to respective block health headquarters. The problem has started after this responsibility being handed over to panchayet. However, district health authority has taken certain steps and issued relevant orders to the health functionaries to overcome this irregularity. Presently, CBR, CDR, IMR, MMR etc. are primarily taken from SRS estimate of the state.

Infrastructure of the health facilities in the rural area is particularly inadequate. As per estimates of 1993, there were 2.4 health facilities per 100 sq. km.—state average being 9.8 and Bardhaman district being as high as 16.0. Bed population ratio and percentage of health facility in the rural area were lower than the state average. There is no reason to change that picture. Some of the rural centers suffer from difficulty in accessibility due to geographical reason. Some of the hospitals in the urban area are underutilized.

There is wide presence of private sector in health care predominantly in the urban sub-divisions. There is little involvement on their part in regular surveillance activity in outbreak control. Endeavor from the government end is also inadequate.

There is a good number of non-governmental organizations (NGO) operating in the district. One NGO is running two TB units under RNTCP programs. 53 NGOs have been listed who used to play remarkable in different health programs, particularly in NPCB. During pulse polio programs and FHAC some of the NGOs played a significant role. However, still the aspect of collaboration of public sector and NGOs deserves further strengthening.

It is observed that there is good number of vacancy in the posts of medical officer, nurse, pharmacist, general duty attendant and sweeper in the BPHCs and PHCs. In the sub-centers, all the supervisory tiers are working with a lot short of personnel. 159 out of 691 sanctioned posts of Health assistant (Male) are vacant.

At the district level, there is no sanction of statistical and epidemiological cell. Staffs deputed from other centers do the related works.

There is no set up of district level public health laboratory. Such deficiencies of infrastructure are adversely affecting the performances of the district, particularly in relation to surveillance and epidemic control.

An existing surveillance system covers 19 communicable diseases and 11 other important disease conditions in the district. It is not under NSPCD. There are 35 reporting units, 22 block headquarters and 13 hospitals. Apart from this, reports are collected from medical institutions describing their performances (admission, discharge, death, surgeries done, bed occupancy etc.) and information about the inpatients in terms of category of disease, discharge and death. It encompasses 84 categories as per the site and type of the disease. Both the reports of communicable diseases and the hospital performances are sent to the district surveillance unit on monthly basis, where it is compiled and sent to Surveillance cell of SHSDP II, State bureau of health intelligence and Joint Director (public health & communicable diseases).

The reporting system was very irregular in the pre 2000 time. It has improved since then and presently, most of the 35 reporting units used to send their monthly reports more or less regularly.

However, the existing report format is such that it prevents accurate calculation of attack rate and CFR. The numerator in case of AR and denominator in case of CFR are overestimated—thus falsely increasing the Incidence and decreasing the CFR.

There is considerable underreporting in many diseases till date. It was very high in the pre 2000 period. The district health authority is rectifying that defect slowly and steadily. But to do this, reporting format should be revised.

Some of the centers put their field data in the OPD head. However, this problem needs to be streamlined and there must be clear guideline to report field data in proper format.

There is lack of coordination among different offices within the district health set up, which sometimes creates ambiguity in the reports.

The data and reports of recent outbreaks suggest that diarrhoeal diseases including cholera are a major problem in the district. Presence of El tor 01 ogawa in the pipe water of a good number of municipalities raises pertinent question about the quality of the water supplied to the community. Some blocks were also affected by Vibrio cholarae. The surveillance data on diarrhoea shows a steep increase in the last two years. This might be due to increased morbidity and partly due to improved reporting system. Increased incidence of diarrhoeal diseases is possibly due to lack of health awareness, lack of supply of safe drinking water and improper sanitary standard of the population of the district.

Acute respiratory tract infection (ARI) is also highly prevalent. Sudden increase of cases in 2001 and 2002 is possibly due to better functioning of the reporting system. Death in 2002 is considerably higher in comparison to previous years. Lack of awareness, improper housing standard and large family might be the causes of increased morbidity.

Tuberculosis is highly prevalent in the district. From 1-3-01 RNTCP was initiated. Whole of the district is now under cover of RNTCP network. Detection of N Sp+ve cases, sputum conversion and cure rate of N Sp+ve cases are increasing steadily. The trend of development is positive and encouraging. Poor socio-economic standard, bad housing, large family and lack of awareness might be responsible for this high prevalence.

Malaria is present in the district. Though the data shows low prevalence, it is to be borne in mind that the data of huge urban area in Barrackpur sub-division is not included in it

and the cases diagnosed by the private practitioners are mostly not reported. As per district health authority, most of these cases, particularly the PFs, are imported from Kolkata and neighboring districts.

In case of Poliomyelitis, the immunization coverage for the previous years, as reported, is more or less satisfactory. However 3 cases of Polio were detected in 2002 at isolated pockets of resistant area. Polio eradication program is conducted more vigilantly since then.

There were no reported cases of Meningococcal meningitis in 2000 and 2002. However, 9 cases and 2 deaths were reported in 2001. Possibly, there is laxity in diagnosing the disease. Lack of diagnostic facilities within the district might result in improper diagnosis of the disease.

National Leprosy Elimination program started MDT on 17-8-1994. Prevalence of Leprosy during the year 2000 to 2003 show that it is steadily decreasing from the pre MDT era. Presently, this vertical program is functionally integrated with Multi-purpose health scheme.

Data on Dog bite and Rabies elicit that the number of dog bite cases treated has steadily increased over years. Increased presence of stray dogs in the localities might be the reason. Number of Rabies cases was considerably high in 2001.

It is perceived that information about affection of Enteric fever suffers from underreporting due to lack of laboratory confirmation.

Kala-azar is a typical public health problem in this district. It is endemic in 5 blocks. Sporadic cases are found in almost all blocks and in many of the municipalities. In the municipal areas, the cases are mostly imported from Bihar. But in rural area, presence of sand fly has been detected. Local spread is believed to be present. In Kansona village of Bongaon sub-division, increased number of PKDL cases is detected without having a definite history of Visceral Leishmaniasis.

Chronic Arsenicosis is another public health problem of the district. 19 out of 22 blocks and 3 out of 27 municipal areas are affected. There is no national or state level program on Arsenicosis. Cases are detected by different health facilities and sporadic surveys by district health authority. This problem deserves more attention.

Blood Safety Program shows that collection of blood has remarkably increased since 2001. Incidence of positive tests of HIV, HBV and VDRL is in a declining trend.

National Blindness Control Program has been gaining momentum over years with increased number of cataract operations. Extensive NGO involvement has been assured in this program.

The trend of road traffic accidents is on the rise during the previous years. This is possibly due influx of vehicles, inadequate and bad road condition and rash driving.

The data on different type of offenses over the period of previous 5 years show that it is on the rise in this district. It is possibly due to increased unemployment, insecurity in economic condition, cross-border un-ethical businesses etc.

Flood and inundation of land by tidal water are chronic problems of Bongaon and Basirhat sub-divisions. In the year 2000, a major flood occurred in this district. Affected population was 254386 in 100 GP of 15 blocks, 777412 in 17 municipalities – total 1031798 persons. Whole of Bongaon sub-division, half of Basirhat and a small part of Barrackpur were affected. Though more than 10 lac people were affected and out of which 226306 persons were taken care of in 487 relief camps, vigilant public health action by District health authority and increased awareness of the affected people helped to keep the diarrhoeal morbidity and mortality at such a low level. Not a single outbreak occurred in those camps. [Total diarrhea attack – 2842, Death – 3; Total snakebite cases – 7, Death – 4; Total other disease – 15745, Death – 5].

Occasional tornado used to lash Chandpara village of Gaighata block in Bongaon sub-division during the last 3 decades. Last two attacks occurred in 2000 and 2003 leading to

considerable loss in assets and animal lives. Exact environmental and geographical cause is not yet known.

State Health System Development Project, Phase II run by loan from World Bank is continuing in this district involving all secondary tier hospitals, all rural hospitals and BPHCs/PHCs of Sundarban area. Adequate input in developing the infrastructure and extension of services of these units has been arranged through this project. Health care facilities have increased to a considerable extent. However, full outcome is yet to be achieved in some units.

An in-depth discussion with Deputy CMOH II, the program officer for disease surveillance and outbreak control, reveals that the public health activities are suffering from inadequate infrastructure, inadequate staffs, lack of trained manpower, acute shortage of fund (most of the fund for other programs are taken from NMAP), lack of vehicular support and absence of electronic conductivity between periphery and the district headquarter. The planning and implementation of existing surveillance system and outbreak preparedness need revision and updating. The reporting format is to be revised by a workshop conducted by the state involving district level officers. Case definitions of the diseases under surveillance and of outbreak potential should be clearly laid down. Laboratory network is to be strengthened along with establishing a competent laboratory set up at district level.

6. Recommendations

Fill up of vacant posts at sub-centers, PHCs and BPHCs.

Sanction and establish District Epidemiological cell and District public health laboratory.

Revise disease surveillance reporting format and strengthen outbreak preparedness and response network.

Allocate adequate fund and more vehicular support to run the health programs.

Develop electronic conductivity between periphery and the district; district and the state headquarter.

Ensure effective implementation of the program on arsenicosis and kala azar.

Ensure data analysis at district and block level and effective feedback system.

Involve private sector and non-governmental organizations in surveillance activities and public health programs.

Laboratory Facilities in North 24 Parganas District, West Bengal, India, 2003

1. Introduction

Our country is now facing the challenges of both communicable and non-communicable diseases. In one hand, diseases like diarrhea, acute respiratory infection and other communicable diseases are prevalent in many parts of the country, on the other hand diseases like diabetes, ischemic heart disease, road traffic accidents, hypertension etc. are on the rise due to change in life style. West Bengal as a whole and North 24 Parganas district in particular, is no exception to that. But the maximum load to health service refers to communicable diseases, as they manifest early and in most cases acutely demanding some intervention. Disease surveillance is a prerequisite for effective control and prevention of both communicable and non-communicable diseases. It is essential for controlling epidemic prone diseases by early prediction, early detection and early intervention. Outbreaks of various water borne, vector borne and air borne diseases are still very common. A full proof surveillance system can play an important role in planning, implementation and monitoring those disease control programs.

The management of these diseases warrants diagnosis, mostly by laboratory tests. Prevention and control of important diseases can be planned only if the exact magnitude of these diseases is accurately projected based upon laboratory results. It is essential not only for making diagnosis and follow-up of treatment of an individual, but for also supporting other public health programs. High quality laboratory services contributes directly to reduce mortality and morbidity and cost of providing health services and also indirectly because of their impact, socially and economically. Reliable laboratory support is essential in investigation of diseases. Isolation, identification and characterization of the pathogen using epidemiological marker, typing methods form an integral part of disease surveillance system.

Appropriate laboratory infrastructure of buildings, space, equipments, reagents, and human resource development and training program are essential to tackle all locally prevalent communicable diseases. Rapid advances in scientific methodology have made it possible to develop diagnostic reagents for most of the locally prevalent diseases. Well-established linkages between various laboratories and electronic linkages with information databases and epidemic surveillance systems are equally vital. Integration of laboratories at various levels is needed to have complete information at the state level and to use the relevant information efficiently for control and prevention of communicable diseases and feedback.

2. Objectives

Based on this rationale, we studied the laboratory facilities existing in North 24 Parganas with the objectives: (1) to describe the existing laboratory facility available (2) to describe the extent of utilization of existing laboratory facilities (3) to study the role of private laboratories in disease surveillance and outbreak control (4) to study the role of state reference laboratories or other specialized laboratories to support the surveillance system and in epidemic control (5) to recommend the laboratory facilities required in the district for control of locally prevalent diseases.

3. Methods

We visited 14 laboratories situated at block primary health centers (BPHC), rural hospital (RH), state general hospital (SGH), sub-divisional hospital (SDH), and district hospital (DH). We interviewed persons (physicians, pathologists, superintendents, public health workers, laboratory technicians) concerned with the maintenance of the laboratory service and its utilization to understand the extent of service available; checked records to identify the available facilities and their present utilization. This was compared with the facilities proposed to have been available in that particular tier of health facility. We prepared data collection formats and used it to collect relevant information.

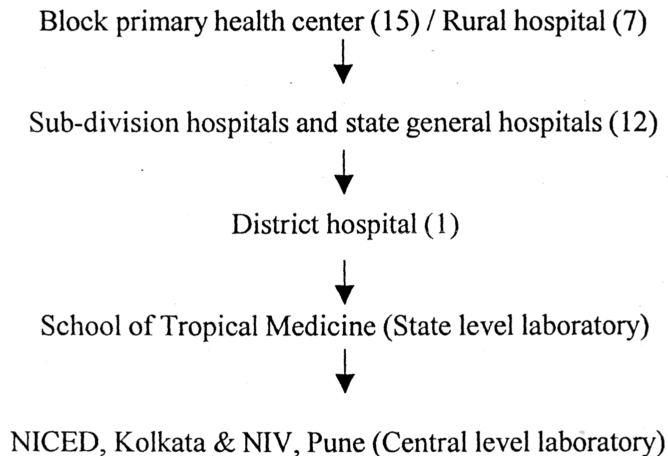
4. Results and Discussion

4.1. Infrastructure in Government facilities

The minimum laboratory set up is present at the BPHCs. There is no laboratory facilities at the PHC level, excepting sputum microscopy for identification of TB in selected PHCs. Graded laboratory services are available at state general, sub-divisional and district hospital.

In the district there are 15 BPHCs. State Health System Development Project II (SHSDP II) has taken some steps to expand the laboratory facilities at some of the BPHCs at Sundarban (mangrove forest) area and at seven rural hospitals, eight state general hospitals, four sub-division hospitals and one district hospital.

Figure 1: Flow chart of Laboratories at Government facilities



4.2. Laboratory facilities: proposed and existing

Different categories of hospitals have been provided with the facilities to perform laboratory tests. Facilities differ with the grade of hospital. However, it was observed that though proposed many of the tests are not done.

Proposed functioning of the laboratories in different tiers: government has formulated a clear-cut guideline depicting what laboratory facilities should be available at which level. They have given inputs in terms of manpower, equipments and consumables for upgrading the laboratories. The table below depicts proposed and existing facilities in different tiers of hospitals.

Table 1: Proposed and Existing Diagnostic laboratory Facility at Different Tiers of Hospitals, North 24 Parganas District

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing
1) Hematology	Blood for Hemoglobin	Yes	In some of the centers	Yes	In some of the centers	Yes	Yes	Yes	Yes
	TC, DC, ESR, BT, CT	Yes		Yes		Yes	Yes	Yes	Yes
	Peripheral blood smear	Yes		Yes		Yes	Yes	Yes	Yes
	Absolute Eosinophil Count	No	-	Yes	No	Yes	Yes	Yes	Yes
	Platelet count	No	-	No	-	Yes	Yes	Yes	Yes
	PCV	-	-	-	-	Yes	No	Yes	No
	Blood Group & Rh. typing	-	-	Yes	-	Yes	Yes	Yes	Yes

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	**Existing**	**Proposed**	**Existing**	**Proposed**	**Existing**	**Proposed**	**Existing**
	Blood smear for Malaria	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Blood smear for Microfilaria	Yes	No	Yes	No	Yes	No	Yes	Yes
	Reticulocyte count	-		-		Yes	No	Yes	Yes
	LE cell phenomenon	-		-		-	-	Yes	No
	Blood Bank (Cross matching)	-		-		Yes	Yes	Yes	Yes
	HIV, VDRL, MP, HbsAg	-		-		Yes	Yes	Yes	Yes
2) Urine Analysis	Sugar & Albumin	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	Microbiology	-	-	Yes	No	Yes	Yes	Yes	Yes
	Bile salt/pigment, Specific gravity, pH	-	-	-	-	Yes	Yes	Yes	Yes
	Ketone bodies	-	-	-	-	Yes	No	Yes	Yes

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing
3) Stool Analysis	Parasites (Ova & Cyst)	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	Occult Blood	-		-		Yes	Yes	Yes	Yes
	Hanging drop method	Yes	No	Yes	No	Yes	No	Yes	Yes
4) Semen Analysis	Morphology, reaction, count	-	-	-	-	Yes	No	Yes	Yes
5) CSF Analysis	Cell count	-	-	-	-	Yes	No	Yes	Yes
6) Aspirated fluid Analysis	Cell count & sedimentation cytology of malignant cell	-	-	-	-	Yes	No	Yes	Yes
7) Pap smear		-	-	-	-	Yes	No	Yes	No
8) FNAC		-	-	-	-	Yes	No	Yes	No
9) Sputum cytology		-	-	-	-	Yes	No	Yes	No

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing
10) Malignant cell in Hematology		-	-	-	-	Yes	Yes	Yes	Yes
11) Bone marrow		-	-	-	-	Yes	No	Yes	No
12) Immuno-hematology		-	-	-	-	Yes	No	Yes	No
13) Coagulation disorder		-	-	-	-	Yes	No	Yes	No
14) Sickle cell anemia		-	-	-	-	Yes	No	Yes	No
15) Test for Thallasaemia		-	-	-	-	Yes	No	Yes	No
16) Histopathology		-	-	-	-	Yes	No	Yes	No

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing
17) Microbiology	Direct smear exam. (AFB, ZN, KLB)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	C/S of all specimens (Blood, urine, pus etc.)	-	-	-	-	Yes	No	Yes	No
	Direct exam. Of specimen for fungal infection	-	-	-	-	Yes	No	Yes	No
	Bacteriological analysis of water	-	-	-	-	-	-	Yes	Yes
	Stool culture for V.Cholera	-	-	-	-	-	-	Yes	No
	Preparation and supply of proper transport media for all peripheral levels (VR, Carry Blair)	-	-	-	-	-	-	Yes	Yes

Facility	Tests	BPHC		Rural Hospital		SDH / SGH		District Hospital	
		Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing
18) Biochemistry	Blood sugar, Urea	-	-	-	-	Yes	Yes	Yes	Yes
	BUN, Creatinine	-	-	-	-	Yes	No	Yes	No
	Total & direct bilirubin	-	-	-	-	Yes	Yes	Yes	Yes
	CSF analysis	-	-	-	-	Yes	No	Yes	Yes
	LFT, Cholesterol, GTT, Lipid profile	-	-	-	-	Yes	Yes	Yes	Yes
	Blood gas analysis	-	-	-	-	Yes	No	Yes	No
	CPK, CPK-MB,	-	-	-	-	Yes	No	Yes	Yes
	Serum electrolytes, acid phosphatase,	-	-	-	-	Yes	No	Yes	No
	Alkaline Phosphatase, Lithium carbonate level in blood	-	-	-	-	Yes	No	Yes	No

4.4. Performance of laboratories

At District Hospital (DH) level

Mostly routine hematological, urine & stool, semen, and aspirated fluid analysis tests are carried out at this level. But histopathology, Pap smear, FNAC, sputum cytology, bone marrow, Immuno-hematology, coagulation disorder, sickle cell disease, Thallasaemia, Microbiology, culture sensitivity Blood sugar, BUN, CSF analysis, GTT, Blood gas analysis, estimation of CPK, CPK-MB, serum electrolytes, acid phosphatase, Alkaline Phosphatase, Lithium carbonate level in blood are not done at this level though all should have been done as per proposal. There is no dearth of manpower as 2 pathologists and 6 technicians are posted at this level.

This laboratory is the one having best infrastructure among all government health facilities. If its full resource and infrastructure are utilized, it can act as a reference laboratory for different tests necessary for surveillance of diseases of public health importance and during outbreak situation. All, excepting the viral diseases, can be diagnosed at this establishment.

At Sub-Divisional / State General hospital level

A good number of routine hematological, urine & stool, semen analysis tests are carried out at this level. Tests like BUN, Creatinine, CSF analysis, LFT, Cholesterol, GTT, Lipid profile, Blood gas analysis, estimation of CPK, CPK-MB, serum electrolytes, acid phosphatase, Alkaline Phosphatase, Lithium carbonate level in blood etc. are not done here though proposed. 1 pathologist and 3 technicians are in place at all the sub-divisional hospitals.

These laboratories can be utilized for appropriate tests necessary for the surveillance of the diseases and during an outbreak situation. Facilities can be mobilized to diagnose water borne diseases, malaria, Kala-azar, Filaria, bacterial diseases, TB, STD, HIV, HBV etc. at these facilities.

At Rural Hospital & Block Primary Health Center level

The laboratory service at BPHC level is actually limited to examination of malaria slides and sputum microscopy for AFB in most of the institutions. But the proposed tests were many like routine blood, urine & stool analysis. Only one technician is in place at most of the centers doing the malaria surveillance work only. Many of the malaria technicians are not adequately trained and so they need training for elementary laboratory work.

The health facilities of this tier have limited scope in diagnostic tests. However, malaria, TB can be diagnosed at this level.

Over all Functioning

The laboratories at district, sub-divisional and state general hospitals are not doing many of the investigations, which they are supposed to do. Number of technicians at most of the centers was found to be adequate. Supply of consumables and reagents were found satisfactory. Equipments were found to be sub-standard as per the opinion of the doctors and staffs and there was no effective system of maintenance. There was no facility of histopathology at any of the hospitals. It was possibly due to lack of supply of all necessary equipments, lack of competence of the technicians and lack of orientation and initiative on the part of doctors and other technical staffs.

In this context, it may be said that the absence of these services were possibly due to weakness in the infrastructure, lack of motivation of the doctors and other technical staffs.

4.5. Quality Control

Quality control of the laboratory work was found to exist in case of sputum microscopy at the centers under RNTCP. There are 100 microscopy centers throughout the district (69 at government, 13 at quasi government and 18 at NGO run health facilities), which are under quality control mechanism as per WHO norm. There is no other quality control mechanism existing.

4.6. Involvement of laboratories in disease surveillance and in outbreak situation

In the BPHCs and Rural hospitals, laboratories are routinely utilized for only malaria and tuberculosis passive surveillance work. This is applicable for higher tier hospitals also. None of these laboratories were involved in the laboratory investigations of public health emergencies. The district hospital has a facility of water testing, which other institutions have rarely utilized. It appears that the technical staffs attached to those laboratories do not have much orientation, enthusiasm, training, guidance, supervision and commitment for disease surveillance and public health emergencies.

All these facilities can support in surveillance activity and during epidemic emergencies by laboratory back up of different level. What is needed is proper orientation and networking of this establishments and utilization of their full potential.

4.7. Malaria laboratories at ACMOH offices

There was facility of examining malaria slides at ACMOH offices at different sub-divisions. But, in the later period, due to lack of laboratory technicians, 3 of the 4 sub-divisional malaria laboratories have been closed down. Only one malaria clinic is functioning at ACMOH office, Basirhat.

4.8. Involvement of laboratories in private sector

There are 235 Nursing Homes, 489 Laboratories and other clinical establishments (X-ray, USG, Physiotherapy clinics etc.) licensed to function as per clinical establishment act in this district. There is high concentration of such establishments in Barrackpur sub-division. However, necessary investigations suggested that none of the private laboratories has been involved in the disease surveillance and during investigation of the outbreaks. Rather they were found to be grossly unaware about this. There is no decision at the policy makers' level for involving them.

However, district health authority has recently decided to integrate this sector in disease surveillance and outbreak investigation. A letter has been issued to all licensed clinical establishments for this purpose. Format for regular monthly reporting from nursing homes and laboratories is under preparation. It would be considered as a pre-requisite for renewal of old license and issuance of new license. Some of the laboratories have been contacted personally in this regard. During verbal discussion, most of them expressed their willingness to collaborate with the health authority.

4.9. District level Public Health laboratory

The District level public health laboratory of this district was not set up properly. Some material input had been given. Arrangements of bacteriological testing of water, detection facilities of Kala-azar and malaria, preparation of transport media for stool culture have been made. But, unfortunately, it was not functioning properly probably due to lack of commitment and co-ordination of district health authority. The district deserves a full-fledged functioning public health laboratory for proper discharge of disease surveillance and outbreak control.

4.10. Role of State level laboratories and laboratories of other departments

School of Tropical Medicine, Kolkata acts as the reference laboratory at the state level. Stools, water samples, blood samples for Kala-azar are supposed to be examined at this institute to provide feedback to the concerned. There is also limited facility for detection of viruses in specimens. There is a laboratory under Public health engineering department at the district to assess the level of Arsenic in water. UNICEF has recently established four laboratories in collaboration with NGOs to test the water for estimating arsenic level.

4.11. Role of National level laboratories

Presently, National Institute of Cholera and Enteric Diseases (NICED), Kolkata (ICMR) helps the state government during epidemic investigation, when asked for. In the last epidemic of unknown fever in Murshidabad, NICED team investigated the epidemic. National Institute of Virology (NIV), Pune also did a number of investigations including

one already mentioned and Siliguri epidemic last year. National level laboratories routinely helped in polio surveillance. National Institute of Epidemiology, Chennai (NIE) can contribute a lot with their expertise in epidemic investigation. All India Institution of Hygiene and Public Health also helped the state government in this respect.

5. Conclusion

It was evident that the laboratory network was not in desired shape in this district. Lack of skilled manpower with motivation and commitment seem to play a major role for this existing situation.

The existing infrastructure needs to be strengthened including provision of properly trained manpower.

There was gross under utilization of resources at most of the places. So, regular supervision and performance appraisal of the laboratories by the district health authority is needed.

Most of the establishments possibly were not aware about the need of disease surveillance and the role of laboratories in surveillance and in outbreak control. So, they need to be made aware about it.

Private laboratories could play an important role in disease surveillance as many diseases are diagnosed first by them. By informing any unusual occurrence to the appropriate authority, they can play a major role in detecting and control of an epidemic at its early stage. A strategic planning is needed to fix up the responsibility at all tiers.

6. Recommendations

Following is my recommendation for building an efficient laboratory network in the district responsive and responsible to surveillance activities and outbreak preparedness.

6.1. Strategic planning

Identify laboratories under health services. Provide the laboratories properly trained committed manpower. Identify laboratories from medical colleges and specialized hospitals to be treated as reference laboratory to the district. Decentralize testing facilities at various levels of laboratories. Strengthen laboratories of different tiers by providing necessary instruments, media, reagents, kits and other required material. Provide communication facilities to identified laboratories. Establish Management Information System (MIS) for laboratory data. Integrate laboratories at sub-district/district/state level for compilation, analysis and dissemination of data for action. Involve private laboratories and link them with Government laboratories for coordination.

6.2. System strengthening

Provide necessary equipments and rapid diagnostic reagents and kits, media etc. Provide advanced technology at selected laboratories. Train of laboratory personnel. Network laboratories for MIS system and develop software. Reorganize laboratory staff. Identify private laboratories. Establish referral centers at selected medical collage laboratories and specialized hospitals like STM, NICED, NICD, NIV & Haffkin institute.

6.3. Need for Integration

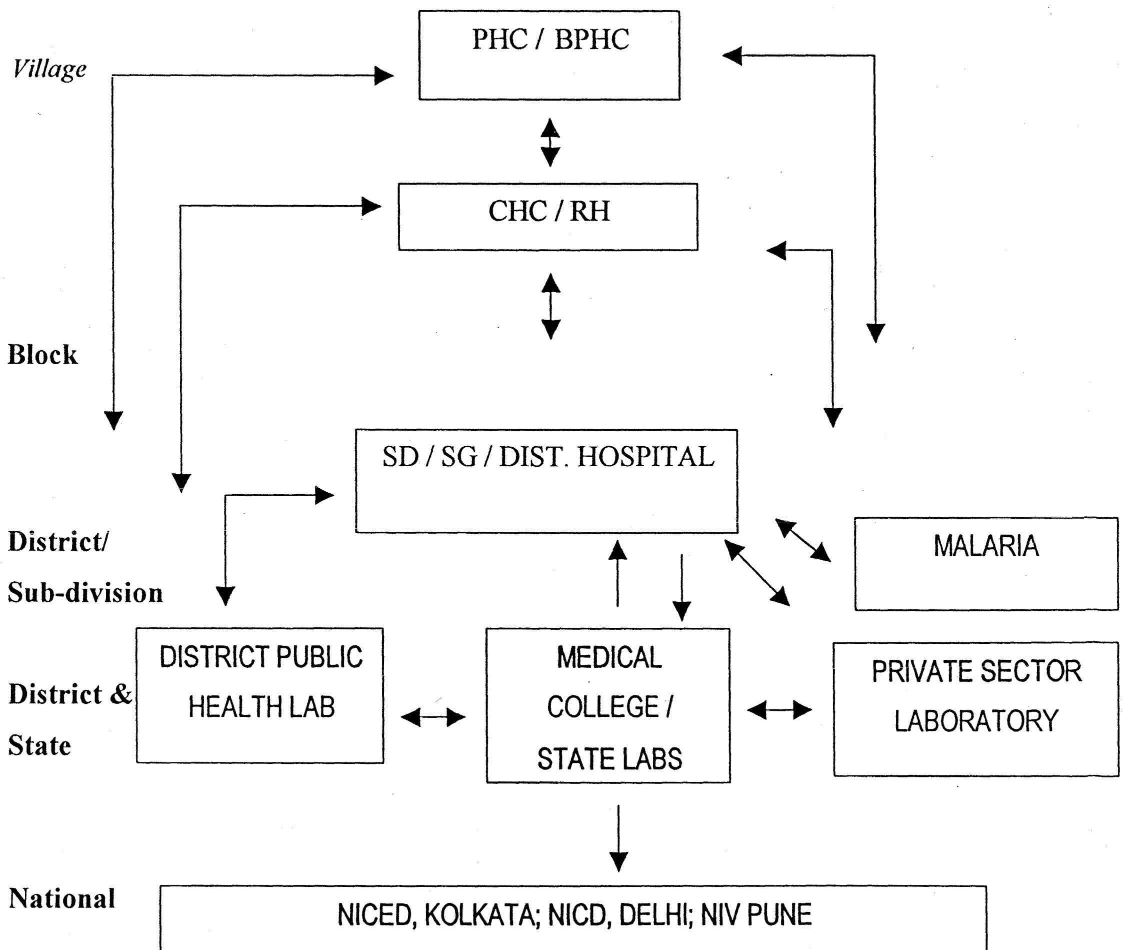
Integrate the laboratory network with vertical health program system. Improve lack of co-ordination and linkages at various levels. Ensure systematic collection, compilation and analysis of laboratory data for action and rapid communication.

6.4. Networking of diagnostic laboratories

Peripheral laboratories:	Primary Health Center
	Block Primary Health Center
	Community Health center / Rural hospital
Sub-divisional Laboratory:	SD hospital laboratory
	Malaria Laboratory under ACMOHs

District Level Laboratories:	District Hospital Laboratory
	District Public health Laboratory
Divisional & State level laboratories:	PH Lab & Medical college laboratory
National level laboratories:	NICED, Kolkata; NIV, Pune, NICD, Delhi

Figure 1: Proposed laboratory linkages in the district



6.5. Proposed functions of the laboratories at different tiers

Laboratories at different tiers may have different functions. It is proposed in Table 2.

Table 2: Proposed role of laboratories

Sl. No.	Laboratory	Main functions
1	Peripheral labs at PHC / BPHC / RH	Basic microscopic tests Routine few clinical and biochemical tests
2	District & SD hospitals	Complete serological tests / Rapid Diagnostic tests Complete biochemical tests.
3	District & sub-divisional Malaria labs	Complete PBS for MP Malaria spot test.
4	District Public Health Labs.	Complete analysis of water and food All types of bacterial culture. Ant microbial susceptibility test.
5	Medical college lab / state level lab	Reference for specific diseases. Training Research
6	National Laboratories	Co-coordinator Technical advisor. Training /Research

6.5. Proposed structure and facilities of the District level Public Health Laboratory

The diseases under surveillance and of epidemic potential could only be effectively controlled if there remains a strong laboratory facility at the district level. In this context, a district level public health laboratory is an absolute necessity. The public health laboratory will be under the direct supervision of the epidemiologist. Microbiologist of the district hospital will look after this laboratory in addition to his/her normal duty. 3 well-trained laboratory technicians are to be posted there.

Table 3 highlights the diseases under surveillance and of outbreak potential and proposes the laboratory tests that need to be available at the district public health laboratory for proper implementation of surveillance activities and response to outbreak situations.

Table 3: Proposed Facilities of a district public health laboratory

Sl. No.	Diseases under Surveillance	Laboratory facility Needed
1	Enteric infections – Cholera, Shigella, Salmonella, E. Coli, Enteric fever & other protozoal diseases	Hanging drop technique, Bacterial culture and sensitivity, Widal test, Stool for OPC
2	Hepatitis A,B & C	Serology, Estimation of Bilirubin, AST & ALT
3	Tuberculosis	Microscopy, Culture facility
4	STD & AIDS	VDRL, TPHA, Serology for HIV, Culture for gonococcus
5	ARI	Culture of throat swab, C/S facility for all bacterial infections
6	Kala-azar	Serology
7	Chronic Arsenicosis	Water test, Arsenic estimation in blood, Skin biopsy
8	Leprosy	Microscopy
9	Viral infections – JE, Dengue	Serology
10	Malaria	Microscopy, Serology for P. Falciparum
11	Others	Bacterial culture facility of all body fluids, CSF for cell count and biochemistry, Bacteriological quality of water, Preparation of bacteriological & transport culture media, Facility for testing food products.

DESCRIPTION OF THE SURVEILLANCE SYSTEM, NORTH 24 PARGANAS DISTRICT, WEST BENGAL

1. Introduction

Epidemiologic surveillance is the ongoing and systematic collection, analysis and interpretation of health related data in the process of describing and monitoring health events. This information is used for planning, implementing and evaluating health interventions and programs. Surveillance data are used both to determine the need of the public health action and to assess the effectiveness of the programs. An appropriate surveillance system allows us to use the public health resources in a best possible way by ensuring that only important problems are under surveillance and that the said system operates efficiently.

Today infectious communicable diseases pose a serious threat to our country. The disease burden in India in this respect is among the highest in the world. Infectious diseases are major causes of admissions in the hospitals and visits to health facilities. Non-communicable diseases are also on the rise due to change in life style and environment. India is passing through an epidemiological transition and in many states/districts non-communicable diseases contribute significantly to overall burden of the diseases in the community. The diseases of high outbreak potential like cholera and other diarrhoeal diseases, ARI, malaria, Dengue, Japanese encephalitis etc. is highly prevalent in many parts of our country. Certain socio-economic factors leading to ecological changes increased the risk of diseases and epidemics. The receptivity of an area to outbreaks is related to inadequate drinking water facilities, poor sanitary conditions and a weak public health system. Unfortunately, conditions are conducive for outbreaks in most parts of the country. While not all outbreaks can be predicted or prevented, epidemic preparedness

and precautionary measures can reduce the risk of outbreaks, minimize their scale and lessen their impact on human suffering.

In this backdrop, essentiality of an efficient surveillance system is unquestionable. It enables us in early prediction, early detection and early intervention in a public health crisis. It can also facilitate the study of the disease patterns and identify new emerging diseases, if any. It plays a crucial role in obtaining political and public support for the health programs in the country.

An efficient surveillance system must fulfill the following criteria.

1. Listing and prioritizing communicable diseases prevalent in the district.
2. Listing and prioritizing communicable diseases of high outbreak potential.
3. Listing and prioritizing non-communicable diseases of public health importance.
4. Designing case definition of each disease under surveillance.
5. Level of referrals and their role after receiving report – a) Action for control of diseases b) feedback to upper and lower levels.
6. Surveillance system should be made flexible, dynamic, efficient, and it should be used properly.
7. A person should be responsible at each level for handling surveillance data. S/he should be adequately trained in analyzing and interpreting data. Duplication of data and missing information are to be cared.
8. When some serious/infectious disease would be suspected, immediate public health action is to be initiated at community level, e.g. contact tracing, mass prophylaxis, vaccination, control of environment etc.
9. There should be follow up of the disease and action taken.
10. There must be a trained epidemiologist/public health specialist at the top in the district for monitoring diseases continuously (weekly, monthly, yearly) in terms of time, place and person distribution and to detect an epidemic at an early stage. S/he should provide feedback to his/her higher and subordinate institutions.
11. Role of laboratories in diagnosing suspected cases at the earliest possible time at all levels (as per specifications) needs to be ensured.

12. Epidemic investigation/Rapid response team is to be constituted.
13. Regular meeting with district health/other linked sector authorities is to be held.
14. Participation of private and NGO sectors in surveillance is to be ensured.

2. Objectives

Based on the above criteria, I described the existing surveillance system of North 24 Parganas district with the following objectives.

a) To describe the existing surveillance system in North 24 Parganas.
b) To describe the application of the surveillance system by the health authorities.
c) To find out the epidemic preparedness of the district.
d) To find out the laboratory support services available at the different levels of health facilities to facilitate surveillance system.
e) To learn about the status of surveillance in urban sectors.
f) To study the existing infrastructure for training of health personnel.
g) To study the relationship with other vertical programs involved in surveillance and the status of intersectoral coordination.
h) To study the involvement of non-governmental organizations and private health sectors in surveillance and epidemic control.

3. Methods

I visited the office of the Chief Medical Officer of Health (CMOH) of the district, described him the purpose of my study and sought help and advice. Deputy CMOH II of the district is the nodal officer for disease surveillance. I met him and sought permission to access the data and records available, to interview the persons responsible for surveillance activities at different tiers of the service delivery system. I prepared formats to record data and designed checklists for interviewing the concerned persons. I interviewed the 30 health functionaries at the district hospital (DH), sub-division hospitals (SDH), state general hospitals (SGH), rural hospitals (RH) and block primary

health centers (BPHC) and primary health centers (PHC) regarding the system, their role, awareness, and impression about this. Health supervisors, field level health workers were also interviewed. I checked their reporting formats, how they were filling it and on what basis and also asked about the regularity of sending such reports. I enquired about the constraints they were facing and laboratory support they were receiving. I tried to assess their awareness about case definitions of the diseases under surveillance, knowledge on epidemic preparedness and response. Relevant records were verified at different institutional levels. Some peripheral health workers, both at institutions and at community level were discussed about their community action in need. Attempt was made to understand the overall epidemic preparedness status of the district, data management system and use of data by the health authority of the district.

4. Results and Discussion

4.1. Types of systems existing in the district

Currently there are four major surveillance programs in the district.

1. There is monthly disease surveillance for 19 communicable diseases.
2. There is monthly disease surveillance system for 11 other diseases of public health importance. The list of disease conditions under this heading is incorporated in the format of communicable diseases.
3. There is hospital-based surveillance under HMIS of 84 disease conditions as per site and type of the diseases.
4. There are vertical programs for some diseases like TB, Malaria, HIV/AIDS/STD, Blindness and Polio etc.

The details of the four major disease surveillance systems are shown in Table 1.

Table 1: Status of existing surveillance system in North 24 Parganas

Different criteria of surveillance	Communicable diseases	Some important diseases of PH importance	HMIS surveillance	National programs
		Case Detection		
Diseases	19	11	84	TB, Malaria, VPDs, HIV/STD etc.
Case definition	Yes	Yes	Yes	Yes
Register for case detection	OPD/IPD registers, Field surveys	OPD/IPD registers	OPD/IPD registers	Yes
Case management manuals	No	No	No	Yes
Are the reporting units clearly defined?	BPHC, RH, SDH, SGH & DH	BPHC, RH, SDH, SGH & DH	BPHC, RH, SDH, SGH & DH	Yes
		Data Reporting		
Forms for reporting	Manual forms	Manual forms	Manual forms	Yes
Is the transmission channel clearly defined?	Yes BPHC/RH/SDH/SGH/DH → Dy. CMOH II → State (PH section, SBHI and SHSDP II)			Yes
Mechanism of transmission	Manually, by post or fax	Manually, by post or fax	Manually, by post or fax	Manually, by post or fax, Email used in RNTCP
Frequency of reporting	Monthly	Monthly	Monthly/ Quarterly	Monthly / Quarterly

Different criteria of surveillance	Communicable diseases	Some important diseases of PH importance	HMIS surveillance	National programs
Specific person for reporting	Yes (Many posts are vacant)	Yes (Many posts are vacant)	Yes (Many posts vacant)	Yes
		Data Compilation		
Register for compilation	Yes	Yes	Yes	Yes
Manually or computerized	Manually	Manually	Manually	Manually, computerized in RNTCP
Software available for compilation	No	No	No	No excepting RNTCP
Specific person identified for compilation	Yes (Many posts are vacant)	Yes (Many posts are vacant)	Yes (Many posts are vacant)	Yes
		Analysis		
Is analysis being done?	Inadequately done	Inadequately done	Inadequately done	Done
Is there any specific person for analysis?	No	No	No	No
Is there any action threshold defined for each disease?	No	No	No	No in most programs excepting Polio & Pf malaria
Use of software for data analysis	No	No	No	No excepting RNTCP
Use of GIS in analysis	No	No	No	No

Different criteria of surveillance	Communicable diseases	Some important diseases of PH importance	HMIS surveillance	National programs
		Laboratory		
Laboratory facility available	At BPHCs, RH, SDHs, SGHs, DH, State level reference laboratory at STM, Some NGO run sputum microscopy centers			
Manpower available in labs.	Adequate in hospitals. Some posts are vacant at rural centers.			
Tests done at the labs.	At BPHC & RH level – Sputum microscopy and Malaria parasite At SDH/SGH level – Hemogram, AFB, MP, urine, stool, VDRL, HbsAg, HIV At DH level – Widal, LFT, Lipid profile, water testing and other tests			
Capacity to collect lab samples	No earmarked persons			
Lab guideline for collection and transport	No	No	No	No
Transport media available	Cary Blair media available at district hospital for transport of stool			
		Response Mechanism		
Availability of RRT	No formal team. Team formed by Deputy CMOH II from his staffs as and when necessary.			
Vehicle for RRT	No earmarked vehicle. Vehicle of Deputy CMOH II used as and when necessary.			
Is there any specific person identified for coordination of response?	District Sanitary Inspector does the job.			
Are there any manuals available for response?	No	No	No	Yes
Is there a plan for epidemic preparedness & response?	No. A plan for disaster management like flood is present.			Yes
Availability of an epidemic cell	No sanctioned unit at district level. Sanctioned unit at sub-divisions with deficient staffs.			No

Different criteria of surveillance	Communicable diseases	Some important diseases of PH importance	HMIS surveillance	National programs
Is there any mechanism for feedback?	In monthly meeting at district level. Also started at sub-division level.			
		Urban surveillance		
Is there any surveillance in urban sector?	Highly deficient as there is no staffs under district health authority. Mainly based on the reports collected from the hospitals in the urban areas. Two zonal offices of CMUHO collect reports mainly in connection with malaria and submit it to the directorate directly.			
		Infrastructure		
Legislations	State laws and country laws			
Mechanisms to implement it	Weak and deficient.			
Focal point for surveillance	Not clearly defined.			Yes
Is there a budget for surveillance?	No	No	No	Yes, as in Malaria, TB, HIV/STD etc.
Manpower at each level	Deficient			
Training of the staffs	Mainly program based			
Availability of phone line	Present in most BPHCs, hospitals and district center.			
		Manuals		
Operating manuals	No			Yes
Technical guideline	Present, but not used by the staffs regularly.			Yes
Training manuals	Yes, Program based.			Yes

4.2. Reporting system

The current surveillance provides basic information about a limited group of diseases. The data of reporting units (35 units – 22 blocks, 13 hospitals) is collected via monthly reports. Two reporting format are in use – one for 19 communicable diseases and 11 diseases of public health importance and another for 84 disease conditions as per site and type designed by HMIS. Both the reports are compiled at the office of Deputy CMOH II based on the data transmitted from the 35 rural and urban units and sent to Public Health section of the directorate, State Bureau of Health Intelligence (SBHI) and State Health Service Development Project II (SHSDP-II).

Reporting habit of the units was very irregular before 2001. The situation improved afterwards. Presently, most of the units are reporting more or less regularly. However, still there are some irregular units and incompleteness of data is the most vexing problem in respect to many units.

Reports of the sub-centers (n=690) collected by the health workers are compiled at the sector level (n=117) by the sector supervisors. Reports of the sectors are submitted at the block where Computer (a post, not machine) compiled these data. The compiled report is then sent to district under the signature of BMOH. In the urban areas, the reports as per HMIS format are prepared by the hospitals (n=13) and sent to the district. Epidemic investigation and any other special reports are submitted by respective ACMOHs of the sub-divisions.

Urban municipal health set up used to send regular reports during special programs like Pulse polio or Family Health awareness Campaign (FHAC). During any event of public health crisis including epidemic they inform district health authority and function jointly to control the same. However, there is no existing system of regular monthly reporting of the diseases under surveillance by the municipalities.

At the district level, there is no sanctioned statistical cell for compilation and analysis of data. One person has been detailed from adjacent district to do the work. Acting District Sanitary Inspector and other staffs help that person.

There is no system of regular weekly reporting of selected epidemic prone diseases. However, during epidemic daily report is prepared and control action is usually designed accordingly.

Table 2: List of communicable diseases under surveillance (n = 19)

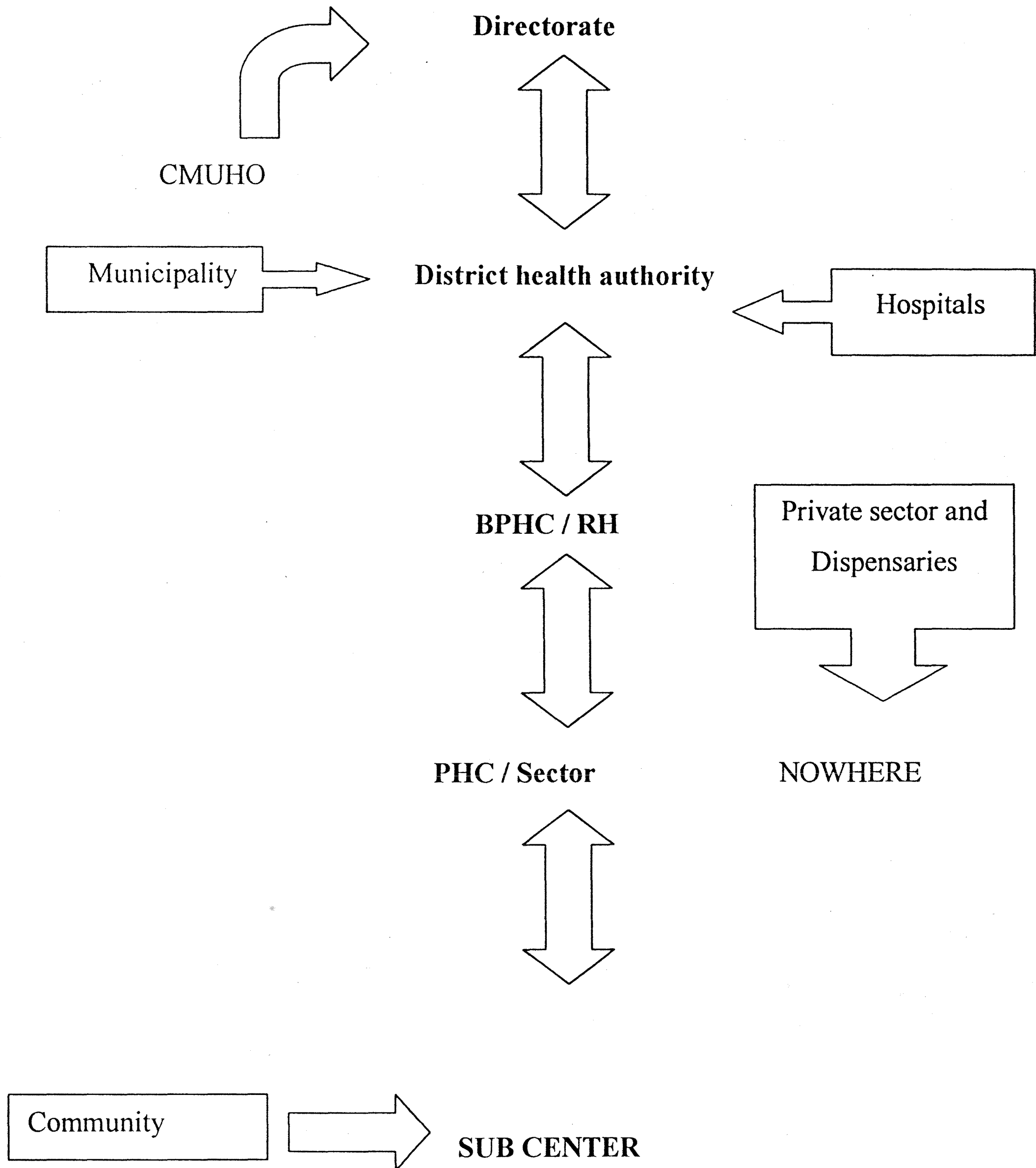
Diarrhoeal diseases	Enteric Fever
a) Cholera	Viral Hepatitis
b) Gastroenteritis	Japanese Encephalitis
c) Bacillary dysentery	Meningococcal Meningitis
d) Other	Rabies
Diphtheria	STD
Acute Poliomyelitis	Tuberculosis
Neonatal Tetanus	Malaria
Other Tetanus	Kala-azar
Whooping Cough	ARI (including Influenza,
Measles	excluding Pneumonia)
Pneumonia	Chicken Pox

Table 3: List of some important diseases under surveillance (n = 11)

Dog Bite	Food Poisoning
Snake Bite	Dengue
Other Animal Bite	Influenza
Sun Stroke	Anthrax
Guinea worm	Arsenicosis
Filaria	

'Monthly Report of Medical Institutions' format of HMIS is used to collect data from health facilities. It provides us data of that facility on its existing infrastructure, its utilization like total number of admission, patient days, total discharge and death, bed occupancy rate, department wise number of outpatients, number of major surgeries, post

Figure 1: Flow of surveillance information



4.4. Existing situation of Epidemic Investigation

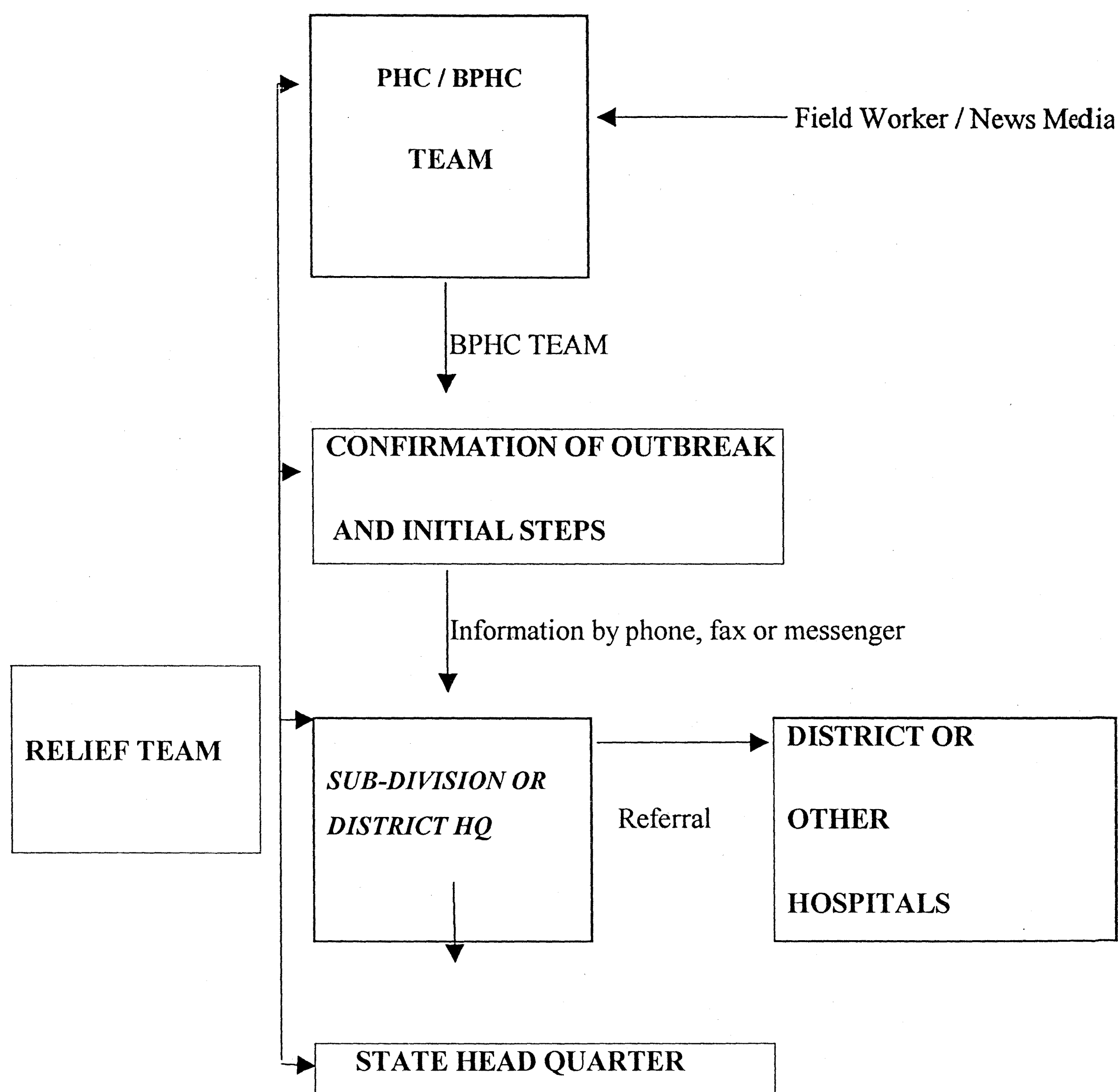
Information about probable epidemic is usually obtained from various sources – from the field workers, community, municipal authorities in urban area and news media. On the basis of first information, the BPHC team consisting of health supervisors and health workers, sometimes, medical officers visit the site to see patients and verify the epidemic. If outbreak is confirmed, initial steps to control it are started by the block authority and the MO in charge informs the ACMOH of the sub-division and district headquarter over telephone or special messenger.

A team from the sub-division or the district headquarter consisting of senior public health staffs sometimes headed by the ACMOH or Deputy CMOH II visit the spot. Investigation is carried out, the patients if necessary are referred to the near by hospital and public health measures are taken.

The Deputy CMOH II on behalf of the CMOH informs the Public health section of the Directorate and sends a status report as per prescribed format. In need, state team visits the site of outbreak and extends help to the district authority.

There is no ideally constituted team for rapid response or epidemic investigation. The work is done by the epidemic cell at the sub-division level and team constituted by Deputy CMOH II at the district level mainly by the senior paramedical worker.

Figure 2: Flow chart of epidemic preparedness and response



4.5. Analysis

At present, data is just passively transferred from periphery to district. There is very little analysis done at the peripheral level. At the district level, efforts have been taken to analyze the yearly data to find out trends of certain diseases of public health importance. There is no system of analyzing the data monthly and area wise. On the basis of absolute

figures district authority has attempted to identify the vulnerable areas of the districts, specifically in relation to Arsenicosis, Kala-azar, diarrhea etc. HMIS data submitted by the hospitals are analyzed to find out the level of performances of the hospitals.

4.6. Laboratory Infrastructure

It is deficient at all levels. There is no functioning district public health laboratory. One attempt has been made to establish such at the district hospital, but it is non-functioning from the date of inception. Little endeavor is present to use whatever facilities available at secondary tier hospitals for PH purpose. Private sector has almost no involvement in surveillance and outbreak control.

Table 4: Major tests performed at different health facilities, North 24 Parganas

Category	Tests Performed
BPHC	Malaria parasite, Sputum for AFB
Rural Hospital	Malaria parasite, Sputum for AFB
SD & SG hospital	Malaria parasite, Sputum for AFB, Hemogram, Urine, Stool, HbsAg, HIV,VDRL etc.
District hospital	Malaria parasite, Sputum for AFB, Hemogram, Urine, Stool, HbsAg, HIV, VDRL, LFT, Lipid profile etc.

Cultures of microorganisms, histopathology, fine needle aspiration cytology (FNAC), cerebrospinal fluid (CSF) biochemistry facilities are not available at any of the hospitals of the district. The laboratory facility of revised national tuberculosis control program (RNTCP) is well developed through out the district and Malaria slide examination is done at all tiers of health institutions. Quality assurance is only present in RNTCP.

4.7. Urban Surveillance

More than 50% of population of this district lives in the urban area. There are 27 municipalities and 1 cantonment board. Some of the municipalities are supported by Kolkata Metropolitan development Authority (KMDA) and some are not. The first group

of municipalities has an infrastructure of health with one or more medical officers at the top. These municipalities enjoy support from IPP8 and CUDP III schemes. The health workers employed under these schemes receive very small honorarium and usually do the work of MCH, child nutrition among the BPL families. They are involved in issue-based programs like Pulse polio, FHAC etc. These health workers conduct no regular surveillance activities. During any public health crisis, district health authority with the help of this network combats the crisis situation. The status of non-KMDA municipalities in this regard is very poor. They have to depend on the district or sub-divisional health authority and local volunteers solely for this purpose.

In Barrackpur sub-division, a zonal network of Calcutta Metropolitan Urban Health Organization (CMUHO) is present. They usually do the work related with NAMP and report directly to directorate. Zone I irregularly sends report of NAMP to the district. If there is an epidemic, they send information to the district urging intervention. During issue based programs like Pulse polio, FHAC etc they work jointly with district health authority. There is a lot of vacancy at all its level. This network is not under the control of district health authority, accountable directly to the directorate, as a result of which district health department is in no position to utilize its existing resources fully.

In summary, it can be said that though the field network in the urban area is deficient in comparison to rural sector, the resources whatever available either under municipalities or under CMUHO remain underutilized due to lack of planning and its proper execution. Surveillance data obtained from this area mainly contains information of the hospitals and so inadequate for comprehensive assessment.

4.8. Integrated child development scheme (ICDS) infrastructure

There are 27 project units functioning in the district – 21 in blocks and 6 in urban area (4 in Barrackpur sub-division and 2 in Barasat sub-division). 1 in Baduria block is going to be commissioned soon. 4970 AWW and 24 CDPO are working. ICDS is involved in routine immunization, child nutrition, sanitation, pre-school education, and food supplementation programs. Health education is imparted in the mothers' meetings. They

do referral of suspected cases of TB and Leprosy. However, they are not involved in any regular disease surveillance activities.

4.9. Training Infrastructure

District has no training center. The district officers used to get training from the state. They in turn impart training to the doctors and health workers of the district as and when necessary. State facilitators used to attend these training programs. However, the district health authority has successfully conducted training programs on different national programs in the past.

4.10. Relationship with other vertical programs

The surveillance of communicable diseases is somewhat fragmented along the lines of other national programs like RNTCP, NAMP, NLEP, HIV/AIDS etc. Sometimes, reporting has to be made at multiple sites leading to overburdening of the existing surveillance mechanism.

4.11. Private health sector

Private health sector is huge in this district, particularly concentrated in Barrackpur sub-division. There are 235 Nursing homes and 489 laboratories and other clinical establishments. Apart from these, a large number of independent medical practitioners and quacks render medical service in urban and rural area. There are several representative bodies of the medical professionals. Doctors in private sector are mostly members of Indian Medical Association and doctors in government service by their service organization, Association of Health Service Doctors, west Bengal.

Involvement in the NGO sector is on the rise. 53 NGOs have been enlisted who used to participate in different national programs like TB, Blindness control, Immunization, AIDS control, Voluntary blood donation etc. A large NGO (SHIS) looks after two TB units. Still it can be said that there is lack of coordination existing between government and NGO sector and there is a lot of scope to develop this. Private sector has not been

approached properly to be a part of the disease surveillance and outbreak control system. There is no clear policy decision in this regard.

4.12. Strengths of the existing system

- Availability of an existing surveillance system.
- Availability of manpower / infrastructure from periphery to district.
- Reporting of communicable diseases on monthly basis.
- Reporting channels are clearly identified.
- Outbreak reporting done mostly by community and health workers.
- Laboratory set up available from BPHC to District hospital.
- Successful implementation of ongoing vertical programs like NAMP, RNTCP, RCH, NLEP etc.
- Presence of ICDS network in 22 blocks and 6 units in urban area.
- Presence of IPP8 and CUDP III network at most of the municipalities.
- 172 government doctors, 4 private practitioners, 603 government health workers, 3 gram pradhans and 63 NGO volunteers have been trained on 'Disease surveillance activity' as per the module designed by NICD in 23 batches, 2 days each.
- Electronic communication facility has improved from the BPHC level due to necessary input by SHSDP II. It has decreased the delay of arrival of reports from the periphery due to routine use of fax.

4.13. Weakness of the existing system

Reporting system

- There are currently number of surveillance systems with considerable overburdening of the surveillance mechanism and duplication to some extent.

- There are no clear-cut case definitions for each of the disease under surveillance. A guideline designed by NICD of how to identify a disease serves the purpose till date.
- The monthly report format contains OPD, IPD data. Field data of the blocks are amalgamated in these two heads. There is some duplication as some of the patients in IPD are also entered in OPD data.
- Reporting is directly from BPHC to district leading to information overload at that level. Sub-division is least involved.
- There are problems in timeliness and completeness of data - hence loosing its integrity for early action.
- There are problems in understanding the disease pattern of non-reporting blocks. Similar problems are present in urban areas as the status of communicable diseases in those areas is mostly assessed on the basis of hospital data only. Hence, cannot be considered as useful data for establishing early signals to the field.
- Forms and registers are mostly manually prepared. Data transmission from periphery to district is done manually at most centers. Introduction of Fax facility at BPHC/RH level is improving the scenario reducing the delay in reporting.
- The district is not under NSPCD.
- There is a hospital-based system for collecting data, from which some sort of NCD surveillance can be done. But it remains ineffective till date.

Analysis and Interpretation

- Only limited analysis is apparently carried out at district level.
- These consist primarily of tabulation of data in registers and compilation for sending it to the state. Yearly trend of some diseases are calculated in the district level mainly on the basis of disease load. Monthly trends of diseases in individual block and municipal area are not systematically examined by calculating the rates.

- Hospital performances are evaluated yearly on the basis of guideline designed by the state from the HMIS data collected from the institutions.
- Tools, knowledge and skills for analysis are almost absent among the medical officers of BPHC, RH and hospitals.

Manpower

- There are vacancies in the posts of medical officers at PHCs, BPHCs and Rural hospitals. A large number of posts of MPHW (Male) and Supervisors are vacant.
- Posting of paramedical technical persons at the hospitals lack rationality. It leads to underutilization in some centers and overburdening in some others.

Laboratory

- Laboratory facilities are inadequate at all levels. Even at district hospital culture facility is not available.
- There is no public health laboratory functioning at the district level.

Response Mechanisms

- There is no Rapid Response Team at district level. However, during crisis team is organized and sent to the site for investigation and control.
- Support for investigation teams is not apparent.
- There are scanty manuals and guidelines for response mechanisms.
- Feedback mechanisms are limited to monthly meetings. Formal mechanism like News Letter is not published.

Connectivity

- 6 blocks in riverine area of Basirhat are difficult to approach.
- Telephone and vehicle facilities are not available at all blocks.

- Computer facility is available at district headquarter. But, there is no Internet or on line facility.

Training facility

- There is no training institute in the district.

Private Sector

- Private sector has little been sensitized for participating in the surveillance and outbreak control.
- It is highly concentrated in Barrackpur sub-division.
- There is lack of coordination between government and private sector.

Surveillance mechanism

- Increased incidences of diarrhoeal diseases including cholera, Kala-azar and Arsenicosis have pointed towards the gaps in the surveillance mechanism.
- The existing system is weak, especially in the urban area.
- At present, record keeping and response mechanism have improved in comparison to previous years. But there is little analysis.
- Lack of laboratory facilities leads to delay in the diagnosis in the disease conditions.
- The surveillance of communicable diseases are somewhat fragmented along the line of the national programs. This leads to unnecessary duplication and loss of an opportunity for synergistic development of the surveillance system.
- There is considerable lack in coordination between the office assigned for surveillance and the other offices responsible for national programs.
- The understanding of the reporting format e.g. for 84 disease conditions reported by 35 units, is inadequate among the reporting personnel leading to submission of data which sometimes raises the question of reliability.

- The HMIS data format is too long asking for much information, which is never analyzed.
- There is delay in reporting and outbreak response from the difficult to approach riverine area.
- Lack of systematic training facilities leads to insufficient understanding and haphazard approach to control epidemic situation in some events.

4.14. Opportunities of the existing system

- The field activities can be more intensified if the vacancies of the MPHW (M) and supervisors etc. are filled up.
- Filling up of posts will make the PHCs function better.
- The laboratories can be made better functioning with some inputs in terms of material, manpower and training.
- Health care network present in the KMDA supported municipalities may be utilized to a greater extent, if the field staffs are given additional financial boosting.
- ICDS network covers the whole of rural area and a part of urban area. These workers may be utilized to a greater extent. Possibly, it can be done with some additional financial benefits.
- SHSDP II has been giving some inputs to develop the infrastructure of some selected BPHCs, all hospitals. This can help a lot to fill up the gaps in the existing surveillance and laboratory network.
- NABARD is going to launch a project of up-gradation of one third PHCs. Properly planned implementation of such may help in development of surveillance system in the rural area.
- Proper training of the existing staffs on surveillance and outbreak control may improve the situation.
- Revised and simplified format of reporting, stoppage of collection of data unnecessary at present, preventing duplication of data will lessen the burden of the health workers and increase the quality of reporting.

- Framing of proper case definition of diseases and strict adherence to it will raise the quality of existing system.

4.15. Threats in the existing system

- Natural crisis like flood and high tides in some areas may jeopardize the surveillance system.
- Overburdening of field staffs due to vacancy of posts, absence and vacancy of posts at the district level have already resulted in grievances, which is affecting the quality of work.
- Lack of easy approachability of the riverine blocks leads to problem in surveillance and outbreak control.

5. Recommendations

Collect surveillance data of communicable diseases following the format of National Surveillance Program for Communicable Diseases (NSPCD0. It is more precise and comprehensive.

Collect and periodically update demographic data through field survey so that proper denominators can be used to calculate incidence/attack rates. It must be done up to sub-center level.

Follow case definitions of the diseases under surveillance to ensure proper reporting.

Focus on sentinel surveillance for non-communicable diseases of public health importance.

Do not collect data, which will not be analyzed. It will lessen the burden on the health workers and improve the quality of work.

Analyze the data at least from block level. Certain basic indicators should be fixed. Quarterly analysis of data to find out the trend of diseases is to be done by the district health authority for each block and the district as a whole.

Ensure computer facility from block headquarter level and training of staffs to use it.

Design simple software to do the analysis work. Provide it to the blocks and upwards.

Ensure on line electronic connectivity between blocks and district.

Avoid duplication of reporting by integrating surveillance activity of all the disease related programs.

Strictly follow the case definitions of the diseases under surveillance.

Supply printed formats for reporting sufficiently to sib-center level.

Strengthen laboratory infrastructure from BPHC to District hospital and ensure minimum tests at each level.

Involve private sector more widely in surveillance activity. Necessary policy decision to involve private laboratories and practitioners should be announced without delay.

Ensure involvement of non-governmental organizations in implementation of national programs, disease surveillance and outbreak control.

Establish a Rapid Response Team at the district level.

Establish an Epidemiological cell and public health labortory at the district level.

Immediately fill up the vacancies of medical officers and paramedical personnel.

Ensure regular training of the health personnel to increase the efficiency and update the knowledge.

Improve inter departmental coordination.

Ensure regular feedback system from district to periphery.

SECONDARY HEALTH RELATED SURVEILLANCE DATA ANALYSIS, NORTH 24 PARGANAS DISTRICT, WEST BENGAL

1. Introduction

Secondary data analysis uses the analysis of data that the analyst was not responsible for collecting or data that was collected for a different problem from the one currently under analysis. The data that are already collected and archived in some fashion are referred to as secondary information (Stewart and Kamins, 1993). Statistical meta-analysis might be considered a special case of secondary analysis.
Secondary information is an inexpensive data source that facilitates the research process in several ways. It is also useful for generating hypotheses for further research. It is useful in comparing findings from different studies and examining trends. Population data sets, such as Bureau of the Census data, may be used to compare sample to population characteristics in order to examine the representativeness of the study sample. (Stewart and Kamins, 1993)

The analysis of secondary information is a useful strategy for learning research process. The secondary data sets that have used optimum sampling techniques provide an optimum resource for students by virtue of the quality of sampling and the time and expense involved in data collection.

There is more than a subtle difference between 'data', 'information' and 'intelligence'. Data consists of discreet observations of attributes or events that carry little meaning when considered alone. Data as collected from operating health systems or institutions

are inadequate for planning. *'Data'* need to be transformed into *'information'* by reducing them, summarizing them and adjusting them for variations, such as the age and sex composition of the population so that comparisons over time and place are possible. It is the transformation of information through integration and processing with experience and perceptions based on social and political values that produces *'intelligence'*. Data that are not transformed into information and information that is not transformed into intelligence to guide decision-makers, policy makers, planners, administrators and health care personnel themselves, are of little value.

The important uses to which health information generated by secondary data may be applied are:

1. To measure the health status of the people and to quantify their health problems including medical and health care needs.
2. For local, national and international comparisons of health status.
3. For planning, administration and effective management of health services and programs.
4. For assessing whether the health services are accomplishing their objectives in terms of their effectiveness and efficiency.
5. For assessing the attitude and degree of satisfaction of the beneficiaries with the health system, and
6. For research on a particular problems of health and disease.

2. Objectives

The present study of analyzing the secondary data of North 24 Parganas district aims at understanding mortality and morbidity pattern and trend of the diseases of public health importance. The objectives of the study are:

1. To describe the trends of diseases of public health importance.
2. To identify diseases of epidemic potential.
3. To study the present state of disease surveillance system and its lacunae.
4. To study the epidemic preparedness status of the district.

3. Methods

I contacted the Chief Medical Officer of Health (CMOH) of the district and described him the purpose of my project and also the need to analyze the secondary health related data of the district. I explained him how this analysis will come to his use to understand the status of the events of public health importance of his district and also in the evaluation of the ongoing surveillance programs. I sought permission from him to access the secondary health related data and also requested him to direct Deputy Chief Medical officers to cooperate me to do such analysis.

Deputy Chief Medical Officer II is the nodal officer to look after the disease surveillance activities of the district. Deputy Chief Medical Officer III supervises family planning and reproductive and child health program. Assistant Chief Medical Officers are in charge of the administrative sub-divisions. I met all of them and described the purpose of my project and the outcome of my discussion with CMOH. They, all, ensured me their cooperation. I met superintendent of the district hospital for the same purpose and he responded favorably. I attended one district level Health Information and Management System (HMIS) meeting and explained to the officers in charge of peripheral health institutions. I asked necessary cooperation from them.

I then visited the State Bureau of Health Intelligence and Project cell under the Directorate of Health Services and obtained necessary permissions to access the secondary health related data of my study district available to them.

I designed formats for collection of necessary data from different authorities and also an interview schedule to obtain information about methodology of reporting from the peripheral institutions. I pre-tested the formats and schedules and made essential corrections.

I visited the offices of the above-mentioned officers and went through the data available at their offices and filled up the data collection formats after necessary verification. Different tiers of health facilities at various corners of the district were also visited to collect such data. Concerned persons in the above-mentioned establishments were

interviewed. I crosschecked collected data with those available at State Bureau of Health Intelligence and Project cell of the health directorate.

4. Results and Discussions

4.1. Disease profile: Diarrhoeal diseases

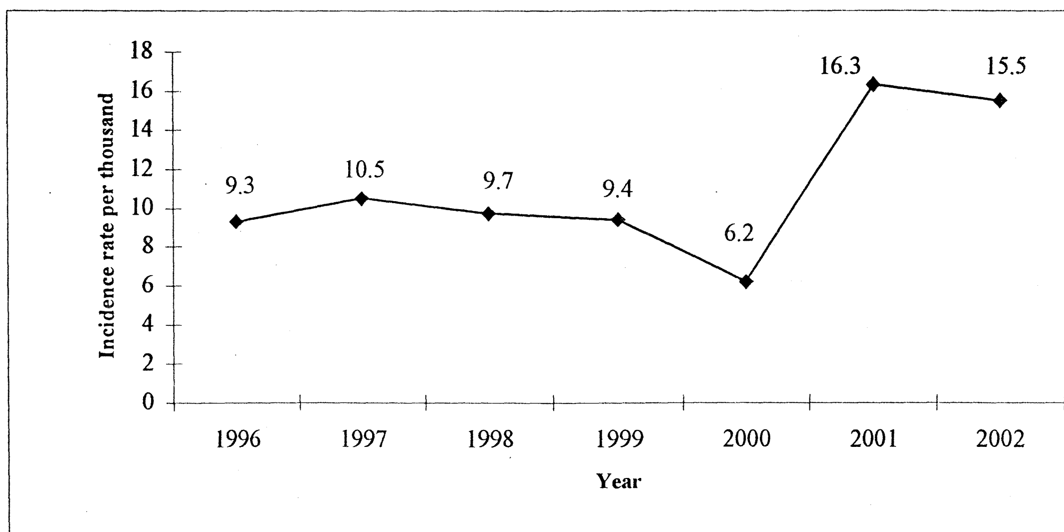
The Table 1 and Figure 1 above show increased incidence of diarrhoeal diseases since 2001. It is probably due to better reporting system since the year of 2000. However, first quarter of 2003 shows considerably lower incidence rate, which could be due to seasonal variation. There is endemicity of cholera in the district with episodes of outbreak in both rural and urban areas. However, cholera cases used to be reported under diarrhoeal disease surveillance system and so included in the data furnished below. Water and sanitation system in both urban and rural area deserves further improvement.

Table 1: Diarrhea cases in all age groups, North 24 Parganas, 1996-2002

Year	Cases	Death	Incidence per 1000 population	Case fatality ratio (%)
1996	67932	32	9.33	0.05
1997	76778	43	10.54	0.06
1998	70465	78	9.68	0.11
1999	68256	28	9.37	0.04
2000	44878	65	6.16	0.14
2001	145462	72	16.29	0.05
2002	138684	84	15.53	0.06

Source: Dy. CMOH II office, North 24 Parganas

Figure 1: Diarrhea cases in all age groups, North 24 Parganas district, 1996-2002



4.2. Disease profile: Acute respiratory infection, Measles and Enteric fever

Incidence of ARI shows increase in 2001. Possibly it was due to better reporting system. However, in first quarter of 2003 it showed a low incidence probably due to seasonal variation. (Table 2, Figure 2)

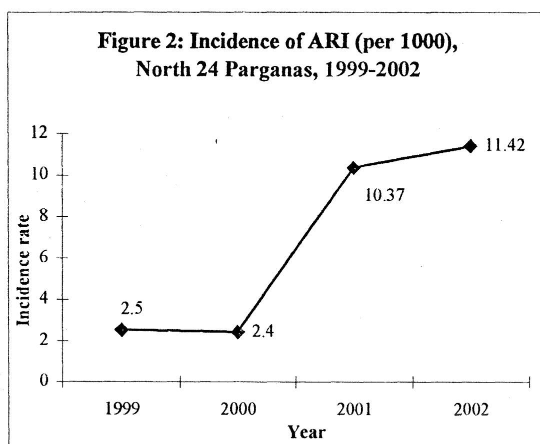
Incidence of Measles shows an upward trend in 1999 and 2001. Probably it could be due to cyclical trend of measles epidemic, which usually occurs every 3 to 4 year in our country due to accumulation of large number of un-immunized children in the community. Before confirming it as cyclical trend, we need to observe further. The first quarter of the year 2003 shows a lower incidence, probably due to seasonal variation. (Table 2, Figure 3)

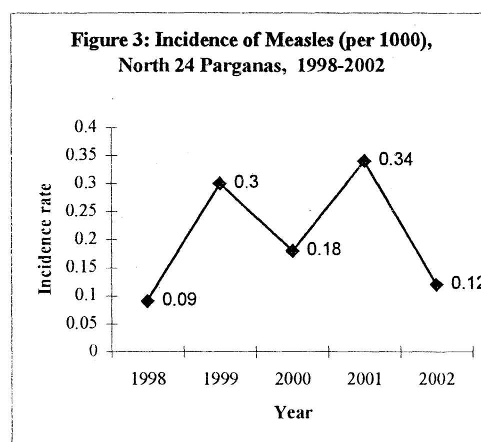
The incidence of Enteric fever appears to have a declining trend since 2001 but needs to be observed further for confirmation. It could be due to lesser attendance of cases in hospitals or under-reporting. (Table 2, Figure 4)

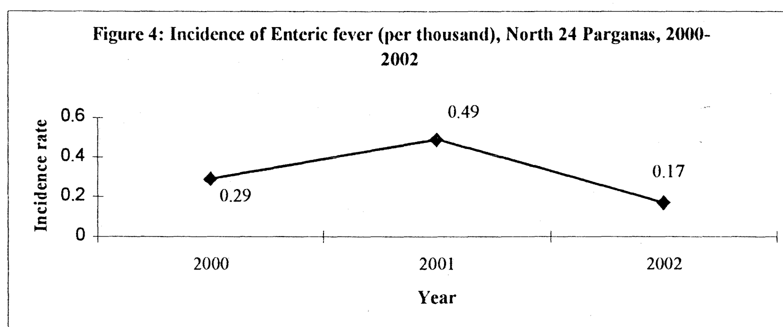
Table 2: Status of ARI, Measles and Enteric fever in all age groups, North 24 Parganas

Year	ARI				Measles				Enteric fever			
	Cases (OPD+IPD)	Incidence rate/ 1000	Death	CFR in 100	Cases (OPD+IPD)	Incidence rate in 1000	Death	CFR in 100	Cases (OPD+IPD)	Incidence rate/ 1000	Death	CFR in 100
1998	NA	-	NA	-	684	0.09	0	0	551	0.07	0	0
1999	18560	2.5	13	0.07	1919	0.3	1	0.05	NA	-	NA	-
2000	17472	2.4	4	0.02	1351	0.18	0	0	2091	0.29	0	0
2001	92628	10.37	9	0.01	3045	0.34	0	0	4425	0.49	1	0.02
2002	102016	11.42	114	0.10	1055	0.12	1	0.09	1566	0.17	1	0.06

Source: Dy. CMOH II office, North 24 Parganas







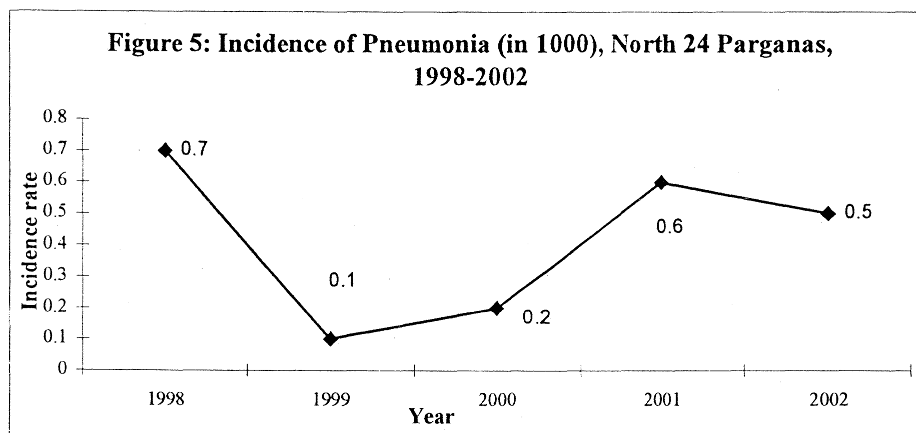
4.3. Disease profile: Pneumonia

Incidence data showed that the disease is present at a low but persistent level. Case fatality in 2002 was pretty high in comparison with the previous years. However, causes of the pneumonia could not be ascertained in most of the cases due to non-availability of laboratory back up. Vaccines of Pneumococcus and Haemophilus Influenza are available in the commercial market. There are also common organisms causing pneumonia. A study is needed to ascertain the cause of such pneumonia, so that appropriate vaccination could be advised to the susceptible population. (Table 3, Figure 5)

Table 3: Pneumonia in all age groups, North 24 Parganas, 1998-2002

Year	Cases	Death	Incidence in 1000	CFR in 100
1998	5089	4	0.7	0.1
1999	967	8	0.1	0.8
2000	1710	0	0.2	0.0
2001	5791	43	0.6	0.7
2002	4324	55	0.5	1.3

Source: Dy.CMOH II office, North 24 Parganas



Incidence of pneumonia shows a sharp rise in 2001-02, possibly due to an outbreak. However, no case fatality in that year due to that disease raises the question of reliability of data. (Table 4, Figure 6)

4.4. Disease profile: Measles, Diarrhoea and Pneumonia in < 5 years

Incidence of Measles in < 5 years age group shows a downhill trend after 1999-00. However, in 2002-03 it is showing an upward trend, possibly due to a cyclical rhythm. However, data of more years is needed to establish this hypothesis. (Table 4, Figure 6)

Incidences of Diarrhoeal diseases were persistently high in comparison with the incidence of the said disease in the whole population (Table 1). It establishes that this age group is highly vulnerable to this disease and program needs to be intensified to reduce the mortality. (Table 4, Figure 7)

Table 4: Diarrhea, Measles and Pneumonia in < 5 years age group, North 24 Parganas, 1999-2003

Year	Diarrhea				Measles				Pneumonia			
	Cases	Incidence rate/ 1000	Death	CFR in 100	Cases	Incidence rate in 1000	Death	CFR in 100	Cases	Incidence rate/ 1000	Death	CFR in 100
1999-2000	35809	37.8	7	0.02	963	1.01	0	0	423	0.4	4	0.9
2000-2001	34125	36.1	19	0.05	760	0.8	0	0	515	0.5	1	0.2
2001-2002	41750	36	16	0.04	649	0.5	0	0	2067	1.8	0	0
2002-2003	41985	36.2	21	0.05	901	0.8	0	0	941	0.8	0	0

Source: Dy. CMOH III office, North 24 Parganas

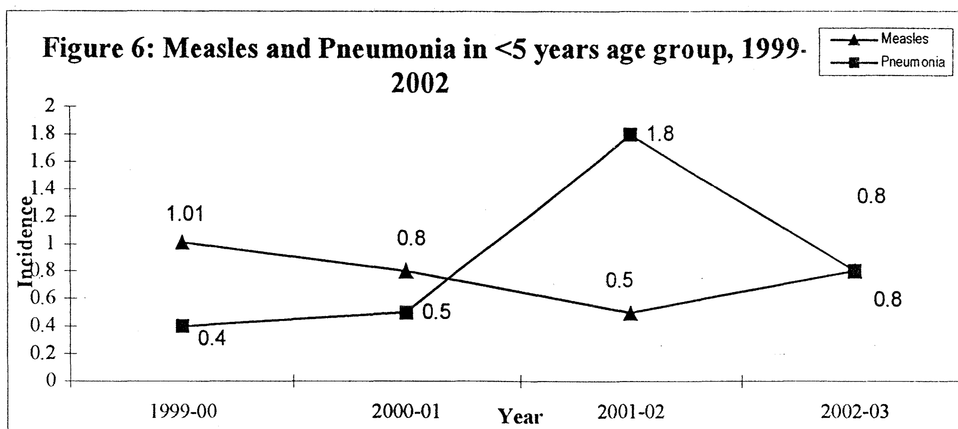


Figure 6: Measles and Pneumonia in <5 years age group, 1999-2002

4.5. Disease profile: Viral hepatitis, Diphtheria and Whooping cough

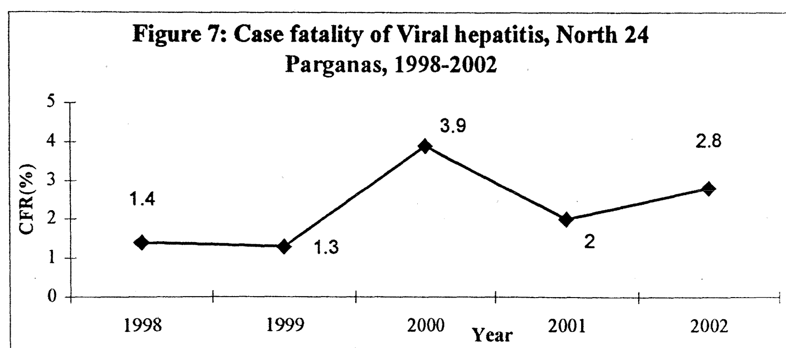
Every year there has been reporting of Hepatitis cases. But due to lack of laboratory confirmation, it is difficult to understand proportional contribution of different types of hepatitis. Mortality due to hepatitis is high, between 1.3 to 3.9%. Study is needed to establish the causative type of virus in most of the cases, so that appropriate measures including vaccination could be taken. (Table 5, Figure 7)

There were few Diphtheria cases in the district in each year. Morbidity due to Whooping confirmation, it is difficult to understand true pertussis cases.

Table 5: Viral Hepatitis, Diphtheria and Whooping Cough, North 24 Parganas, 1998-2002

Year	Viral Hepatitis			Diphtheria			Whooping Cough		
	Case	Death	CFR (%)	Case	Death	CFR (%)	Case	Death	CFR (%)
1998	482	7	1.4	2	0	0	684	0	0
1999	149	2	1.3	2	1	50	50	0	0
2000	204	8	3.9	0	0	0	161	0	0
2001	729	15	2.0	0	0	0	327	0	0
2002	433	12	2.8	1	0	0	205	0	0

Source: Dy.CMOH II office, North 24 Parganas



4.6. Disease profile: Tetanus

There were no neo-natal tetanus cases during last two year (Table 6). The TT (PW) coverage (Figure 9) is insufficient (National target 100%). Moreover, it has been showing a declining trend in last two years. In this context, a close look is to be given so that no tetanus cases miss the diagnosis and to find out whether there is any gender disparity in reporting of the cases

Table 6: Tetanus in North 24 Parganas, 1998-2002

Year	Neonatal tetanus			Other Tetanus		
	Case	Death	CFR (%)	Case	Death	CFR (%)
1998	1	0	0	1	0	0
1999	NA	NA	-	2	NA	-
2000	1	0	0	0	0	0
2001	0	0	0	2	0	0
2002	0	0	0	1	0	0

Source: Dy. CMOH II office, North 24 Parganas

4.7. Disease profile: Poliomyelitis

Two and three polio cases were detected in this district during last two years. This is due to the fact that there are some areas with poor polio immunization coverage. Some population groups are also reluctant to come under this coverage. Planned endeavors have been taken by the district health authority to cover those vulnerable areas. District

Acute Flaccid paralysis (AFP) surveillance data shows an AFP rate of 2.6 (expected rate: at least one non-polio AFP in 100,000 population within 15 years of age)

Table 7: Poliomyelitis in North 24 Parganas, 1998-2003

Year	Number of Polio cases
1998	2
1999	2
2000	0
2001	0
2002	2
2003	3

Source: Dy.CMOH III office, North 24 Parganas

4.8. Antenatal care (ANC) and institutional delivery coverage

Both the minimum ANC coverage (National target 100%) and institutional delivery (National target 80%) data (Table 8) show poor performance. Possibly, it has influenced the pregnancy outcome (Table 10). Proportion of institutional delivery had not increased significantly since 1999. Further studies needed to establish the reason behind it, like insufficiency in the infrastructure and affordability, accessibility and acceptability of the health facilities. A study conducted by International Institute for Population Sciences, New Delhi in 2002 in North 24 Parganas revealed that proportion of pregnant mother having no antenatal check up was 11.6% and having 3 or more check up was 64.4%. Pregnant mothers under coverage of any modern method of contraception were 48.3%; total fertility rate being 1.9. However, if 3 antenatal check up, at least one dose of tetanus toxoid and provision of 100 iron-folic acid tablets were taken together, the proportion dropped down to miserable 19.6%. It indicates the urgent necessity of strengthening the program.

Table 8: Status of Antenatal check up and Institutional delivery among pregnant women registered (%), 1999-2002

Year	3 Antenatal checkup done	Institutional deliveries
1999-00	42.8	53.0
2000-01	39.6	52.4
2001-02	40.6	50.9
2002-03	52.1	53.5

Source: Dy. CMOH III office, North 24 Parganas

4.9. Immunization coverage

Polio, DPT and BCG immunization coverage data show good coverage (National target >90%). However, it has been already mentioned that there are 3 polio cases in this year. It establishes that some population groups have not taken the facility. It is undesirable in the context of eradication of polio. Achievements of the routine immunizations deserve a review in this perspective (Figure 8, Table 9).

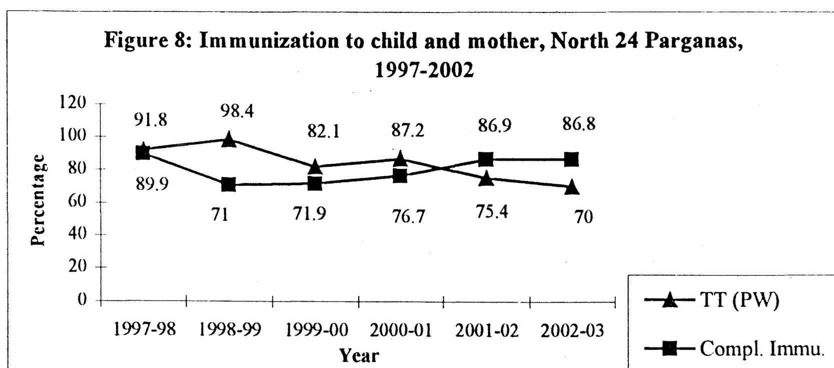


Figure 8: Immunization to child and mother, North 24 Parganas, 1997-2002

Table 9: Immunization (%) coverages, North 24 Parganas, 1997-2002

Year	Polio	DPT	BCG	Complete Immunization (Measles)
1997-98	101.3	99.1	92.9	89.9
1998-99	110.1	108.4	88.5	71.0
1999-00	97.8	97.8	80.5	71.9
2000-01	99.9	97.6	92.1	76.7
2001-02	101.2	98.9	100.3	86.9
2002-03	87.9	89.9	98.1	86.8

Source: Dy. CMOH III office, North 24 Parganas

4.10. Status of maternal mortality, still birth, low birth weight babies

Maternal Mortality Rate (MMR) is almost static during the previous 4 years. Still Birth Rate (SBR) is high and almost steady during the last 3 years. It may be due to poor antenatal care of the pregnant mothers (Table 8). Proportions of low birth weight babies (LBW) over time are lesser than national average (around 30%), though no improving trend is observed. It might be due to poor maternal nutritional status of the mothers and inadequate monitoring during antenatal period. 3rd and higher order of birth was high, around 20% in the previous 3 years. It indicates lack of family planning awareness among the couples, possibility of scanty accessibility of related facilities (Table 10).

Table 10: Maternal mortality rate (MMR), Still birth rate (SBR), Low birth weight (LBW) babies and 3rd & higher order of births, North 24 Parganas, 1999-2002

Year	MMR (per 1000 live birth)	SBR (per 1000 total birth)	LBW (%)	3 and 3+ order of births (%)
1999-00	0.2	15.8	NA	NA
2000-01	0.2	14.0	15.1	20.9
2001-02	0.1	14.1	13.6	21.1
2002-03	0.2	14.4	15.7	19.5

Source: Dy. CMOH III office, North 24 Parganas

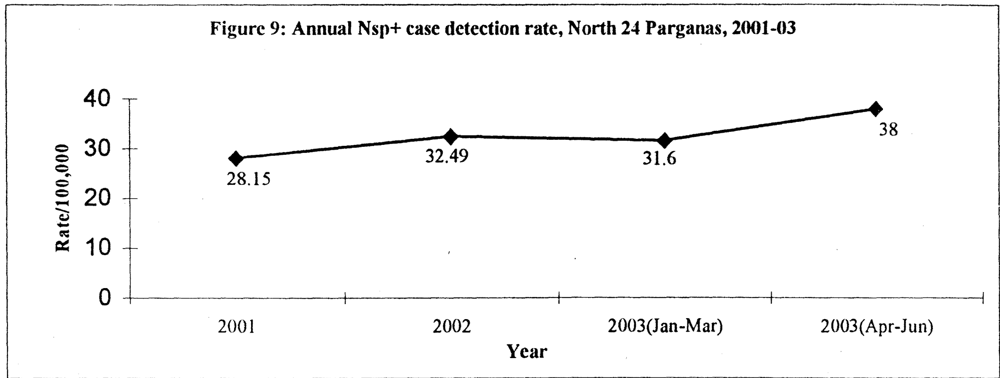
4.11. Disease profile: Tuberculosis

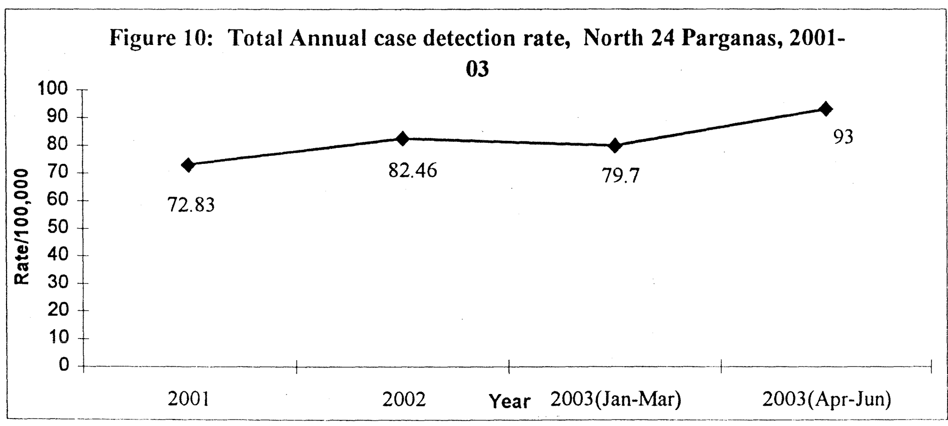
The Annualized Case Detection Rate (ACDR) of new sputum positive cases (Table 11, Figure 9) showed an overall increasing trend over the years but it is far below the expected level (Target: 60/100,000). The same picture is also observed in case of Total ACDR (Table 11, Figure 10), which needs to be improved further (Target: 135/100,000). However, sputum conversion rate showed considerable achievement (Target: 90%). Revised national Tuberculosis Control Program (RNTCP) has been initiated from February 2001.

Table 11: Status of Tuberculosis (RNTCP), North 24 Parganas, March 2001 to June 2003

Year	Annualized case detection rate of New sp+ cases (per 100000)	Total Annualized case detection rate (per 100000)	Sputum conversion of New sp+ cases	Cure rate of New sp+ cases
2001	28.15	72.83	80.91%	79.70%
2002	32.49	82.46	90.10%	--
2003(Jan -March)	31.60	79.70	90.20%	--
2003(April-June)	38.00	93.00	--	--

Source: District TB Center, North 24 parganas





4.12. Disease profile: Malaria

Incidence of Malaria showed a steady decline since year 2000. P. Falciparum incidence also decreased considerably over the same period. Information obtained from enquiry suggests that most of the P. Falciparum cases were imported from adjacent districts. There was no reported mortality since 1996 in the district. (Figure 11, 12; Table 12)

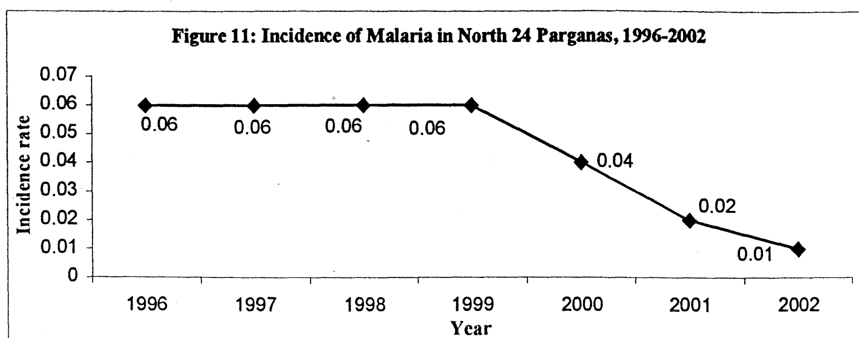


Figure 11: Incidence of Malaria in North 24 Parganas, 1996-2002

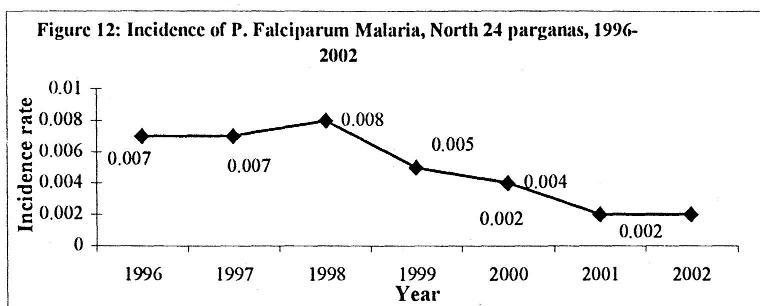


Figure 12: Incidence of P. Falciparum Malaria, North 24 parganas, 1996-2002

Table 12: Status of Malaria (excluding urban area), North 24 Parganas, 1996-2002

Year	P. Vivax	P. Falciparum	Total	Total Incidence per 1000	Incidence of Pf per 1000	Death
1996	414	55	469	0.06	0.007	0
1997	405	49	454	0.06	0.007	0
1998	449	58	476	0.06	0.008	0
1999	436	40	476	0.06	0.005	0
2000	267	33	300	0.04	0.004	0
2001	180	21	201	0.02	0.002	0
2002	119	20	139	0.01	0.002	0

Source: Dy. CMOH II office, North 24 Parganas

4.13. Disease profile: Leprosy

Prevalence of Leprosy over the time showed steady decline and reached the elimination target on 28-2-03 (Table 13). In view of that, Government has started the process of functional integration of the said vertical program with the Multi-purpose system.

Table 13: Leprosy in North 24 Parganas, 1999-2003

Time	Prevalence rate per 10,000
Before MDT	5.24
31-3-2000	2.44
31-3-2001	1.17
31-3-2002	1.5
28-2-2003	1.0

Source: Zonal Leprosy Office, North 24 Parganas

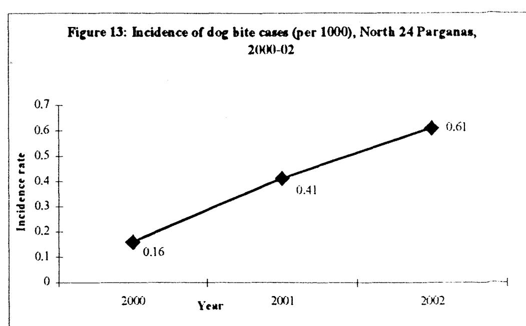
4.14. Disease profile: Rabies and dogbite

Incidence of dog bite cases was found to be increasing over time. There is a scarcity of Anti-rabies vaccine in the district. A large number of patients need to be referred to state level referral hospitals for vaccination.

Table 14: Dog bite and Rabies, North 24 Parganas, 2000-03

Year	Dog bite cases reported	Incidence of dog bite cases per 1000	Number of rabies cases
2000	1153	0.16	0
2001	3668	0.41	11
2002	5589	0.61	3

Source: Dy.CMOH II office, North 24 Parganas



4.15. Disease profile: Kalaazar

This district situated in the Gangetic delta of West Bengal is a place where Kala-azar cases are found to be prevalent. Higher prevalence (42% of the total cases) was observed among migrating laborers from Bihar and Orissa. It is hypothesized that many of them got this disease in their home state and carry to this West Bengal. However, methodological study is needed before inferring it. The incidence of this disease showed a steady decline since 2000. Case fatality was high before due to irregular treatment and lack of monitoring. The situation has improved presently. (Table 16, Figure 14, 15)

Table 16: Status of Kala-azar, North 24 Parganas

Year	Case	Death	Incidence (in 1000)	CFR in 100
1996	420	9	0.05	2.14
1997	308	1	0.04	0.32
1998	219	3	0.02	1.4
1999	384	6	0.05	1.6
2000	243	5	0.03	2.05
2001	193	0	0.02	0.0
2002	182	1	0.02	0.5

Source: Dy.CMOH II office, North 24 Parganas

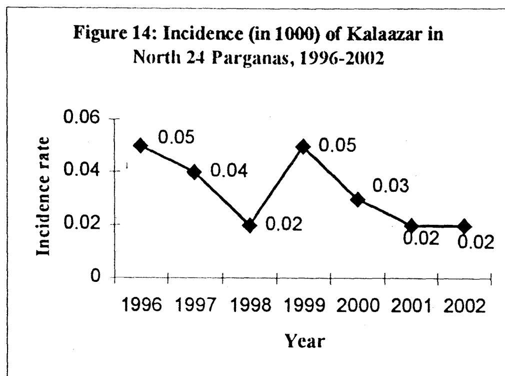


Figure 14: Incidence (in 1000) of Kalaazar in North 24 Parganas, 1996-2002

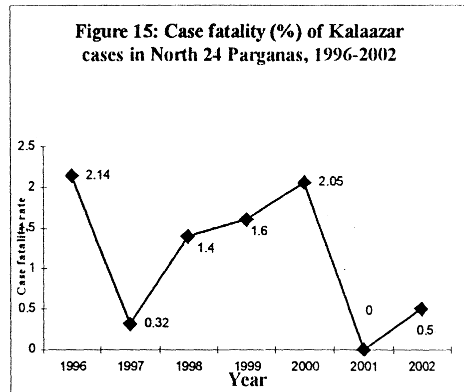
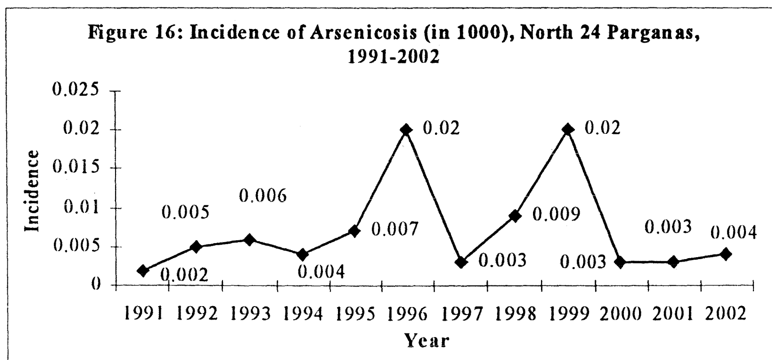


Figure 15: Case fatality (%) of Kalaazar cases in North 24 Parganas, 1996-2002

4.16. Disease profile: Arsenicosis

There is no National program for Arsenicosis. 19 blocks and 9 municipal areas are arsenic affected in this district. State health authority initiated a surveillance system on arsenicosis in the affected districts. Specially designed tube wells fitted with arsenic filter were installed in the affected villages. UNICEF is now assisting for establishing Arsenic clinics in the affected areas and water testing laboratories. Public health engineering department has also facility of testing water quality. They also monitor the efficacy of the special tube wells at regular interval. The increased incidence in 1996 and 1999 resulted from special drive for active case finding. However, due to supply of arsenic free water at most of the affected areas reduced the morbidity. Case fatality, after the initial high level, now maintains a more or less steady low level. There is no laboratory facility for diagnosis of Arsenicosis patient in the district. The surveillance of this disease needs further strengthening. (Figure 16, 17; Table 17)

Figure 16: Incidence of Arsenicosis (in 1000), North 24 Parganas, 1991-2002



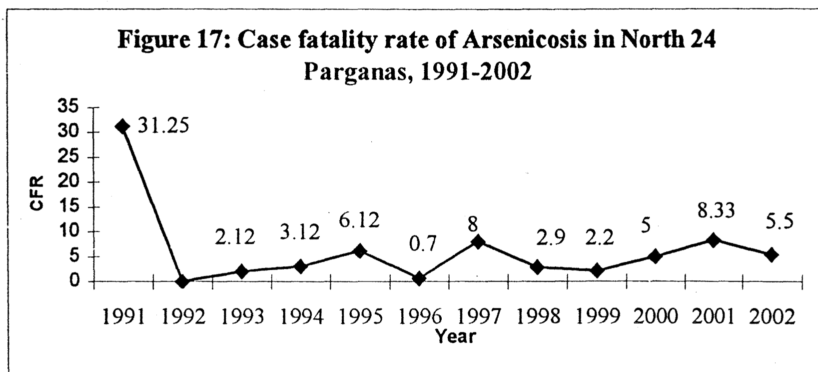


Table 17: Status of Chronic Arsenicosis, North 24 Parganas, 1991 to 2002

Year	New case			Incidence	Death	CFR
	Male	Female	Total	per 1000		(%)
1991	11	5	16	0.002	5	31.25
1992	33	10	43	0.005	0	0.00
1993	39	8	47	0.006	1	2.12
1994	26	6	32	0.004	1	3.12
1995	31	18	49	0.007	3	6.12
1996	92	51	143	0.02	1	0.7
1997	15	10	25	0.003	2	8.0
1998	42	26	68	0.009	2	2.9
1999	95	83	178	0.02	4	2.2
2000	12	8	20	0.003	1	5.0
2001	7	17	24	0.003	2	8.33
2002	24	12	36	0.004	2	5.5

4.17. Disease profile: Japanese encephalitis, Dengue and Meningococcal meningitis

Table 18 shows admitted cases and deaths due to Japanese Encephalitis, Dengue and Meningococcal Meningitis. It is not clear whether all cases were laboratory confirmed or not. In the year 2001, 374 cases were admitted due to meningococcal meningitis. There

could be two possibilities. Either it is due to over-reporting or there was an epidemic. However, case fatality was unbelievably low which again speaks about gross over-reporting.

Table 18: Japanese Encephalitis, Dengue and Meningococcal Meningitis, North 24 Parganas, 1998-2002

Year	Japanese Encephalitis			Dengue			Meningococcal Meningitis		
	Case	Death	CFR (%)	Case	Death	CFR (%)	Case	Death	CFR (%)
1998	0	0	0	NA	NA	-	1	1	100
1999	1	1	100	1	1	100	6	2	33.3
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	NA	NA	-	374	2	0.5
2002	0	0	0	10	0	0	0	0	0

Source: Dy. CMOH II office, North 24 Parganas

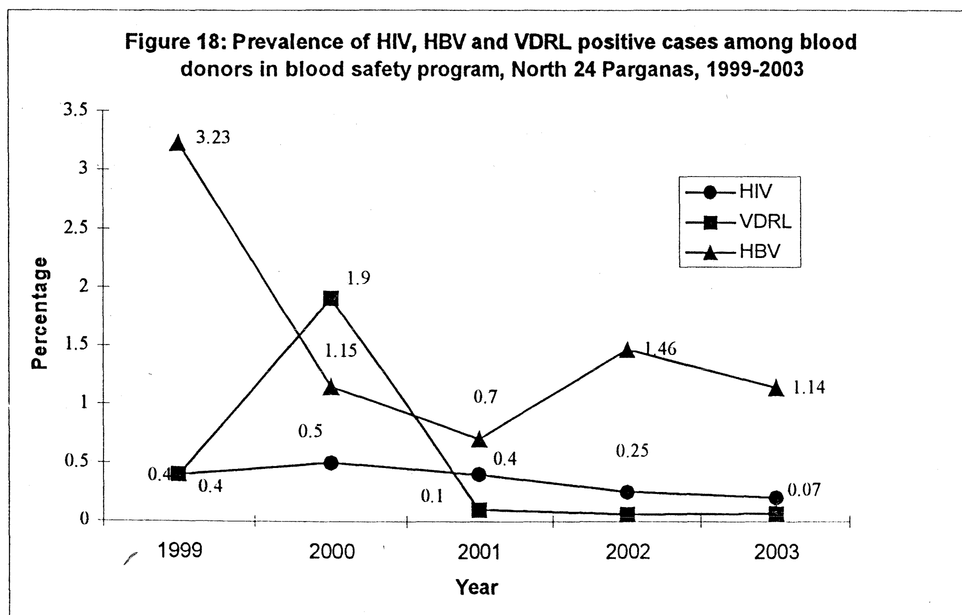
4.18. Blood safety program

Information obtained from blood safety program in the district shows declining trend of HIV and VDRL positive cases since year 2000 among voluntary blood donors. As professional blood donation against money is forbidden in the state, this data gives an indication of the prevalence of related diseases. However, further study should be conducted to estimate the prevalence rates. (Table 19, Figure 18)

Table 19: Status of Blood safety program, North 24 Parganas

Test	Positive cases				
	In 1999	In 2000	In 2001	In 2002	In 2003
HIV	28 (0.4%)	29 (0.5%)	44 (0.4%)	31 (0.25%)	7 (0.2%)
VDRL	28 (0.4%)	111 (1.9%)	12 (0.1%)	7 (0.06%)	3 (0.07%)
HBV	225 (3.23%)	67 (1.15%)	85 (0.7%)	178 (1.46%)	47 (1.14%)
Total blood collected (in bottles)	6967	5819	12303	12217	4114 (Up to March)

Note: Incidence of positive tests in parenthesis. Source: Dy.CMOH II office, North 24 Parganas



4.19. National program of blindness control

National Program of Blindness got momentum from 1999. A number of NGOs are involved in the successful implementation of this program. However, there is no data on the total load of blindness in the district.

Table 20: Year wise distribution of cataract operation cases, North 24 Parganas, 1996-97 to 2002-03

Year	Number of operation
1996-97	6276
1997-98	9531
1998-99	11135
1999-00	15583
2000-01	18432
2001-02	18384
2002-03	18441

Source: Dy. CMOH I office, North 24 Parganas

4.20. Age and sex distribution of death cases at district hospital, north 24 Parganas, 1998 and 2002

Table 21 shows age and sex distribution of death cases at District hospital, North 24 Parganas for the year 1998 and 2002. It suggests that proportion of death due to stillbirth was high in both the years (30% in 1998 and 22.7% in 2002). Stillbirth, though decreased in 2002, yet the rates were very high.

Considering in the context of status of availing at least 3 ANC check up of the district as a whole, it suggests the possibility of insufficiency of antenatal and postnatal care as a contributing factor. However, a methodological study is needed to confirm this hypothesis.

Table 21: Age & sex distribution of death cases at District hospital, North 24 Parganas, 1998 and 2002

Age group	Sex	Year 1998 (n=1147)	Year 2002 (n=1306)
		% to total death	*% to total death*
	Male	13.3	12.4
Stillbirth	Female	16.7	10.3
	Total	30.0	22.7
	Male	5.1	9.9
0-5 years	Female	5.6	5.7
	Total	10.7	15.6
	Male	1.7	1.1
6-14 years	Female	1.4	1.3
	Total	3.1	2.4
	Male	10.9	9.4
15-45 years	Female	9.1	10.3
	Total	20.0	19.7
	Male	11.1	9.7
45-60 years	Female	5.2	6.8
	Total	16.3	16.5
	Male	13.5	14.2
>60 years	Female	6.4	8.9
	Total	19.9	23.1

Source: District hospital, North 24 Parganas

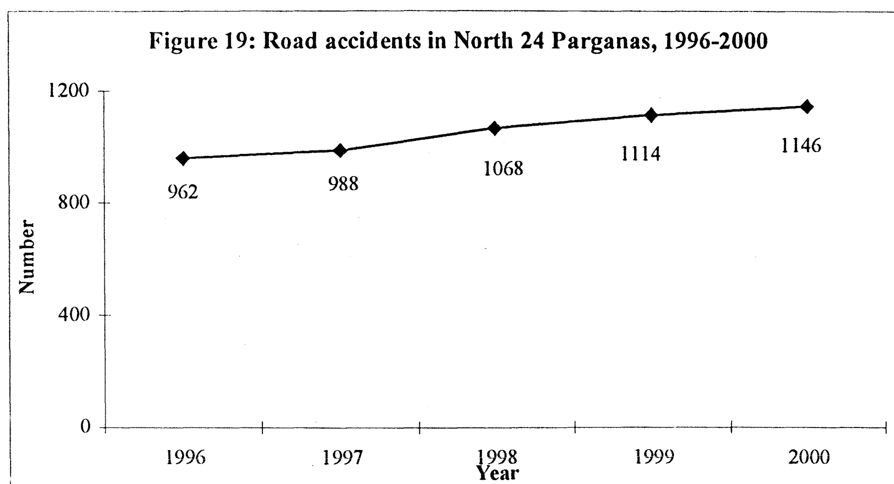
4.21. Road traffic accidents

Road accidents in North 24 Parganas district had been increasing over the period of time. Number of accidents increased by 19% in 2000 in comparison to 1996 (Table 22, Figure 19). Possible causes might be bad road condition, insufficient road space in comparison to load of traffic and ignoring traffic rules by both the vehicles and the passer by. However, further study is needed to find out the reason behind it.

Table 22: Status of Road Accidents in North 24 Parganas, 1996-2000

Year	Number of accidents occurred	Number of persons injured	Number of persons killed
1996	962	1011	318
1997	988	1001	321
1998	1068	1079	350
1999	1114	1163	370
2000	1146	1030	398

Source: Superintendent of Police, North 24 Parganas



4.22. Social offenses

Offenses are showing a rising trend; 14% increase between 1996 and 2000. The number of rioting decreased in successive years. But, occurrence of murder increased by 40% over the same period. Problems related to socio-economic, moral aspects influencing the occurrence of offenses are to be addressed with due importance (Table 23).

Table 23: Different Classes of Offense in North 24 Parganas, 1996-2000

Classes of offense / Year	1996	1997	1998	1999	2000
Murder	175	184	230	219	245
Dacoity	66	34	37	40	26
Robbery	94	74	65	83	79
Burglary	134	108	58	49	51
Rioting	689	628	674	505	357
Theft	2327	2314	2222	2197	2115
Minor offenses	4488	4325	1452	1237	1757
Offenses against women	NA	NA	NA	905	842
Others	NA	NA	4861	3064	3616
Total	7973	7667	9599	8299	9088

Source: Superintendent of Police, North 24 Parganas

4.23. Outbreak reports

Outbreaks of cholera spread through contaminated piped water were not uncommon in North 24 Parganas district. Between 1st January 2002 and 31st March 2004, district surveillance system pointed out contaminated water supplied through pipeline as the cause of 21 diarrhoeal outbreaks (out of 38 detected in the district) in 11 municipalities; of which 9 were documented due to *Vibrio Cholerae El Tor 01 Ogawa*. However, stool samples in 22 outbreaks and water samples in 17 outbreaks either were not sent for laboratory investigation or reports were not found. This was possibly due to lack in laboratory back up at the district level. Most of those outbreaks (15 out of 21) occurred in the municipalities of Barrackpur sub-division [14], where 38% population of the district resides. Lack of an effective routine disease surveillance system in the urban area aggravated the situation. Other data shows that ARI is also highly prevalent. Kala-azar in certain pockets of the district is highly prevalent has the potential to cause epidemic in

the high-risk areas. Hepatitis and enteric fever are other two water borne diseases, which have adequate outbreak potential in the district.

4.24. Status of Surveillance System:

An existing surveillance system covers 19 communicable diseases and 11 other important disease conditions in the district. There are 35 reporting units, 22 block headquarters and 13 hospitals. Apart from this, reports are collected from medical institutions describing their performances (admission, discharge, death, surgeries done, bed occupancy etc.) and information about the inpatients in terms of category of disease, discharge and death. It encompasses 84 categories as per the site and type of the disease. Both the reports of communicable diseases and the hospital performances are sent to the district surveillance unit on monthly basis, where it is compiled and sent to Surveillance cell of SHSDP II, State bureau of health intelligence and Joint Director (public health & communicable diseases) for analysis.

It is observed that there is good number of vacancy in the posts of medical officer, nurse, pharmacist, general duty attendant and sweeper in the Block Primary Health Centers and Primary Health Centers. In the sub-centers, all the supervisory tiers are working with a lot short of personnel. 159 out of 691 sanctioned posts of Health assistant (Male) are vacant. At the district level, there is no sanctioned statistical and epidemiological cell. Staffs deputed from other centers do the related works. There is no set up of district level public health laboratory. This is adversely affecting the performances of the district, particularly in relation to surveillance and epidemic control.

The reporting system was very irregular in the pre 2000 time. It has improved since then and presently, most of the 35 reporting units used to send their monthly reports more or less regularly. However, the existing report format is such that it prevents accurate calculation of attack rate and CFR. The numerator in case of AR and denominator in case of CFR are overestimated—thus falsely increasing the Incidence and decreasing the CFR. Reporting format should be revised.

4.25. Surveillance system as proposed by Integrated Disease Surveillance Program (IDSP)

The list of diseases may be revised in the light of proposals put forward in the IDSP final document. Revised list of diseases may be as follows.

Core Diseases

Vector Borne Disease	: 1	Malaria
Water Borne Disease	: 2	Acute Diarrhoeal Disease (Including Cholera)
	: 3	Typhoid
Respiratory Diseases	: 4	Tuberculosis
Vaccine Preventable Diseases	: 5	Measles
Diseases under eradication	: 6	Polio
Other Conditions	: 7	Road Traffic Accidents (Linkup with police computers)
Other International commitments	: 8	Plague
Unusual clinical syndromes	: 9	Meningoencephalitis, Respiratory Distress, (Causing death / hospitalization) Hemorrhagic fevers & other Undiagnosed conditions

Sentinel Surveillance

Sexually transmitted diseases/Blood borne	: 10	VDRL, HIV, HBV, HCV
Other Conditions	: 11	Water quality
	: 12	Outdoor-air quality (Large urban centers)

Regular periodic surveys

NCD Risk Factors : 13 Anthropometry, Physical Activity, Blood pressure, Tobacco, Nutrition, Diabetes, Cancer

Additional priorities

In addition to the core diseases that will be under surveillance, the district will put ARI, Pneumonia, Rabies, Kala-azar, Arsenicosis, Viral hepatitis, Blindness, Leprosy under surveillance.

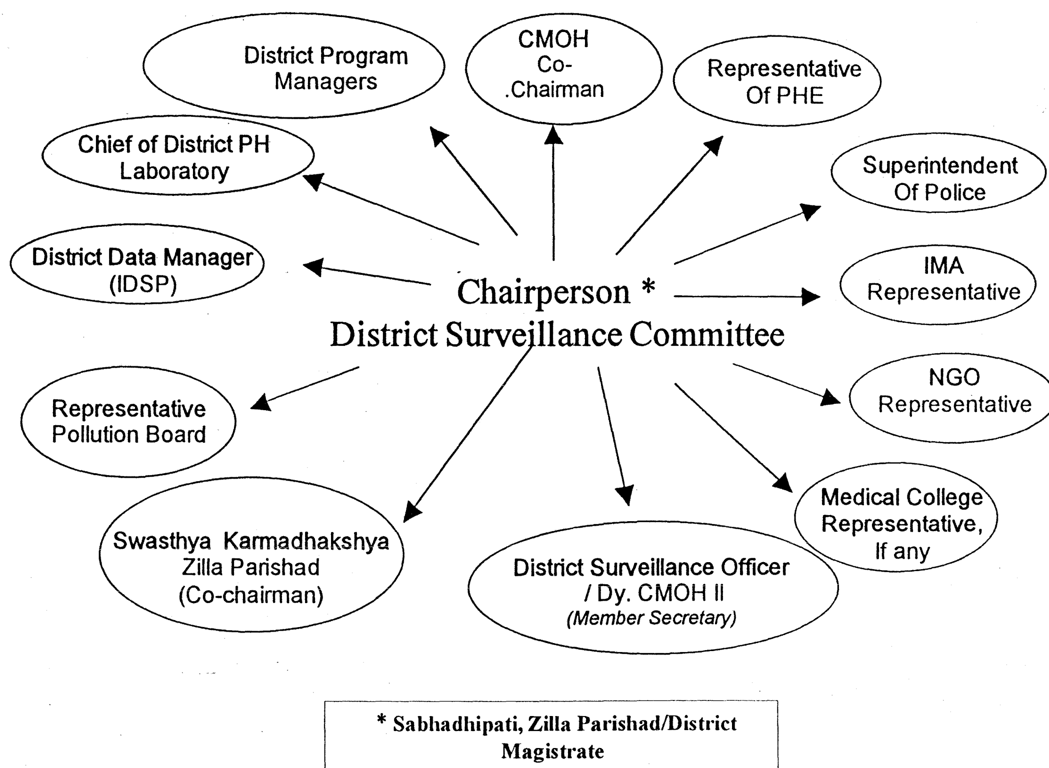
District Surveillance Unit (DSU):

The district surveillance unit will be responsible for the regular running of the program. It will be chaired by the District collector / District -Magistrate. The members of the DSU will include:

1. District Collector *(Chairperson)*
2. Chief Medical Officer of District *(Co-Chair)*
3. Program officers of TB, RCH
4. Representative of Medical College, if any.
5. Police Superintendent
6. Representative from the Public Health Engineering department
7. NGO representative
8. Swasthya karmadhakshya, Zilla Parishad *(Co-chair)*
9. Head of the District Public Health Laboratory
10. District data manager
11. IMA representative
12. Representative of Pollution Board
13. The Deputy CMOH II or District Surveillance Officer *(Member Secretary)*

The DSU will meet once a month regularly and as often as needed during an epidemic. A routine report of this meeting should be forwarded to the State Surveillance office once a month to understand the progress and problems in various districts. Reports of these meeting will be forwarded to the National Surveillance cell once in three months.

Figure 20: Organogram for the district



*** Sabhadhipati, Zilla Parishad/District Magistrate**

5. Recommendations

1. Ensure water quality surveillance Make it available up to the level of state general hospitals. Ensure regular testing of water samples from randomly selected water sources from both rural and urban area.

2. Take measures to improve awareness about ARI particularly among the mothers for early detection and prompt management.
3. Improve immunization coverage of the vaccine preventable diseases. Satisfactory complete immunization level is to be achieved.
4. Ensure better diagnostic facility diseases of public health importance.
5. Improve coverage of vaccination to pregnant mothers, at least three antenatal check ups and distribution of iron-folic acid tablets.
6. Take measures to improve care during delivery and to increase family planning awareness of the eligible couples.
7. Motivate doctors and health workers to refer chest symptomatic for sputum microscopy.
8. Achieve leprosy elimination by sustaining the present program.
9. Take measure to decrease stray dog population and ensure availability of anti-rabies vaccine.
10. Ensure safe water supply at the arsenic affected areas and periodic survey to assess the prevalence of the disease.
11. Revise data collection format for disease surveillance.
12. Ensure involvement of non-governmental organizations and private sector for implementation of national programs, disease surveillance and outbreak control.
13. Create Rapid Response Team at the district level for outbreak response.
14. Establish an Epidemiological cell at the district level.
15. Establish a District level Surveillance Unit.
16. Establish a Public Health Laboratory at the district.
17. Fill up immediately the vacancies of medical officers and paramedical personnel.
18. Arrange regular training of the health personnel to increase the efficiency and update the knowledge.
19. Improve inter departmental coordination is to be improved.
20. Ensure regular feedback system.
21. Arrange public health researches for the interest of the program implementation.

SECTION.2

SECOND FIELD POSTING

Evaluation of Revised National Tuberculosis Control Program at Habra TB Unit, North 24 Parganas, West Bengal, February–April 2004

ABSTRACT

Background

India engaged in directly observed treatment with short course chemotherapy (DOTS) to control tuberculosis since 1993. We evaluated the program in a West Bengal district three years after inception of DOTS to identify gaps in implementation.

Methods

We selected one tuberculosis unit among 20 on the basis of population characteristics that were representative of the district. We interviewed new sputum positive patients, 14 years of age and older, registered during the fourth quarter 2002 and the third quarter 2003. We inspected DOTS centers, reviewed treatment outcome in 2001-2002 and case detection activities in 2003 to compare all standard indicators to national targets.

Results

We interviewed 90 patients (84%) of the 107 patients registered (Median age: 35 years). The median delay between appearance of symptoms and diagnosis and between diagnosis and initiation of treatment were 2 months (Range: 1-3) and 6 days (Range: 0-44), respectively; 18 (20%) patients found the opening time of DOTS centers inconvenient; 81

(90%) and 60 (67%) received DOTS during the intensive and continuation phase, respectively. Of 50 DOTS centers, 16 (32%) lacked provision of water, cup or sitting arrangement.

In 2003, 1.8% to 2.2% of suspect patients were referred for sputum microscopy (Target: 2-4%). A total of 662 patients (110/100000 population) were detected (Target: 135/100,000). Of those, 230 patients (38/100,000 population) were new sputum positive (Target: 60/100,000). The cure rate improved in 2002 (91.5%) compared with 2001 (79%, p=0.02; Target: 85%). There was no formal involvement of private sector.

Conclusions

While DOTS made progress since 2001, referral for sputum microscopy is still low, affecting detection rates. Broader stakeholder engagement might help bridging the gap.

Keywords

Evaluation, Revised National Tuberculosis Control Program, Tuberculosis, DOTS.

Evaluation of Revised National Tuberculosis Control Program at Habra TB Unit, North 24 Parganas, West Bengal, February–April 2004

1. Introduction

Tuberculosis (TB) as a public health problem is particularly pronounced in the countries of Asia and Sub-Saharan Africa. TB is the largest single cause of death among young people and the adults, accounting for more than two million deaths a year. About a third of the world's population harbours the infection; this large pool of infected people means that TB will continue to be a major problem in the foreseeable future. While they belong to all socio-economic strata, the vast majority of the TB patients are poor [1]. In this context, control of TB has been singled out as one of the top priorities of public health around the world. Under the leadership of the World Health Organization (WHO), TB control programs incorporating the technical and management principles of the Directly Observed Treatment, Short-course (DOTS) have been instituted in 127 countries of the world [2].

In India, the DOTS-based TB control program is being implemented with a view to achieving the WHO targets of case detection and cure among TB patients. DOTS, no doubt, is the best treatment currently available for tuberculosis control. Preliminary reports from India are highly encouraging with an increasing cure rate from 70.7% to 83.9% from 1993 through1998 [3, 4]. Case-finding efficiency of RNTCP has considerably improved, but is still less than 50%. Until we achieve a steady and acceptable cure rate throughout the country, it is not possible for us to boost up case finding. By 1998, DOTS coverage in India was only 20 million by mid-1998, 2% of the population. Rapid RNTCP

expansion began in late 1998. By the end of 2000, 30% and by the end of 2002, 50% of the country's population was covered. The present coverage is 778 million (75% of the population) [5,6]. Experts have cautioned against too rapid expansion of DOTS and the need for a phased expansion to cope up with the enhanced requirements in terms of technical and diagnostic support as well as uninterrupted drug supply. With 50% case finding efficiency and 85% cure rate, the cumulative effectiveness of RNTCP can be considered to less than 50% (50% of 85%= 42.5%). Mathematical models also suggest that DOTS alone cannot reduce tuberculosis incidence in a timely fashion even when HIV is not a problem.[7] This is a clear indication for the need of close surveillance of tuberculosis control as suggested by WHO [8]. However, patient adherence to the standardized regimen of anti-TB drugs is a *sine quo non* for completion of treatment and resultant cure of tuberculosis. Ensuring compliance of TB patients with the treatment regimens over a long period of 6-9 months is the most challenging part of a TB control program. Even under the revised TB control program in India, though a lot of resources have been put to increase the compliance, completion of treatment among smear-positive TB patients remain below target [5].

As per Census of India report 2001, North 24 Parganas is the largest district of West Bengal bearing 11.13% (9 million) of the state's population and with a high population density of 2181 persons/Sq. km. (State average: 904/Sq. Km.). 54.3% of the population resides in urban area [9]. All these signify that this district plays an important role to determine the health status of the state. RNTCP was initiated in this district from March 2001. The infrastructure of RNTCP in this district consists of 20 TB units, 97 functioning microscopy centers and around 950 DOT centers. Overall picture shows that though cure rate and sputum conversion rate have improved slowly during last 18 months, the status of case detection is not satisfactory. All these establish the rationale for evaluation of the said program in this district.

The purpose of this study is to independently investigate and assess strengths and weaknesses of RNTCP implementation at a TB unit, with the objective of further improving program performance at that TB unit, in that district and the state as a whole.

2. Objectives of the evaluation

1. To review the structure, process and output of RNTCP in the study area.
2. To independently assess strengths and weaknesses of RNTCP implementation with the objective of further improving program performance.
3. To assess the accuracy of records and reports.

3. Review of literature

3.1. TB: A Growing Epidemic

Caused by *Mycobacterium tuberculosis (M.tb)* and transmitted from person to person through infected airborne droplet nuclei [10], TB is a major infectious killer worldwide and claims about 2 million lives each year [11]. Globally about 8 million new TB cases developed in 2000 and an estimated 2 million men and women died, most 15-45 years old. 95% of cases and 98% of deaths occurred in the developing world [12]. TB disproportionately affects the adults belonging to lower socio-economic stratum. Although mortality and morbidity in any age group have significant social and economic costs, the deaths of adults in their prime, community leaders and producers in most societies, cause a particularly onerous burden [13]. TB is, therefore, not only "a health concern" but also a "complex socio-economic problem that impedes human development"[14].

In many parts of the world, the TB epidemic is growing and assuming serious proportions. Global increase in TB incidence is attributed to inadequate attention to TB in public policies, demographic changes, rising incidence of HIV/AIDS, adverse socio-economic trends [15], emergence of multi-drug resistant TB (MDRTB) [16] and the breakdown in primary health care services. The resurgence of TB and the emergence of multi-drug resistance present a challenge to the medical community attempting to successfully control the disease [16, 17]. In 1993, the WHO declared tuberculosis a global emergency [18].

3.2. TB and DOTS

TB is curable with currently available anti-TB drugs – isoniazid (H), rifampicin (R), pyrazinamide (Z), streptomycin (S), and ethambutol (E) – administered in correct combinations and right doses throughout the course of treatment spanning 6-9 months. WHO recommended a new cost-effective strategy for TB control that has resulted in high success rates even in resource-poor settings. The strategy, known as, the Directly Observed Treatment, Short-course (DOTS), evolved from "collective best practices, clinical trials and programmatic operations of TB control over the past two decades."[11]

DOTS has five key components: (1) political commitment to TB control, (2) case detection by sputum smear microscopy, (3) directly observed treatment (DOT) during whole of the treatment period, particularly the intensive phase (IP) of first two or three months, (4) a regular, uninterrupted drug supply of all essential anti-TB drugs, and (5) a standardized recording and reporting system. The strategy advocates the cure rate of at least 85% of smear positive cases, and detection of at least 70% of such cases [11]. The most pressing task is to improve cure rates and reach more cases of tuberculosis in the main endemic countries of the world [19].

3.3. TB Burden in India

India is the second most populated country in the world with a population of one billion. Of the 22 countries, which account for 80% of the global disease burden on account of TB, India has the dubious distinction of being on the top of the list [20]. India accounts for nearly 30% of all tuberculosis cases in the world today, and more adults in India die from TB today than from any other infectious disease. Every year TB costs India more than $ 3 billion (Rs.13000 crore). In addition, TB patients spend more than $ 180 million (Rs.645 crore) on private TB care. TB does not merely reflect socio-economic status – TB perpetuates and exacerbates poverty [21]. In 1990, TB accounted for a loss of 46.5 million DALYs (Disability Adjusted Life Years) globally. It was 3.4% of the total DALYs loss in the world. India alone accounted for 23.3% (10.8 million) DALYs [22].

3.4. Epidemiology of TB in India

The only national survey for disease prevalence was conducted during 1955-58. Many of the regional surveys have been conducted since then in different parts of the country.

38% of the total population is infected with TB. In males, almost 70% of persons aged 40 and more are infected. The annual risk of tuberculosis infection (ARI) is estimated to be between 1% and 2% with marked variation between areas [23]. Christopher Murray and his colleagues have mentioned that the relationship between ARI and incidence of pulmonary smear positive TB is linear in developing countries. It is estimated that there are 49 cases of smear positive TB per 100,000 for every 1% risk of infection [13].

The prevalence of active, culture positive TB is of the order of 400 per 100,000 people. The prevalence rates of cases have shown almost no change over a period of over 20 years from different surveys in different areas [24].

It is estimated that about 180 new TB cases per 100,000 populations (approximately 2 million in the whole country) occur in India every year, and about 45-50% of those cases are infectious (smear positive). Thus the estimated incidence of new smear positive cases is 85/100,000 population [23].

Without appropriate chemotherapy, TB is highly fatal. The case fatality rate of smear positive patients is thought to be higher than all forms of TB combined. A five-year study of the natural history of the disease in Bangalore undertaken prior to 1970s found that 49% of smear-positive and culture-positive patients died within five years [13]. Of the estimated 2 million TB deaths in the world every year, about 25% (500,000) TB deaths occur in India alone [25].

Prevalence rates of infection, disease and mortality are more in males than females: females account for a third of cases in all ages. However, among females, about half of the women are in childbearing age [24].

No nation wide study has been carried out to determine the magnitude of primary and acquired resistance among TB patients. Local studies show that primary isoniazid resistance is more than 10%. Primary rifampicin resistance and multi-drug resistance is about 3% [23].

HIV infection is the strongest risk factor for developing TB in individuals remotely or recently infected with TB bacilli. Because of a combination of economic decline, insufficient application of control measure (case detection and chemotherapy) and the HIV/AIDS epidemic, tuberculosis is on the rise in developing and transitional economies. Between 1993 and 1996, there was 13% increase in the estimated number of tuberculosis cases world wide, one-third of which can be attributed to HIV [26]. In 1997, there were 10.7 million people co-infected with TB and HIV [27]. A person who is HIV positive and infected with TB is 30 times more likely to develop clinical symptoms than is an infected person who is HIV negative, because their weakened immune systems allow the bacteria to develop unchecked [26]. A person who is HIV positive and develops TB can expect to survive only five to six weeks, although chemotherapy can extend such an individual's life expectancy for 2-5 years [28]. Therefore, the close interaction between HIV infection and clinical TB can have a major impact on TB epidemiology in India. Individual with dual infection have much higher rates of breakdown from infection to clinical disease. A mathematical model developed by WHO with regard to India suggests that the number of cumulative TB cases over the next 20 years with a relatively low HIV prevalence (a peak prevalence of HIV infection of 2.5% among adults in states where the current rate is 1% or more and 1% in states where the current rate is less than 1%) and rapid RNTCP expansion (coverage of the entire country within 2005, and meeting the global targets of detection and cure by 2006) will be approximately 21 million. In the worst-case scenario of high HIV prevalence (5% in adult population throughout the country) and slower RNTCP expansion (coverage of only 55% of the country by 2007), there would be 46 million cases of TB over the next 20 years – more than twice the baseline rate [23].

ARI is an excellent indicator of burden of TB in a community. Government of India has undertaken a nationwide representative sample survey of ARI with the active

collaboration of National Tuberculosis Institute (NTI), Bangalore and Tuberculosis Research Institute (TRC), Chennai [25].

3.5. National Response to TB

National Tuberculosis Program (NTP) was established in India in 1962 to provide TB control services to the people. An extensive infrastructure comprising District TB Centers, TB clinics and TB beds in hospitals was created under the NTP. However, the program failed to achieve the desired results with treatment completion remaining as low as 30%. A joint review of the program by the Ministry of Health, Government of India, the WHO and Swedish International Development agency (SIDA) in 1992 revealed that "no significant epidemiological impact on disease prevalence was observed" [3] and the NTP "suffered from managerial weakness, inadequate funding, over reliance on x-ray, non-standard treatment regimens, low rates of treatment completion, and lack of systematic information on treatment outcomes" [3].

As an alternative to erstwhile NTP, a DOTS based Revised National Tuberculosis Control Program (RNTCP) was designed and introduced in pilot districts. "Starting in October 1993, the RNTCP was implemented in a population of 2.35 million in five sites in different states of India (Delhi, Kerala, West Bengal, Maharashtra and Gujrat). The program was expanded to a population of 13.85 million in 1995 and 20 million in 1996. Rapid scale-up began in late 1998, when another 100 million were covered under RNTCP [3]. The coverage at the end of 2003 is 778 million (around 75% of the population). Thirteen states/union territories are fully covered under RNTCP. Diagnostic facilities have been established in about 7800 laboratories throughout the country. 3, 50,000 health staffs have been trained. 700 NGOs and 3000 private practitioners have been involved.

In 2003, Annual Total Detection Rate was 132 per 1,00,000 (Target: 135/100,000), Annual New Sputum Positive Case Detection Rate was 52 per 1,00,000 (Target: 60/100,000), the average cure rate of the new sputum positive patients was 86% (Target: 85%), success rate was 87% and sputum conversion rate was 90% (Target: 90%). Since

inception of the program, more than 25, 00,000 patients were put on treatment thus saving about 4, 50,000 additional lives [29].

The Government of India has taken important steps to strengthen coordination between TB and HIV control programs. The basic purpose of this coordination is to ensure optimal synergy between the two programs.

3.6. Research Activities

A nationwide cross-sectional study was conducted in different parts of India to assess the prevailing epidemiological situation of the country by estimating the Annual Risk of TB Infection (ARTI). National Tuberculosis Institute (NTI), Bangalore, Tuberculosis Research Center (TRC), Chennai, and other institutions conducted the study in collaboration with Central TB Division, GOI between January 2000 and 2002 [29]. The country was stratified into four zones, viz. north, south, east and west. They estimated prevalence of infection and computed ARTI in each zone by the cut-off method (Method I) and the mirror image technique (Method II) [30]. (Table 1)

Table 1: Annual Risk of TB Infection in India

Zone	Method I		Method II	
	Prevalence of infection (%)	ARTI (%)	Prevalence of infection (%)	ARTI (%)
North	10.3 (8.4-12.2)	1.9 (1.5-2.2)	10.5 (7.4-13.5)	1.9 (1.3-2.5)
West	9.3 (6.8-11.8)	1.8 (1.3-2.3)	8.5 (5.4-11.6)	1.6 (1.0-2.2)
South	6.1 (4.9-7.2)	1.1 (0.9-1.3)	5.9 (4.0-7.7)	1.0 (0.7-1.4)
East	6.9 (5.6-8.3)	1.3 (1.0-1.6)	6.9 (5.5-8.2)	1.3 (1.0-1.6)

( ): 95% CI

The zonal ARTI indicates inter-regional differences in the rate of transmission of infection. Higher figures were also found in urban areas compared to those in rural areas. A national ARTI of 1.5% has been derived from the zonal estimates. This study has provided robust data on the epidemiology of TB in India and will serve as the baseline

data for calculating case detection rates in the future and the assessment of the long-term epidemiological impact of RNTCP.

Surveys of drug resistance have been completed in six districts from various parts of the country. The results show that the prevalence of multi-drug-resistant TB (MDR-TB) is less than 3% among the previously untreated patients. Documenting the level of drug resistance in the community is important in order to monitor the impact of the program over time and to ensure that treatment regimens used by the program are appropriate. The present relatively low level of MDR-TB makes the expansion of the RNTCP throughout the country the priority to ensure that drug resistance levels remain low in India. In 2004, statewide drug resistance surveillance studies are planned in two states, using a generic protocol developed by TRC, Chennai and NTI, Bangalore. These studies would indicate appropriateness of the regimens being used and in the future, trends/patterns of drug resistance could be analyzed [29].

The study conducted by IIHMR, Jaipur, collected and analyzed baseline data on accessibility and utilization of different components of RNTCP by Scheduled Castes/Scheduled Tribes (Under privileged section of population protected by constitutional provision) in different parts of the country. Its recommendations include strengthening of RNTCP in rural areas, especially Scheduled Castes/Scheduled Tribes (SC/ST) pockets; adoption of area specific strategies; promoting early diagnosis and completing treatment; strengthening of behavior change; communication through effective strategy and treatment, and in general, increase in awareness about correct regimen of treatment under RNTCP [29].

Administrative Staff College, Hyderabad conducted a study to assess the baseline data on gender differentials for the utilization of RNTCP, to analyze these differentials for the barriers in utilization and to make recommendations based on the findings. The recommendations include optimization of the use of services through various measures to improve the diagnostic and treatment facilities. The findings highlight that barriers are mainly because of the attitude of the health care providers at different levels and there is need for greater interpersonal communication between patients and providers. [29]

3.7. Finance

In 1997, Government of India obtained a soft loan from the World Bank for US$ 142 million to implement the RNTCP in at least one third of the country and to prepare the rest of the country for its implementation at a later date; RNTCP in Orissa is supported by the Danish Government and in Andhra Pradesh is supported by the British Government. Agreement has been signed with Global Fund against AIDS, TB and Malaria (GFATM) for funding of RNTCP activities in three states – Chhattisgarh, Jharkhand and Uttaranchal – for the round I support (US$ 8.73 million). GFATM is supporting in some districts of Uttarpradesh and Bihar (110 million populations) in the second round support (US$ 31 million). USAID is now supporting implementation of the program in the entire state of Hariyana. Public Private Mix project for involvement of private sector has been initiated in 14 major cities of the country [4, 25, 29].

4. Methods

We conducted the evaluation study during February and April 2004. We designed the methodology of evaluation to assess the structure, process and outcome with special reference to the consistency between reports and records of the TB unit and microscopy centers, accuracy of these records with the actual information provided by the patients. The evaluation included interviews of all new sputum positive patients registered in fourth quarter 2002 and third quarter 2003, all key RNTCP staffs of the TB unit, review of records and reports and analysis of the available secondary data. We chose third quarter 2003, as the patients registered during that quarter would reflect the recent situation of the ongoing treatment and microscopy activity. We chose fourth quarter 2002, as the patients registered in that quarter would reflect the recent situation of treatment outcome. In both the quarters, recall period would be minimum in respect to treatment activity and outcome.

4.1. Study Site

We selected Habra TB unit on the basis of its population coverage, performance and urban-rural mix. It comprises of Habra Municipality, Ashoknagar Municipality,

Gobardanga Municipality, Habra I community development block and part of Gaighata block. The TB unit gives coverage to 619109 persons (as per Census 2001), out of which 49.7% live in rural area and 50.3% lives in urban area. Practically, it almost resembles the population characteristic of the district (54.3% urban population. In this context, this TB unit was chosen for evaluation.

TB unit is situated at Habra MM unit. There are 6 Treatment center cum Microscopy centers (TCMC) - Habra Mobile Medical (MM) unit, Asoknagar State General Hospital (SGH), Machalandapur Block Primary Health center (BPHC), Gobardanga Rural Hospital (RH) and Dharampur Primary Health center (PHC), Routara PHC (since October 2003); 2 Treatment centers (TC) - Ghoja PHC and Gaighata PHC; and 50 DOT centers (23 in Habra I, 11 in Gaighata, 5 in Routara, 5 in Habra Municipality and 6 in Asoknagar Municipality). We evaluated all these centers. We did not evaluate treatment outcome of Gaighata PHC as it was recently included in Habra TB unit.

4.2. Study Population

1. All new sputum smear positive patients (> 14 years) registered in thirdquarter 2003 (n = 60) and in fourth quarter 2002 (n = 47).
2. Medical officer, TB control in charge (MOTC) of Habra TB unit (n = 1).
3. All other medical officers attached to TCMCs & TCs (n = 11).
4. Senior Treatment Supervisor (STS) (n = 1) and Senior TB Laboratory Supervisor (STLS) (n = 1), TB Health Volunteer (TBHV) (n=2) attached to TB unit.
5. Laboratory Technicians (LT) (n = 6) attached to Microscopy Centers.
6. DOT providers attached to 50 Dot centers (n = 116).

4.3. Indicators

Structure

1. Population covered by TB unit (Program target: 1 in 500,000 population)
2. Number of Microscopy center (Program target: 1 in 100,000 population)
3. Number of DOT centers (Evaluation target: 1 in 10,000 population)
4. Number of DOT providers (Evaluation target: 1 in 5000 population)

5. Availability of necessaries at DOT center (Expected: clean water, water cup, sitting arrangement)
6. Number of personnel at TB unit and Microscopy centers (Expected 1 STS, 1 STLS, 2 TBHVs, 6 LTs to be appointed on contractual basis)
7. Availability of drugs (sufficient and stock for 1 month)
8. Availability of binocular microscope (1 in each MC)
9. Availability of laboratory consumables (sufficient and stock for 1 month)
10. Availability of forms, cards and registers (sufficient and stock for 1 month)
11. Availability of one two wheeler for STS and STLS
12. Training status (Program target: 100%); Knowledge and practice assessed in terms of awareness about essentiality of sputum conversion and cure rate, Lab. Technician knowing the need of 3 sputum examination at the time of diagnosis, DOT provider knowing the need of follow up sputum examination, number of doses in IP and CP
13. Participation of Non Governmental Organizations
14. Participation of Private Practitioners

Process

1. Delay in diagnosis (Acceptable limit: = 1 month)
2. Delay in initiation of treatment (Acceptable limit: ≤ 3 days)
3. Proportion having free microscopy service (Program target: 100%)
4. Proportion having record of initial sputum examination (program target: 100%)
5. Proportion having 3 sputum tests before diagnosis, 2 sputum tests at the end of IP & CP (Program target: 100%)
6. Cured patients having two sputum tests at the end (Program target: 100%)
7. DOT during intensive phase (Evaluation target: 85%) and during continuation phase (Expected: 100%)
8. Proportion found consistent in crosscheck between patient's document and laboratory registers (Evaluation target: 100%)

9. Patients' knowledge assessment on definite issues – stratification by age, sex, ethnicity, education, economic status etc (Evaluation target: 90%)
10. DOTS activity (DOT provider) – Maintenance of PWBs & treatment cards, DOT in IP & CP, facilities of DOT, return of the blister pack, crosschecking of cards and patient wise drug boxes (PWB) etc. (Evaluation target: 100%)
11. DOTS activity (Patients) – Consistency of the regimen with the record, DOT in IP & CP, Free treatment, convenience of patients in terms of time, place & DOT provider (Evaluation target: 100%)
12. Assessment of DOT compliance – stratification by age, sex, education, income, ethnicity, convenience, knowledge etc. (Evaluation target: 90%)
13. Proportion of supervisory visit in each quarter by MOTC, other MO & STS, review of patient treatment activity by MO & STS, presence of official records of the same, LT keeping slides, STLS reviewing the slides, defaulter retrieval activity by MO, STS & DOT provider

Outcome

1. Referral of chest symptomatic for sputum microscopy – 2-4% of adult patients attending out patient door
2. New smear positive cases – 60/100000 populations
3. Sputum conversion rate of new smear positive patients – 90%
4. Cure rate of new smear positive patients – 85% or more
5. Default rate of new smear positive patients – less than 5%

4.4. Data collection instruments:

We developed semi-structured interview schedules and used to collect information from the patients, involved doctors, and RNTCP staff and observational findings. We developed data collection formats and used to collect secondary data from reports and registers.

Interview schedules (Annexure I)

IS 1 – For new sputum smear positive patients of thirdquarter, 03 and fourth quarter 2002 (Awareness about TB, DOTs in IP and CP, convenience, payment, follow up sputum, satisfaction, age, sex, ethnicity, checking of sputum examination results & treatment card etc.).

IS 2A – For MOTC (Knowledge, supervisory visits, awareness about referral of chest symptomatic, sputum conversion & cure rate of the TU, participation in retrieval of resistant defaulters, awareness about logistics & drug stock, IEC activities etc.)

IS 2B - For other medical officers (Training status, knowledge, awareness about sputum conversion status, review treatment activities, defaulter retrieval etc.)

IS 3 – For STS and THV (Knowledge, supervisory visits, defaulter retrieval, review of patient treatment activity, field record, reporting activity etc.)

IS 4 – For STLS (Knowledge, supervisory visits, review of microscopy activity, field record, quality control etc.)

IS 5 – For Laboratory Technicians (Knowledge, crosschecking of laboratory registers, proportion done 3 sputum at diagnosis & 2 during follow up, preservation of positive & negative slide etc.)

IS 6 – For DOT providers and observation of DOTS (Marking & maintenance of PWBs, DOT to patients in IP & CP, Facilities for DOT, marking of treatment card, return of foils, crosschecking of cards &boxes, verification of address, defaulter retrieval etc.)

Secondary data collection format (Annexure II)

DF 7A and 7B – Secondary data collection format for Habra TB Unit and TCMCs

DF 8 – Secondary data collection format for study subjects

4.5. Data Collection

We were assisted by the STS and two TBHVs to visit the centers and patient-homes. 55 patients of third quarter 2003, 35 patients of fourth quarter 2002, 92 DOT providers, MOTC, 10 medical officers, STS, STLS, TBHVs, all laboratory technicians were

interviewed. We evaluated all the 50 DOT centers, six microscopy and treatment centers. We crosschecked 168 treatment cards and drug boxes. TB register, laboratory registers, report and returns of TU sent to DTC, stock register of TU and MCs, field diaries of the supervisory staff and MOTC were reviewed.

4.6. Definitions

Patient who received at least 20 of 24 doses during Intensive Phase (IP) under direct observation and who received at least one dose per week during Continuation Phase (CP) under direct observation was considered to have received directly observed treatment. Patient aware about the duration of the treatment was considered 'informed' about TB. DOT provider aware about the number of doses to be given to patients under direct observation during IP and CP was considered 'informed'. Directly observed treatment was considered inconvenient among the patients reporting inconvenience with regards to the time, place and cost incurred. We considered a DOT center lacking in facility when any of the three necessaries (clean water, water cup and sitting arrangement) was not available.

4.7. Data Analysis

All records were entered in Epi Info version 6.04d (Center for Disease Control, Atlanta, GA 2001) and interpreted using the Relative Risk (RR) and 95% Confidence Interval (CI). P values < 0.05 were considered significant.

5. Results

5.1. Structure

The population coverage of the TB unit was 619109 as per Census 2001. There were six microscopy centers each supposed to cover 100,000 populations. 50 DOT centers were functioning with average population coverage of 12000 per DOT center.

Posts of STS, STLS, TBHVs and LTs were all filled up on contract basis as per program criteria. 116 DOT providers were imparting the service with average population coverage of 5172/DOT provider (Expected: 5000/DOT provider). However, a good number of posts of multipurpose health workers and supervisors were vacant.

Only 68% of the DOT centers had clean water, water cup and sitting arrangement for the patients.

TB drugs were sufficiently available at TB unit and treatment centers and all the units had buffer stock of drugs for one month.

We found laboratory consumables sufficiently supplied and centers were having stock of coming one month. Cards, forms and were sufficient. Supply of other logistics from TB unit was regular and need based.

Each Microscopy Center had a functional binocular microscope.

STS and STLS were using one two wheeler provided by the program authority. Supply of fuel was found satisfactory.

We found 96% (109 out of 113) of the personnel involved in RNTCP work (Doctor to DOT provider) trained.

No Governmental organization was participating in any of the schemes of RNTCP. None of them was approached and sensitized by the TB unit to get involved in the program through schemes. There were some DOT providers attached to different NGOs and there

were few DOT centers housed at the premises of some NGOs; but such involvements had not been formalized by agreement with District TB Control Society. None of the private practitioners was found involved in any of the schemes. However, some of them were referring poor patients for sputum microscopy. TB unit had not even approached and sensitized them to participate in the program through schemes.

5.2. Process

Patient Characteristics

Proportions of patients interviewed in the study quarters show that more responses were obtained in third quarter 2003. (Table 2)

Table 2: Proportions of patients interviewed

Quarter	Patients interviewed
Fourth Quarter, 2002	35/47 (74.5%)
Third Quarter, 2003	55/60 (91.7%)
Total	90/107 (84.1%)

Reason analysis of patients not interviewed showed that most (82%) of them changed their residence either within the district but outside TB unit area or to other districts and rest 18% died. Comparison between subjects interviewed and not interviewed shows no significant difference (Table 3).

Table 3: Comparison between patients interviewed and not interviewed

Features	Findings		Remarks
	Interviewed	Not Interviewed	
Mean Age	35.8 years	34.9 years	p = 0.8
Male sex	73.3%	70.6%	p = 0.2
Scheduled caste and tribe	54.4%	52.9%	p = 0.8

Demographic and socio-economic characteristics of the study subjects shows that most of them (71.1%) belong to active age group (15 to 44 years), mean age being around 36 years. 73.3% were male; and 54.4% belonged to scheduled caste and scheduled tribe; 66.7% were either illiterate or did not cross primary level of education; 73.3% had family income up to Rs.2000 and none above Rs.5000; 87.8% were either unemployed or casually employed (Table 4).

Table 4: Demographic and socio-economic features of the patients (n = 90)

Features	Findings
Age	Median 35 years (range: 16 years to 80 years)
Age group accounting for highest %	15 to 44 years: 64 (71.1%)
Male Sex	66 (73.3%)
Scheduled caste and tribe*	49 (54.4%)
Religion	Hindu: 84 (93.3%)
Marital status	Married: 63 (70%)
Education	Illiterate or up to primary level: 60 (66.7%)
Family income	Rs.2000 and less: 66 (73.3%); Rs.5000 or less: 90 (100%)

* Under privileged section of population protected by national constitution

Median delay in diagnosis was 2 months (Expected: 1 month or less), median time in initiating treatment was sub-optimal (Expected: 3 days or less). Proportions of patients aware about the duration of their treatment (82.2%; Expected >90%) and the possible side effects of the drugs were not satisfactory (72.2%; Expected >90%). (Table 5)

Table 5: Patients' characteristics regarding diagnosis of the disease and related awareness

Patients' characteristics (n = 90)	Findings
Having symptoms suggestive of TB for more than one month before being diagnosed	49 (54.4%)
Average delay in diagnosis (Time period between onset of symptoms and diagnosis at a health facility)	Median: 2 months
Average delay in initiating treatment (Time period between the day of diagnosis by sputum microscopy and starting of treatment	Median: 6 days
Received free treatment	90 (100%)
Aware about what disease they were suffering from	89 (98.9%)
Aware about its infectivity and communicability	89 (98.9%)
Aware about curability of the disease if treated properly	88 (97.8%)
Aware of its potential to be fatal if remains untreated	88 (97.8%)
Aware about the duration of treatment supposed to receive	74 (82.2%)
Expressed overall satisfaction with the program	90 (100%)
Satisfied about the support given by the health workers	88 (97.8%)
Briefed by health workers about the side effects of drugs	65 (72.2%)

5.3. Microscopy Service

At 4 (66.7%) centers, stock register for laboratory consumables were not properly maintained

All laboratory technicians were participating in the quality control program conducted by District TB Center (DTC) and State TB Demonstration and Training Center (STDC)

5 (83.3%) out of 6 laboratory technicians correctly said the target cure and sputum conversion rates, number of sputum examination required for diagnosis and follow up and number of positive and negative slide to be preserved for review.

We found microscopy centers had examined 3 sputum smears for 92% of the chest symptomatic. 85% of the patients interviewed stated that they had provided 3 sputum samples at the time of diagnosis. (Table 6)

Table 6: Microscopy services based on interview of patients (n = 90)

Indicators	Number (%)
Free microscopy service	90 (100)
Three sputum samples at the start of treatment	77 (85.5)
Two sputum samples at the end of IP	90 (100)
Two sputum smears at the end of treatment	90 (100)

Records of all the 107 patients were checked in the TB register and crosschecked with laboratory registers. 106 cards were found for crosschecking. Findings showed some inconsistencies among the records examined. (Table 7)

Table 7: Microscopy services based on laboratory registers, treatment cards (n=107)

Indicators	Number (%)
Record of their initial sputum examination at the laboratory register	105 (98.1)
Three sputum samples examined before start of treatment as per register	104 (97.2)
Sputum examination results at diagnosis consistent between the laboratory register and TB register (n=104)	101 (97.1)
Record of sputum examination at the end of intensive phase as per laboratory register	106 (99.1)
Two sputum smears examined at the end of intensive phase	105 (98.1)
Sputum examination results at the end of intensive phase consistent between the laboratory and TB register (n=106)	106 (100)
Sputum examination results at the end of intensive phase consistent between the laboratory register and treatment cards (n=106)	106 (100)

Out of 107 study subjects, 45 patients were declared 'cured' till the time of evaluation. All of them received necessary microscopy service. (Table 8)

Table 8: Microscopy services based on a review of laboratory registers, treatment cards of cured patients (n = 45)

Indicators	Number (%)
Record of the end of treatment sputum examination	43* (100)
Two sputum samples examined (n=43)	43 (100)
Sputum examination results at the end of treatment consistent between the laboratory register and TB register (n=43)	43 (100)

* Results not available for two patients, one due to death and other due to re-registration

5.4. Treatment Observation

74% of the DOT centers (Expected: 100%) properly maintained drug boxes. 68% had adequate facilities for the patients (Expected: 100%). (Table 9)

Table 9: Status of the DOT centers (n = 50) on the basis of inspection

Indicators	Number (%)
DOT centers maintaining a patient-wise drug box satisfactorily	37 (74)
DOT centers having clean water, sitting arrangements, water cup	34 (68)

We found DOT time not convenient to 20% patients. Thrice a week attendance at DOT center during intensive phase was not convenient to 30% patients. (Table 10)

Table 10: Status of DOT service and its service based on interviews of the patients

Features	Findings
Free treatment service	90 (100)
Time for having a single dose under DOT	Median: 30 minutes
Waiting time at the DOT center	Median: 10 minutes
Distance covered for a single dose under DOT	Median: 1.5 Km.
Patient spending for a single dose under DOT	Median: Rs.4.00.
DOT time convenient	72 (80%)
Thrice a week attendance during IP convenient	63 (70%)

DOT during intensive phase was 90% (Expected: 85%) and that in continuation phase was 66.7% (Expected: 100%). (Table 11)

Table 11: Treatment services based on interview of patients (n = 90)

Indicators	Number (%)
Received required doses under DOT during intensive phase	81 (90.0)
Received required doses under DOT during continuation phase	60 (66.7)

Number of doses in the drug box did not tally with that of treatment cards in 27% patients. Number of empty blister packs matched with the doses marked in the card in only 67% cases. Address verification (26%) and defaulter retrieval (53%) were unsatisfactory (Expected: 100%). (Table 12)

Table 12: Treatment services based on treatment cards and drug boxes (n = 168)

Indicators	Number (%)
Doses used in the drug box consistent with marking in their treatment cards	123 (73.2)
Doses under DOT during intensive phase consistent with marking in their treatment cards	150 (92.8)
Doses under DOT during continuation phase consistent marking in their treatment cards	148 (89.1)
Updating of treatment cards done at the time of DOT	125 (74.4)
Empty blister packs in the drug box consistent with marking in their treatment cards	112 (66.7)
Treatment cards having records of address verification	43 (25.6)
Treatment cards having records of defaulter retrieval activities (n=161)	85 (52.8)

24 DOT providers could not be interviewed as they were either on leave for various reasons or went for training, at the time of evaluation. 76% of the DOT providers had knowledge about number of doses in intensive phase and 62% that of continuation phase (Expected: 100%). (Table 13)

Table 13: Treatment services based on interview of DOT providers (n = 92)

Indicators	Number (%)
Knowledge of the number of doses to be received under DOT during intensive phase	70 (76.1)
Knowledge of the number of doses to be received under DOT during continuation phase	57 (62)
Treatment cards updated at the time of administering the dose	75 (81.5)
Patient returning weekly blister packs during continuation phase	90 (97.8)

We found none of the factors associated with non-observation of DOT among study patients. However, observation of DOT was higher (74%) when total time required for DOT was 30 minutes or less; lesser (59%) among the patients belonging to backward section of the community and lesser (60%) among the patients illiterate or have education up to primary level (p = 0.059). (Table 14)

Table 14: Factors associated with non-observation of treatment (based on patient interviews)

Factors	Received DOT (%)	Relative Risk (95% CI)	P value
Knowledge about TB			
Informed	51/74 (68.9)	1.2 (0.8-1.9)	0.3
Less informed	9/16 (56.2)		
Convenience in DOT timing			
Yes	48/72 (66.7)	1.00 (0.7-1.4)	1.0
No	12/18(66.7)		
Convenience in attending thrice a week for DOT			
Problematic	18/27 (66.7)	1.0 (0.7-1.4)	1.0
No problem	42/63 (66.7)		
Convenience to reach DOT center			
1 Km. or less	30/45 (66.7)	1.0 (0.8-1.3)	1.0
More than 1 Km.	30/45 (66.7)		
Convenience in total time required for a DOT episode			
30 minutes or less	36/49 (73.5)	1.3 (0.9-1.7)	0.1
More than 30 minutes	24/41 (58.5)		

Factors	Received DOT (%)	Relative Risk (95% CI)	P value
Convenience in waiting time at a DOT center			
Less than 30 minutes	51/60 (85)	1.1 (0.9-1.3)	0.5
30 minutes or more	24/30 (80)		
Convenience in expense for a DOT episode			
Rs. 5.00 or less	36/60 (60)	0.9 (0.7-1.3)	0.8
More than Rs. 5.00	19/30 (63.3)		
SC/ST patient			
Yes	29/49 (59.2)	0.8 (0.6-1.0)	0.08
No	27/35 (77.1)		
Sex			
Female	18/24 (75)	1.2 (0.9-1.6)	0.3
Male	42/66 (63.6)		
Age			
Less than 35 years	28/43 (65.1)	1.0 (0.7-1.3)	0.8
35 years or more	32/47 (68.1)		
Occupation			
Regularly Employed	7/11 (63.6)	0.9 (0.6-1.5)	0.8
Unemployed/casually employed	53/79 (67.1)		
Education			
Up to primary level	36/60 (60)	0.75 (0.57-0.99)	0.059
More than primary	24/30 (80)		

5.5. Supervision and Monitoring

Supervision and monitoring is one of the most important components of RNTCP. Medical officer TB control had not visited any TCMC in last one month and only one day he devoted for supervisory visit to DOT centers. None of the medical officers paid visit to

the defaulting patients. Supervisory activities of STS and STLS were satisfactory. We found 50% DOT providers were not verifying the address of the patients before initiation of the treatment. (Table 15)

Table 15: Status of supervision and monitoring activity

Indicators	Findings
Activities of Medical Officer TB Control (MOTC) (n=1)	
Supervisory visit to the TCMC in last one month	Nil
Supervisory visit to the DOT centers in last one month	One day
Review patient treatment activities in last one month	Twice
Maintenance of official records of supervisory visit	Done
Activities of Medical officers (n=10)	
Review patient treatment activities at DOT centers	6 (60%)
Supervisory visit to the DOT centers	6 (60%)
Home visits to retrieve irregular patients	0 (0.0%)
Maintenance of official records of supervisory visit	0 (0.0%)
Activities of Senior Treatment Supervisor (STS) and TB Health Volunteers (THV) (n=3)	
Visit to each health facility once in a month	3 (100%)
Use check list for supervisory activity	3 (100%)
Review patient treatment activities with providers regularly	3 (100%)
Maintenance of field diary	3 (100%)
Home visits to retrieve irregular patients	3 (100%)
Activities of Senior TB Laboratory Supervisor (STLS) (n=1)	
Review all positive slides and 10% of negative slides at MCs	1 (100%)
Visit each MC in the TU area once in a month	1 (100%)
Use check list for supervisory activity	1 (100%)
Participate in quality control program of state	1 (100%)
Maintenance of field diary	1 (100%)

Indicators	Findings
Activities of Laboratory technicians (LT) (n=6)	
Keep slides for review by STLS	6 (100%)
Participate in quality control program of district	6 (100%)
Activities of DOT providers (n = 92)	
Verify the address before initiation of the treatment	46 (50%)
Visit houses of the defaulters for retrieval	92 (100%)

We assessed the awareness of supervisors about program indicators and knowledge related to implementation of RNTCP. Program awareness of 40% medical officers was deficient. 20% of the DOT providers could not tell the correct dose times when a patient would be requested to do follow up sputum examination. (Table 16)

Table 16: Knowledge of the supervisory staff and doctors working in RNTCP

Indicators	Findings
Medical Officer TB Control (MOTC) (n=1)	
Smear conversion rate in the last quarter	1 (100%)
Cure rate in the last quarter	1 (100%)
Medical officers (n=10)	
Have one of the three key RNTCP documents	5 (50%)
Knows the number of patients examined in the last month	3 (30%)
Knows the number of patients found smear positive in the last month	6 (60%)
Senior Treatment Supervisor (STS) and TB Health Volunteers (THV) (n=3)	
Target sputum conversion rate of the new sputum smear positive patients	3 (100%)
Target cure rate of the new sputum smear positive patients	3 (100%)
Proportion of patients examined in the last quarter	3 (100%)
Sputum conversion rate and cure rate in the last quarter	3 (100%)

Indicators	Findings
Senior TB Laboratory Supervisor (STLS) (n=1)	
Proportion of patients examined in the last quarter	1 (100%)
Sputum conversion rate and cure rate in the last quarter	1 (100%)
Target sputum conversion rate of the new sputum smear positive patients	1 (100%)
Target cure rate of the new sputum smear positive patients	1 (100%)
Importance of quality control program	1 (100%)
Laboratory technicians (LT) (n=6)	
Number of sputum examinations required for diagnosis and follow up	6 (100%)
Importance of quality control program	6 (100%)
Target sputum conversion rate of the new sputum smear positive patients	3 (50.0%)
Target cure rate of the new sputum smear positive patients	4 (66.6%)
DOT providers (n = 92)	
Correct duration of treatment for new sputum positive patients	77 (83.7)
Possible treatment outcome if the patient does not take drugs under DOT	90 (97.8)
Importance of the follow up sputum examinations	87 (94.6)
When to provide sputum containers to patients for follow up sputum examination	74 (80.4)

We also observed training status significantly influenced the knowledge level of the DOT providers. (Table 17 A, B, D)

Table 17: Knowledge of the DOT providers (n = 92) in relation to training status

A.

Training status	Knowledge of doses in intensive phase		Relative Risk (95% CI)	P value
	No	Yes		
No	4 (100%)	0 (0.0%)	4.89 (3.24-7.38)	0.0003
Yes	18 (20.4%)	70 (79.6%)		

B.

Training status	Knowledge of doses in continuation phase		Relative Risk (95% CI)	P value
	No	Yes		
No	4 (100%)	0 (0.0%)	2.84 (2.14-3.77)	0.009
Yes	31(35.2%)	57 (64.8%)		

C.

Training status	Knowledge of Address verification		Relative Risk (95% CI)	P value
	No	Yes		
No	2 (50.0%)	2 (50.0%)	1.00 (0.37-2.72)	1.0
Yes	44 (50.0%)	44 (50.0%)		

D.

Training status	Knowledge of sputum examination at the end of IP		Relative Risk (95% CI)	P value
	No	Yes		
No	4 (100%)	0 (0%)	6.29 (3.89-10.16)	0.00003
Yes	14 (15.9%)	74 (84.1%)		

5.6. Accuracy of Reports and Records

We assessed the accuracy of records and reports by crosschecking laboratory register, TB register, treatment cards and reports sent by treatment centers to the TB unit and TB unit to district TB center (Table 18).

Table 18: Inconsistencies in records and reports

Observations	Number (%)
Inconsistency in records of gradation of sputum examination results by Laboratory register and Tuberculosis register (n=105)	3 (2.8)
Inconsistency in records of gradation of sputum examination results by Tuberculosis register and treatment cards (n=107)	1 (0.9)
Inconsistency in records of the date of initiation of treatment by Tuberculosis register and treatment cards (n=107)	1 (0.9)

5.7. Output

We found referral of chest symptomatic for sputum microscopy barely achieved the expected target. Reports of four quarter showed that it was not steady in all the quarters of the year. Annualized total detection rate (127/100,000) was below the target level (135/100,000). Annualized new sputum positive case detection rate (37.5/100,000) was well below the target (60/100,000). Sputum conversion rate, cure rate and success rate of new sputum positive patients were satisfactory. (Table 19)

Table 19: Performance of Habra TB unit in year 2003

Quarter	Outpatients examined (%)	Annualized total detection rate (per lakh population)	Annualized smear +ve detection rate (per lakh population)	Smear –ve : smear +vex	3 mths Sp. Conv. rate of new smear +ve patients (%)	Cure rate of new Sp.+ve patients (%)	Success rate of new Sp.+ve patients (%)
First	2.1	100	37.3	0.75	97.9	88	88
Second	1.9	112.7	38	0.75	91.07	92	92
Third	1.8	101.3	40.7	0.67	91	90	90
Fourth	2.2	127.4	37.5	1.14	98.4	95.9	95.9
Expected level	**2-4%**	**135/100000 population**	**60/100000 population**	**0.4-1.2**	**90% and more**	**85% and more**	**> 85%**

Cure rate of new sputum positive patients was less (79%) and death rate was high (6.2%) in 2001. However, both improved in year 2002. Defaulter rates of new sputum positive patients registered in year 2001 and 2002 were 4.3% and 3.1% respectively (Expected level: <5%). (Table 20)

Table 20: Treatment outcome of new sputum positive patients registered in Habra TB unit, 2001 and 2002

Year	Cured	Died	Failure	Defaulter
2001	79%*	6.2%	0%	4.3%
2002	91.5%*	2.2%	0%	3.1%
Expected level	**85%**	**<4%**	**<4%**	**<5%**

* p = 0.02

5.8. Administrative commitment

We found that district magistrate actively followed up the program apart from health officials. Involvement of general administration and local self-government was found sub-optimal.

Commonest constraints in RNTCP implementation were vacancy of multipurpose health workers at different sub centers, lack in priority of RNTCP in relation to other national programs, particularly Reproductive and Child Health (RCH) program and National Anti-Malaria Program (NAMP), low involvement of the medical officers and health workers and lack of health infrastructure in urban area

6. Discussion

6.1. Structure

Population coverage of the TB unit is 23% more than expected (1/500,000 populations). There are adjacent TB units (Amdanga and Baduria) catering lesser population than expected. Redistribution of area will decrease the excess load and ensure better functioning of the workers. However, requisite numbers of microscopy centers are functioning (Expected: 1/100,000) suggesting the facilities to the population have been ensured. Average population coverage of each DOT center is marginally higher than expected (Expected: 10,000/DOT center). Each DOT provider on an average covers populations, marginally higher than expected (5000/DOT provider). It indicates that functionaries are shouldering additional load, which may influence the quality of work. Training coverage among the health functionaries is good.

Public private partnership is an important concept in RNTCP. Public health problem like TB can never be controlled without proper public-private mix in the implementation of the program. India has one of the largest private health care sectors in the world, with an estimated 8 million private practitioners. These are often the first point of contact for a significant percentage of TB suspects and patients. RNTCP has made a concerted effort to develop partnerships with the private practitioners and NGOs, in order to widen access to quality TB care. 3000 private practitioners and 750 NGOs are officially providing RNTCP service. Documentation from a number of the projects has shown promising results [29]. RNTCP provides interesting schemes for the non-governmental organizations (NGO) and private practitioners. In the study TB unit, no non-governmental organization or private practitioners was participating in any of the schemes of RNTCP. They were not approached and sensitized by the TB unit to get involved in the program through schemes. 50% population of Habra TB unit resides in urban area, where private health sector is predominant. Not involving private health sector and NGOs is likely to influence the performance of the program. One of the causes of lower case detection rates in the TB unit might be due to this.

Filling up of the vacant posts of multipurpose health workers and supervisors is necessary for the better implementation of the program. Other criteria, like status of drug supply, laboratory consumables, forms and registers etc. are satisfactory.

6.2. Process

Patients' Characteristics

The patients interviewed and not interviewed showed almost similar characteristics. So, the study patients interviewed may be considered representative.

Analysis of the demographic characteristics suggests that majority of the patients belonged to 15-44 years age group. It is the most active period of the human life. It corroborates with the fact from earlier studies [31, 32]. 73.3% of the patients were male; 56% of the females belonged to the childbearing ages. Sex wise proportions of study patients suggests that it is similar to the results of previous researches that females constitute one third of (Present study: 26.7%) case from all ages and half of the female patients (Present study: 56%) are of child bearing age group [13, 33].

Majority (54.4%) of the patients belonged to scheduled caste and scheduled tribe, where as population proportion of SC and ST in study area is 39.4% as per Census 2001. It establishes that TB is more prevalent among this socially disadvantaged section of the society in the study area. Researches in India found tuberculosis to be present in all strata of society, although prevalence was higher among the poor and socially disadvantaged [34, 35]. Two third of the patients were either illiterate or educated up to primary level. The family income of all patients was below Rs.5000, almost three fourth (73.3%) being below Rs.2000.00. All these findings lead to conclusion that in the study area TB is more prevalent among the socially and economically disadvantaged; at least the patients from this section mostly come to the government facilities for diagnosis and treatment.

Median delay in initiation of treatment (period between diagnosis by sputum microscopy and initiation of treatment) was 6 days (Expected ≤ 3 days); median delay in diagnosis (period between onset of symptoms and diagnosis by sputum microscopy) was 2 months (Expected: ≤ 1 month). High 'Delay in diagnosis' indicates that community is not

adequately aware about the possible symptoms and signs of TB and so reporting to the health facility is late. For the better performance of the program, delay in initiation of the treatment should be brought down below 6 days, preferably within 3 days.

So far as the knowledge of the patients was concerned, though nearly all patients were aware about some basic information regarding TB and DOT, one fifth of the patients had incorrect knowledge about the duration of own treatment. Long duration of treatment in TB is one of the main reasons of irregular drug intake and non-compliance on the part of the patients. In RNTCP, patients should be made adequately aware about the shorter duration of treatment and intermittent chemotherapy, so that proportion of default gets reduced.

Almost one third of the patients were found not aware about the side effects of the drugs. Experience showed that patients do not feel comfortable psychologically taking six or seven tablets at a time on the DOT day. Moreover, if he/she is not made aware and assured about the possible side effects of the drugs, the causation of mild side effects usually leads to discontinuation of the treatment, default and irregularity [36].

Microscopy service

All the patients received microscopy free of cost, all centers received adequate supply of consumables and logistics, quality assurance program had been undertaken regularly, and most of the laboratory technicians had adequate knowledge relating to their work suggesting well preparedness of the network. However, sputum collection activity could not be done as per guideline at many centers due to lack of space and privacy. In one third of the centers, stock register was not properly maintained. We observed around 10% gap between the laboratory registers and patient responses about three sputum examinations before initiation of the treatment. It was almost same in case of follow up sputum examinations at the end of intensive phase and at the end of treatment. The discrepancies, we observed, might be due to wrong recording on the part of the providers or faulty recall on the part of the patients. In the national evaluation done in 2002, it was observed that 88% patients reported providing two sputum samples at the end of IP 80%

at the end of CP. Nearly 96% cases provided two sputum samples at the time of diagnosis [37].

Treatment service

The treatment service was free of cost as proposed by the program. We have not found necessary facilities (like clean water, cup or bottle, sitting arrangement) for DOT in 32% of the DOT centers. It is not conducive to the implementation of RNTCP. It suggests that acceptability of RNTCP to the patients may suffer for this. This weakness deserves urgent attention of the program managers.

The average total time spent by a patient for a single dose under direct observation was too high, almost 50 minutes; average total distance covered for observing DOT was more than one kilometer. Almost one fifth of the patients reported that the time for DOT was inconvenient to them and about one third reported that attending thrice a week during intensive phase was problematic to them in the context of maintaining their work to earn livelihood. Such information indicates the need of establishing DOT centers and keeping it open at odd hours. It might be achieved by involving NGOs and private practitioners. Virtual non-involvement of NGOs and private practitioners in any of the RNTCP schemes in the study TB unit area was one of the major barriers in the proper implementation of RNTCP.

Observations of direct treatment during intensive phase, as per treatment cards and response from the patients were satisfactory and corroborate each other. But there was a difference of 30% between the findings of the same activity during continuation phase. It suggests that DOT was less observed during continuation phase. It also raises the question on reliability of the reports on DOT activity. Further study is recommended to infer on this. In the internal evaluation of the program at the national level, it was found that nearly 73% of the patients received treatment under direct observation during IP and 65% during CP. They also commented that treatment observation details were not always accurately recorded in the treatment cards [37].

We found at least 25% of the treatment cards were not updated at the time of administering the dose and only in one third of the cases the empty blister packs in the drug boxes did not match with the markings of the treatment cards. Both of these indicate that good number of DOT providers was not following the guideline of RNTCP, thus undermining the quality of the activity.

Moreover, at many centers doses given non-observed to the patients due to various reasons during intensive and continuation phases, were not duly entered in the treatment cards as per guideline. It posed difficulties in assessing the true picture of direct observation of treatment. It had been told by many DOT providers that they were not trained about it. It suggests the necessity of reorientation training of the DOT providers.

One fourth of the DOT centers were not maintaining the drug boxes as per guideline; in about same proportion of cases, number of doses in the drug boxes was not consistent with the markings in the treatment cards. About one fourth and one third of the DOT providers were not aware about the correct number of doses to be given during intensive and continuation phases, respectively. They possibly deserve refresher training in RNTCP.

We found that less informed patients were less likely to receive treatment under direct observation; patients who had to spend more than 30 minutes for a DOT episode were also less likely to do so; patients attended by DOT providers having adequate knowledge were more likely to adhere to observed treatment; scheduled caste and tribe patients were less likely to receive treatment under direct observation; female patients were participating more than males; illiterate and less educated patients were less likely to receive treatment under direct observation. These findings fairly indicate the areas where attention should have to be given for overall improvement of RNTCP.

We reviewed the supervision and monitoring activities and found the role of Medical Officer TB Control (MOTC) in this regard was sub-optimal. Further enquiry revealed that he, being the only medical officer of the TB unit, has to run the out patients door (OPD) for six days a week, that too during the working hours of the microscopy centers

and DOT centers. On the day of his field activity, he had to close down the OPD resulting immense inconvenience to the patients. This is a practical problem and deserves attention of the district level program officers for resolution. The involvement of medical officers in supervision and monitoring was grossly below expected level. It was also felt that motivation in this regard was also lacking among them. In the internal evaluation of the program at the national level, it was found that supervision was weak at all levels [37].

Supervisory function of Senior Treatment Supervisor (STS), Senior TB Laboratory Supervisor (STLS), TB Health Volunteers (THV) was found commendable.

DOT providers verified the address before the initiation of treatment in only 50% cases; however, records of the treatment cards revealed that it was around 26%. Though all DOT providers firmly committed that they were regularly retrieving defaulters, we found that in the records of the treatment cards being only 52.8% cases. Further enquiry showed that the habit of recording the home visits in the treatment cards was lacking in almost all health workers. In the internal evaluation of the program at the national level, it was found that nearly 33% of the DOT providers were not conducting prompt defaulter retrieval visits [37].

Review of the outcome of training activities revealed that all medical officers attached to different health centers deserve reorientation training; it is also true for some of the laboratory technicians and DOT providers. It was also observed that training status and knowledge level of DOT providers were significantly associated in terms of awareness on the dose of IP (RR: 4.89; CI: 3.24-7.38; p=0.0003), CP (RR: 2.84; CI: 2.14-3.77; p=0.009) and follow up sputum examination at the end of intensive phase (RR: 6.29; CI: 3.89-10.16; p=0.00003).

Accuracy of records and reports

Maintenance of records and reports is optimal. Only in 3 cases (2.8%) gradation of sputum results in laboratory register was not consistent with the TB register. Inconsistency in records of gradation of sputum examination results between Tuberculosis register and treatment cards was found in 1 case (0.9%). Date of initiation

of treatment as per TB register was found inconsistent with that in the treatment card in 1 case (0.9%).

Administrative commitment

Though District magistrate was interested about the program, involvement of general administration and local self-governments functioning at rural blocks and municipalities was sub-optimal. It is essential for the proper implementation of the program. Putting lesser priority to RNTCP in comparison to other national programs particularly family planning is a problem in the field situation. It affects the attention of the health workers, thus the implementation of the program. Policy planners may consider this in view of the impact of tuberculosis in public health. Problem of vacancy in the posts of the health workers and supervisors may be addressed in the interest of proper implementation.

6.3. Output

Performance in 2003 indicates referral rate of chest symptomatic from the out patients door (OPD) was 2% (Expected 2-4%). It were also below the expected level in other quarters of the year. In the context of the state of total case detection rate (127/100,000) and new sputum positive case detection rate (37/100,000) of the TB unit, this finding suggests that possibly it is one of the major reasons behind such low case detection rates. Though the annualized total detection rate has been showing an upward trend, it deserves further improvement. Annualized smear positive detection rates in all the quarter were found far below expected level (60/100,000) and also showed sign of stagnation. From epidemiological point of view, this group of patients is most important for the control of TB in the community. Sputum conversion rate and cure rate of the new sputum positive case had increased in every quarter and reached a satisfactory level.

Comparison of treatment outcome of 2001 and 2002 suggests cure rate significantly increased in 2002 (79% versus 91.5%; $p = 0.02$). Defaulter has also decreased (4.3% versus 3.1%).

6.4. Limitations of the study

We chose the study unit based on the similarity in the population characteristics between the TB unit area and the district as a whole. We have not selected it randomly for evaluation.

Interviewer bias was minimized by orientation training of two investigators, who assisted in primary and secondary data collection, about the survey methodology and the instruments used. Principal investigator also demonstrated the method of data collection to the assistants on site.

At many centers, DOT providers gave doses non-observed to the patients due to various reasons during Intensive Phase and Continuation Phase. However, many of them did not mark those in the treatment card maintaining program guideline. It posed difficulties in assessing the true picture of direct observation of treatment. We relied on patient's statement on those cases.

We had not interviewed Private practitioners and Non-Governmental Organizations to understand the reasons behind their non-involvement.

7. Summary and Conclusions

1. Majority of the patients belonged to 15-44 years age group, the most productive period of life. Of these, more than half were females in their childbearing ages. The proportions of patients belonging to minority community and economically disadvantaged section were higher.
2. Average delay in initiation of treatment was found within an acceptable limit. However, delay in diagnosis was considerably high.
3. The knowledge of the patients about the duration of their own treatment and possible side effects of the drugs were found insufficient.
4. Most of the patients examined their sputum at the initiation of treatment; follow up and at the end of the treatment as per program requirement.
5. Less informed, less educated patients were more among the defaulters in regular sputum examination.
6. All the patients received free drugs and microscopy services.
7. The TB unit was not maintaining directly observed treatment sufficiently during continuation phase.
8. Less informed patients were less likely to receive treatment under direct observation; patients who had to spend more than 30 minutes for a single DOT episode were also less likely to do so; patients attended by DOT providers having adequate knowledge were more likely to adhere to observed treatment; scheduled caste and tribe patients were less likely to receive treatment under direct observation; female patients were participating more than males; illiterate and less educated patients were less likely to receive treatment under direct observation.
9. Treatment observation details were not always accurately recorded in the treatment cards.
10. One fourth of the DOT centers were not maintaining the drug boxes as per guideline.
11. One fourth and one third of the DOT providers were not aware about the correct number of doses to be given during intensive and continuation phases, respectively.
12. One-third of the DOT centers lacked basic facilities for providing DOT.

13. Recording the gradation of initial sputum results in laboratory and TB registers mostly corroborated.
14. Supervision was insufficient at the level of MOTC and almost absent at the level of medical officers. However, it was good at the level of STS and STLS.
15. There was weakness in verification of address and retrieval of defaulters to treatment.
16. The DOT providers, who had not been trained, were found significantly less knowledgeable.
17. The referral of chest symptomatic for sputum microscopy from the out patients door was not satisfactory; annualized total case detection rates were low but showing an upward trend in 2003; annualized new sputum positive case detection rates were showing signs of stagnation; sputum conversion and cure rates had improved over time and reached a satisfactory level. Cure rate significantly improved in 2002 in comparison to 2001.
18. Supply of drugs, laboratory consumables and other logistics was regular.
19. No non-governmental organization and private practitioner were found involved in RNTCP.
20. Awareness generation activities among the population in the TB unit area were sub-optimal.

8. Recommendations

8.1. Identification of cases

Ensure adequate referral of chest symptomatic from the OPD for sputum microscopy by motivating doctors and health workers. It has just crossed the lower limit of the expected level in the fourth quarter 2003. Case detections, both total and new sputum smear positive, are poor probably for that reason.

Take measure to make the community aware of cardinal symptoms of TB, its dangers and facilities provided through RNTCP. It will reduce the period of delay in diagnosis. Special stress may be given to the disadvantaged section of the society.

Cut short the time gap to reduce the delay in initiation of treatment.

8.2. Microscopy service

Initiate External Quality Assessment (EQA) program to ensure quality microscopy.

8.3. Treatment observation

Give top priority to make treatment observation more convenient to patients. Considerable proportion of the patients expressed their difficulties in DOT provision. Counsel the patients on the importance of directly observed treatment. This will help to reduce defaulter and irregular drug intake.

Arrange disposable cups, water jugs and seating arrangements at every DOT center.

8.4. Training

Arrange reorientation training for the medical officers and selected DOT providers.

8.5. Supervision

Strengthen supervision at MOTC and Medical officer level. MOTC is to conduct monthly review meeting at TB unit level with the supervisory staff. MOTC is to ensure two days field visit in a week. Ensure manning of out patient door at TB unit on those days.

Ensure weekly review meetings of medical officers with DOT providers and laboratory technicians.

8.6. Administrative commitment

Ensure monthly evaluation of performance of the TB unit by the district health authority.

Involve sub-district general administration and local self-governments in RNTCP.

Advocate RNTCP success stories widely through various media and specially prepared advocacy documents.

8.7. Program review

Arrange internal review of randomly selected DOT centers, treatment and microscopy centers with the help of District health authority.

8.8. Operational research

Develop and test appropriate messages to counsel patients.

Measure the effectiveness of different DOT providers.

Develop and test models to supervise DOT providers.

Understand the perception of PHC staff about participation in the RNTCP.

Examine factors contributing to poor follow up for sputum examination and default to treatment under direct observation.

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ANNEXURE I

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS, WEST BENGAL, 2004

INTERVIEW SCHEDULE: 1

(For New sputum positive patients registered in 3Q, 03 & 4Q, 02)

A. Identification Particulars

1. Name: 2. Age (completed years): 3. Sex: M / F

4. TB No. 5. Caste: SC / ST / Others 6. Religion: ____

B. Social & Economic Particulars

7. Marital status: Married / unmarried / widow / others

8. Dependent family members: ________

9. Education: Illiterate / I to VI / VII to X / X to XII / Graduate and above

10. Monthly family income:

Below Rs. 2000 / Rs. 2000-5000 / Rs. 5000-10000 / Above Rs. 10000

11. Occupation: Unemployed / casually employed / regularly employed

C. Treatment Particulars

12. Since when you have been suffering from suggestive symptoms before coming for treatment? 1 month / 1-2 months / 3 months / more than 3 months/ specify_____

13. For what disease are you undergoing treatment? Yes / No

14. Do you know that the disease is infectious? Yes / No

15. Do you know that your disease can be fatal? Yes / No

16.. Do you know that the disease you suffer from can be cured if drugs are taken regularly? Yes / No

17. Do you know how long you should receive treatment? Yes / No

18. How many doses of drugs did you take under direct observation in IP? Yes / No

19. How many doses of drugs did you take in a week under direct observation in CP? Yes / No

20. Is the time of DOT convenient? Yes / No

21. To attend DOT center 3 times a week:

Highly problematic / Problematic / No problem

22. Distance of DOT center from home (in Km.): _________

23. Average time required each time to attend DOT center and back home: _________

24. Average waiting time at DOT center (in hours / minutes): ___________

25. Average expense to attend DOT center each time (in rupees): ________

26. Can the DOT provider be asked freely about treatment? Yes / No

27. Did the DOT provider caution you about side effects of drugs? Yes / No

28. Are you satisfied with the interaction and support provided by the program staff?

Yes / No

29. Did you pay for sputum examination at the MC? Yes / No

30. Did you pay for drugs after being registered in RNTCP? Yes / No

31. How many sputum samples did you provide before the start of treatment?

3 / 2 / 1 / Nil

32. How many sputum samples did you provide at the end of intensive phase?

3 / 2 / 1 / Nil

33. How many sputum samples did you provide at the end of IP? 3 / 2 / 1 / Nil

Date: _______________ Signature & Name of Interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

INTERVIEW SCHEDULE: 2A (For Medical Officer, TB control)

1. Name:
2. Have you undergone training in RNTCP? Yes / No
3. Do you know the target case detection rate of sputum positive patients? Yes / No
4. Do you know the target cure rate of new sputum positive patients? Yes / No
5. Which one, among 3 and 4 is to be achieved first? 3 / 4
6. Do you know the target sputum conversion rate of new sputum positive patients?

   Yes / No
7. What is the sputum conversion Do you have a copy of any one of the following?

   Technical guideline / RNTCP at a glance / Key facts and concepts / Desk reference
8. What is the rate reported for the TU in the last quarter? ________
9. What is the cure rate reported for the TU in the last quarter? ________
10. What is the referral rate of chest symptomatic from the outdoor department reported for the TU in the last quarter? ________
11. What was the number of sputum smears examined in the MC last month?

    ____
12. What percentage of them was positive in his/her MC? ________
13. How often have you reviewed patient treatment activities with Dot providers in the last one month? ________
14. How often have you visited the irregular/defaulting patients to bring them back on treatment in the last one month? ________
15. How often have you conducted supervisory visits to DOT centers in the last one month? ________
16. How often have you conducted supervisory visits to the PHCs in the last month?

    ____
17. Do you maintain official records of such visits? (Check) Yes / No
18. Is the drug supply from DTC regular? Yes / No

19. Is the reagent supply from DTC regular? Yes / No

20. Is the logistics (cards, consumables etc.) supply from DTC regular? Yes / No

21. Are there stock registers for a) drugs b) reagents at TU?

a) Yes / No b) Yes / No

22. Are NGOs attracted / not attracted to RNTCP? (Give 3 most important reasons)

a) b) c)

23. Are private practitioners attracted / not attracted to RNTCP? (Give 3 most important reasons)

a) b) c)

24. Do you organize IEC activity? Yes / No

25. If 'Yes', how often have you organized IEC activities in the last month?

____

26. If 'No', please state reasons. (Give 3 most important reasons)

a) b) c)

Date ____________________ Signature & Name of the interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS, WEST BENGAL, 2004

INTERVIEW SCHEDULE: 2B (For other Medical Officers of MCs)

1. Name: 2. Health facility:

3. Have you undergone training in RNTCP? Yes / No

4. Do you have a copy of any one of the following?

Technical guideline / RNTCP at a glance / Key facts and concepts / Desk reference

5. What is the target cure rate of new sputum positive patients? ____________

6. What is the target sputum conversion rate of new sputum positive patients? _____

7. What is the expected proportion of chest symptomatic among adult OPD patients?

8. What was the referral rate of chest symptomatic from the outdoor department reported for the MC in the last quarter? ______________________________

9. What was the number of sputum smears examined in the MC last month? _______

10. What percentage of them was positive in his/her MC? ____________________

11. How often have you reviewed patient treatment activities with Dot providers in the last one month? ____

12. How often have you visited the irregular/defaulting patients to bring them back on treatment in the last one month? ____

13. How often have you conducted supervisory visits to DOT centers in the last one month? ____

14. Is the drug supply from TU regular? Yes / No

15. Is the reagent supply from TU regular? Yes / No

16. Is the logistics (cards, consumables etc.) supply from TU regular? Yes / No

17. Are there stock registers for a) drugs b) reagents at MC?

a) Yes / No b) Yes / No

18. Are NGOs attracted / not attracted to RNTCP? (Give 3 most important reasons)

a) b) c)

19. Are private practitioners attracted / not attracted to RNTCP? (Give 3 most important reasons)

a) b) c)

20. Do you organize IEC activity? Yes / No

21. If 'Yes', how often have you organized IEC activities in the last one month?

____

22. If 'No', please state reasons. (Give 3 most important reasons)

a) b) c)

Date ____________________ Signature & Name of the interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

INTERVIEW SCHEDULE: 3 (For Senior Treatment Supervisor and THV)

1. Name:

2. Have you undergone training in RNTCP? Yes / No

3. What is the target cure rate of new sputum positive patients? ______________

4. What is the target sputum conversion rate of new sputum positive patients? ______

5. What is the sputum conversion rate reported for the TU in the last quarter? ______

6 What is the cure rate reported for the TU in the last quarter? _________

7. What is the referral rate of chest symptomatic from the outdoor department reported for the TU in the last quarter? ______________

8. How often have you visited each health facility and DOT center in the last month?

____

9. How often have you visited homes of irregular patients to bring them back to treatment in the last month? ____

10. How often have you reviewed patient treatment activities with DOT providers in the last month? ____

11. Have you used any checklist for field visit? Yes / No

12. Have you maintained a diary recording the details of your field activities?

Yes / No

13. Do you prepare the monthly & quarterly report of the TU? Yes / No

14. Do you maintain the drug stock in drug stock register? Yes / No

Date __________________ Signature & Name of the interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

INTERVIEW SCHEDULE: 4 (For Senior TB Laboratory Supervisor)

1. Name:

2. Have you undergone training in RNTCP? Yes / No

4. What is the target cure rate of new sputum positive patients? ________

7. What is the target sputum conversion rate of new sputum positive patients? ______

8. What is the sputum conversion rate reported for the TU in the last quarter? _______

9. What is the cure rate reported for the TU in the last quarter? ______________

10. What is the referral rate of chest symptomatic from the outdoor department reported for the TU in the last quarter? ____________________

11. How often have you visited each MC in the TU area during last one month?

____

12. How many (%) positive and negative slides do you review at MCs usually?

____

13. Have you used any checklist for supervisory activity in last one month? Yes / No

14. Have you participated in the quality control program in last one month? Yes / No

15. Have you maintained a diary recording the details of the field activities? Yes / No

16. Do you maintain the laboratory stock in a register? Yes / No

Date ___________________ Signature & Name of the interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS, WEST BENGAL, 2004

INTERVIEW SCHEDULE: 5 (For Laboratory technician)

1. Name: 2. Health facility:

2. Have you undergone training in RNTCP? Yes / No

4. What is the target cure rate of new sputum positive patients? Yes / No

7. What is the target sputum conversion rate of new sputum positive patients? ______

8. What is the sputum conversion rate reported for the MC in the last quarter? ______

9. What is the referral rate of chest symptomatic from the outdoor department reported for the MC in the last quarter? ______________________________

10. How many sputum examinations are required for diagnosis? ______________

11. How many sputum examinations are required for follow up? ______________

12. How many positive and negative slides do you preserve for review by STLS?

____

13.Have you participated in the quality control program in last 3 months? Yes / No

14. What was the proportion of the chest symptomatic having done sputum smears thrice in the study quarter? (Count from Lab. Register) __________________

15. What was the proportion of the follow up patients having done sputum smears twice in the study quarter? (Count from Lab. Register) __________________

16. Is there a functional binocular microscope in the MC? (Check) Yes / No

17. Are there adequate supplies of reagents, slides and other consumables for the next one month? Yes / No

18. Do you maintain his/her stock in a register? Yes / No

Date ________________ Signature & Name of the interviewer

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

INTERVIEW SCHEDULE: 6 (For DOT providers)

1. Name: 2. Sub center / DOT center:

3. Have you undergone training in RNTCP? Yes / No

4. What is the correct duration of treatment of new sputum positive patients? _______

5. What would be the treatment outcome if the patient does not take drugs under DOT?

____

6. What is the importance of 2 sputum examinations for follow up? _____________

7. How do you maintain drug box for each patient? _________________________

8. How many doses of drugs do patients receive under direct observation in IP? _____

9. Check any 2 treatment cards: (a) Yes / No (b) Yes / No

10. How many doses of drugs do patients receive under direct observation in CP? ___

11. Check any 2 treatment cards: (a) Yes / No (b) Yes / No

12. Do you have clean water, water cup for providing DOT?

a) Clean water b) Water cup c) Sitting arrangement

13. Do you mark the treatment cards at the time of giving each dose? Yes / No

14. Check any 2 treatment cards: (a) Yes / No (b) Yes / No

15. Do the patients bring back blister packs when they collect weekly drugs? Yes / No

16. Check any 2 boxes: (a) Yes / No (b) Yes / No

17. Is there consistency between number of doses on treatment card and drug box?

18. Check any 2 drug boxes (a) Yes / No (b) Yes / No

19. Have you made address verification of patients in the last 1 month? Yes / No

20. Check any 2 patients / Treatment card (a) Yes / No (b) Yes / No

21. Have you made home visits to retrieve irregular patients? Yes / No

22. Check any 2 patients / Treatment card (a) Yes / No (b) Yes / No

22. At what dose in IP do you give the sputum container for follow up examination?

____

Date ________________ Signature & Name of the interviewer

ANNEXURE II

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

Data Collection Format: 7A (Case detection at TB unit level)

Quarter	% of chest symptomatic	ACDR Total	ACDR NSp+	-ve cases : +ve cases	Sputum conversion of Nsp+ at 3 months	Cure rate of Nsp+ve	Success rate of Nsp+ve
First							
Second							
Third							
Fourth							
Total							

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS,

WEST BENGAL, 2004

Data Collection Format: 7B (Treatment outcome at TCMC level)

Outcome	1Q, 01	2Q, 01	3Q, 01	4Q, 01	1Q, 02	2Q, 02	3Q, 02	4Q, 02
New Sputum positive cases								
Registered								
Cured								
Treatment completed								
Died								
Failure								
Defaulter								
Transfer out								

RNTCP EVALUATION OF HABRA TB UNIT, NORTH 24 PARGANAS, WEST BENGAL, 2004

Data Collection Format - 8

Sl. No	Name	TB No	Initial sputum exam.					2 months follow up sputum					Initiation of treatment				Treatment	
			Date	No .samp	Gr. LR	Gr. TR	Gr. TC	Date	No. samp	Gr. LR	Gr. TR	Gr. TC	Date in TC	Date in TR	Cat. TC	Cat. In TR	DOT in IP – 24 D	DOT in CP – 18 D

Date **Signature**

Evaluation of Severe Acute Respiratory Distress Syndrome Surveillance Program in West Bengal, India, 2003

1. Introduction

Surveillance is an integral part of disease prevention and control. It can provide the needed data for policy and Program development, implementation and evaluation to guide public health action [1]. During the pandemic of Severe Acute Respiratory Distress Syndrome (SARS), Government of India started surveillance of this disease and also directed the State governments to initiate such to prevent possible spread of it from other grossly affected countries. The said surveillance activities started in the state of West Bengal since the end of March 2003 and continued up to 26 June 2003 [2, 3].

However, the SARS surveillance system, which had been instituted in West Bengal with such war footing and also for such a brief period has not been evaluated till date. The present attempt of evaluating the said system in this state is to assess the efficiency and utility of that system in meeting the stated objectives. Moreover, we may learn from such activities, which will help us to build a full proof post outbreak surveillance of SARS.

2. Objectives of Evaluation

- To describe the actions taken in order to prevent and control SARS in West Bengal.
- To assess the magnitude and spread of SARS in West Bengal.
- To evaluate the attributes of the SARS surveillance system instituted
- To recommend future action.

3. Review of literature

The disease came into notice when a patient was admitted in Hanoi, Vietnam, on 26 February 2003 with respiratory illness and died on 13 March 2003. Seven health workers who cared for this patient also became ill on 5 March 2003. Since then, the cases have been reported from many countries [4]. Retrospective studies of patient records, by epidemiologists from China and the WHO Global Outbreak Alert and Response network, indicate that the first chain of transmission began on 16 November 2002 in the southern Chinese province of Guangdong [5]. World Health Organization (WHO) received the first official report of an outbreak of atypical pneumonia from that province on 11 February 2003, stating an affection of 305 persons and 5 deaths. Around 30% of cases were reported to occur in health care workers. Confirmation that cases were consistent with the definition of SARS was made after permission was granted, on 2 April, for a WHO team to visit the province. A cumulative total of 8422 probable cases, with 916 deaths, were reported from 29 countries during the outbreak (data current at 27 November 2003). Of this total, 5327 cases and 349 deaths are reported from Mainland China; total 908 deaths in China, Canada, Singapore and Vietnam with only 8 deaths in the additional 25 countries. A global case-fatality ratio of 11% was recorded at the end of the outbreak [5]. WHO issued a global alert on 12 and 15 March 2003 [6]. On 5 July 2003, WHO announced that the last known chain of transmission of the SARS had been broken, bringing to an end the initial outbreak of a severe new respiratory disease that began in mid-November 2002 in southern China and spread internationally in late February 2003 [5].

As on 31 July 2003, 3 probable cases of SARS have been reported from India, one each in West Bengal, Karnataka and Gujarat [7].

Table 1: Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003 (Based on data as of the 31 December 2003), India [8]

Female	Male	Total	Median age in years (range)	Number of deaths	Case fatality ratio (%)	Imported cases (%)	Date onset first probable case	Date onset last probable case
0	3	3	25 (25-30)	0	0	3 (100)	25-Apr-03	6-May-03

Retrospective studies of patient records indicate that from mid-November through mid-January 2003, small independent clusters of cases were identified in seven provincial municipalities of Guangdong province in Mainland China. No link among these initial clusters of cases has so far been identified, adding weight to theories that the SARS virus jumped to human beings from an animal species or other environmental reservoir found in southern China [5].

Early report suggested some link between cases and contacts with wild animals captured or bred and marked for human consumption. Recent studies have detected a virus almost identical to the SARS corona virus in two animal species, the Masked palm civet (*Paguma larvata*) and the Raccoon dog (*Nyctereutes procyonoides*). However, much more research is needed before conclusions can be reached about an animal reservoir of the virus, the role of interspecies transmission in the origins of SARS, and the repeated introduction of the virus from animals to human beings [5].

Principal modes of transmission were exposure to infected respiratory droplets during close person-to-person contact and to infected fomites. In health care settings, certain treatments, such as use of nebuliser, and procedures, such as intubations contributed to the amplification of transmission, increasing the risk of nosocomial transmission in sophisticated hospitals. Failure to recognize atypical cases, in which symptoms were

often masked by underlying disease, and transfer between institutions of patients during the incubation period were other factors that amplified or reignited outbreaks [5].

In Hong Kong, an outbreak, starting in late March 2003, among residents of a single housing estate, resulting in 329 cases, with 42 deaths, has now been linked to contaminated sewage droplets and faulty bathroom drains, although other hypotheses have been proposed. Investigations of a Hong Kong hotel, where contact with an infected guest on a single floor resulted in at least 16 cases and seeded international spread, suggest that transmission followed exposure to a concentrated source of virus in the corridor [5, 9].

SARS has unusual clinical features, and its pathology has not yet fully understood. Children experience a mild form of disease with extremely low death rate. Mortality rates are highest in the elderly and people with underlying chronic disease. Disease in such patients frequently has an atypical presentation, further complicating diagnosis. Patients with SARS, unlike most other respiratory diseases, are most infectious at around 10th day of illness. At this point, for unknown reasons, some patients spontaneously recover, whereas others rapidly deteriorate to severe respiratory illness, often requiring ventilatory support. Destruction of lung tissues is thought to result from an over-exuberant immune response rather than from direct effects of viral replication. Also distinctive of a respiratory disease is, shedding of the SARS corona virus not only in respiratory secretions, but also in faeces and other bodily fluids [5, 10].

The considerable economic impact of SARS illustrates the importance that a new severe disease can assume in closely interdependent and highly mobile global communities. Efforts to calculate the economic costs continue. Published estimates, largely based on the costs of cancelled travel and decreased investment in Asia, range from US$ 30 000 million to US$ 140 000 million. In most of the severely affected areas, service industries and airlines suffered the greatest losses [5].

Recent information shows the possibility of resurgence of SARS endemic in mainland China. Since 22 April 2004, China has reported that eight persons have been clinically diagnosed as SARS cases or are under investigation for possible SARS infection. Six of these are in Beijing and two, including the single fatality, are in Anhui Province. As of today, close to 1000 contacts of these cases are under medical observation, including 640 in Beijing and 353 in Anhui. Two of the recently reported cases were conducting research at the laboratory: a 26-year-old female postgraduate student from Anhui Province, and a 31-year-old man. The dates of symptom onset in the two cases are widely separated (23 days), suggesting that more than one opportunity for exposure might have occurred in the laboratory from mid-March through early April. At the request of the Chinese Ministry of Health, WHO sent the first members of an international team on 26 April 2004 to help investigate the source of SARS cases recently reported in Beijing and the eastern province of Anhui. On 29 April 2004, the Chinese Ministry of Health has reported diagnostic confirmation of SARS infection in two patients previously under investigation in Beijing. Confirmation is based on the results of laboratory tests, clinical symptoms, and a history of close contact with a known case. According to WHO guidelines for the global surveillance of SARS, classification as a confirmed case at the start of an outbreak requires independent verification of results by an external international reference laboratory. Such procedures are needed in view of the implications that confirmed SARS cases can have for international public health [11, 12, 13].

In the light of the facts mentioned above, it may be concluded that while much has been learned about this syndrome since March 2003, including its causation by a new corona virus (SARS-CoV), our knowledge about the ecology and epidemiology of SARS corona virus infection and of this disease remains limited [14]. Its high transmission potential and case fatality experienced during the outbreak in 2003 is a matter of great concern. Recent incidents of China establish that resurgence of SARS in this world remains a distinct possibility and does not allow for complacency. In this context, evaluation of the surveillance system functioning during March to June 2003 is very rational. Consideration of a post-outbreak surveillance system is very pertinent.

4. Methods

For the purpose of this evaluation, objectives were formulated in consultation with Department of Health and Family Welfare, Government of West Bengal and National Institute of Epidemiology, Chennai. The following attributes were used to evaluate the performance of the surveillance system: simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness and stability [1, 15, 16]. From mid-January 2004 to mid-March 2004, data were collected from four sources: face to face or telephonic interview with the physicians of the hospital earmarked for SARS patients, public health managers responsible for the implementation of the surveillance Program, data analyst of the public health information system and secondary data related to SARS surveillance from end of March 2003 to end of June 2003.

5. Results and Discussion

5.1. Principles of SARS surveillance adopted in West Bengal

1. To identify cases as per case definition of World Health Organization at airport and seaport – Admission in identified hospital – Management and discharge as per WHO protocol.
2. To identify contacts of cases – tracing of contacts – follow up – admission, if necessary.
3. To generate public awareness to prevent unnecessary panic.
4. To gear up medical fraternity to face the challenge.
5. To establish daily reporting system – from district level to Government of India.

5.2. Chronology of Events

- 19 March 2003 – Received a letter with memo no. D-32020/8/2003-EMR dated 18 March 2003 from Health Secretary, Government of India (GOI) addressed to Chief Secretary, Govt. of WB. It contained latest situation of SARS world wide,

explanation of the necessity of preparedness in our country and direction to identify a state level nodal officer to coordinate with National Institute of Communicable Diseases (NICD) and Director General of Health services (DGHS), GOI.

- 20 March 2003 – The matter was discussed with the concerned officers in presence of DHS and due attention was drawn for SARS surveillance.
- 21 March 2003 – The WHO guideline on the case definition for surveillance was informed to all concerned like Director of Medical Education (DME), Director of Health Service (DHS), Joint DHS (FW), Deputy DHS (Admin), Director, The School of Tropical Medicine (STM), Professor, Department of Virology, STM, Principals of all Medical colleges, Joint DME, Surgeon Superintendent SSKM hospital, Principal & Superintendent ID & BG hospital, Airport Health Officer, Netaji Subhas Chandra Bose International (NSCBI0 Airport, Kolkata, Port Health Officer Kolkata Port, Director Airport Authority of India, and other officers in charge of public health and communicable diseases section.
- A state level meeting was convened on 3 April 2003 at the office chamber of Director STM to discuss and take steps for preparedness and combating the disease, if it occurs. All officers were asked to attend that meeting. Director, NICD was intimated about the actions taken on 21 March 2003.
- 26 March 2003 – The Airport Health Officer was requested to keep the suspected/probable SARS patients in the airport quarantine hospital for preventing the transmission of the disease and to keep strict vigil and screening of the incoming passengers from the affected areas. All concerned higher authorities and NICD New Delhi were also informed.
- 31 March 2003 – Communication reached from Airport Health Officer intimating that isolation/quarantine facility at airport is meant for Yellow Fever only. It can not be used for SARS cases.
- 1 April 2003 – Issuance of directives by Airport Health Authority regarding personal protection measures to be taken by the staffs of airport along with information about symptoms of suspected cases of SARS.

- 3 April 2003 – The state level meeting was held at STM and the resolutions were as follows: a) Dy. DHS (PH & CD) to be the Nodal Officer b) ID &BG Hospital, Kolkata identified as the treatment center c) STM, Kolkata to arrange for examination of specimens/samples for isolation and identification of causative agent d) To send indent to GOI for diagnostic test kits including PCR machine for STM, Kolkata e) Awareness address to the passengers in the aircraft before landing f) Disinfection of the aircrafts and cargo etc. arriving from the affected areas g) Transportation facility to be arranged by state health department and airport health authority for suspected cases of SARS.
- 7 April 2003 – Requisition of diagnostic kits, PCR machine, and primers etc. for STM, Kolkata was made to Additional Director, Epidemiology division, NICD, New Delhi for supply to undertake necessary tests. But, it had not materialized. NICED, Kolkata was identified by GOI to assist the state for this purpose.
- 9 April 2003 – Airport health officer referred first SARS suspect, Sree Ram Nigam. He was admitted at ID & BG hospital on 9 April 2003 at 10 PM on the same day.
- 11 April 2003 – Control room started functioning at the Writers' Buildings with roaster duty of five senior officers.
- Samir Maity, the second suspect was admitted.
- 16 April 2003 – Tanshi Hiko Ueno from Japan was admitted. He had no symptom consistent with SARS.
- 18 April 2003 – Radheshyam Gupta was admitted.
- 21 April 2003 – Asitava Purakayastha was admitted.
- 24 April 2003 – Commissioner, Family Welfare & Special Secretary attended the meeting held in presence of Ms. Sushma Swaraj, Honorable Union Minister for Health & family welfare, GOI on 24 April at Parliament Annex, New Delhi to review the arrangements and level of preparedness for prevention of spread of SARS in the country.
- 27 April 2003 – An emergency meeting with the superintendents of the Kolkata hospitals and Principal, ID & BG hospital was held under the chairmanship of DHS at the conference room of CM secretariat, wherein it was decided that a) All

suspect cases either from airport or in and around Kolkata be referred to ID & BG hospital, Kolkata where segregation of cases, suspect & probable, would be made and necessary investigations & treatment would be done b) WHO protocol of case definition, management, discharge and other guidelines would be followed c) 4 (four) general duty medical officers were detailed to work at ID & BG hospital to strengthen the patient care services.

- Jamil Ahmed was admitted.
- 28 April 2003 – 2 (two) cardiologists and 1 (one) professor of respiratory medicine were detailed to serve at the ID & BG hospital.
- 29 April 2003 – DGHS of GOI was requested for clarification on certain points regarding infectivity, susceptibility and asymptomatic cases by D.O. letter dated 29 April 2003. Communication from Ms. Sushma Swaraj, Union Health minister addressed to Sri Buddhadeb Bhattacharya, Chief Minister of West Bengal reached.
- Hazari Prasad was admitted.
- 30 April 2003 – An expert advisory committee was formed under the chairmanship of DME to supervise and monitor the screening, admission, treatment and discharge etc. The committee included DHS, Director NICED, Principal ID & BG Hospital, one virologist and Joint DHS (PH & CD) being the member convener. One professor of pulmonary medicine was later inducted in the committee.
- Meeting was held with the Chief Medical Officers of Health (CMOH) of the districts & Superintendents of hospitals to discuss the latest knowledge obtained to combat SARS. Principal Secretary, Health & FW, was also present. All the officers were provided with the updated copies of the guidelines & protocols on the case definition, diagnostic protocol, discharge protocol, and hospital infection control methodology.
- 1 May 2003 – Joint DHS (PH & CD) attended the meeting of the Center State
- Joint Action Program on SARS on behalf of the state at Nirman Bhawan, New Delhi. Principal Secretary (H & FW), GOI chaired the meeting. A press briefing

by Honorable Union Health Minister followed the meeting. She declared 'India is SARS free on date'.

- Sisir Sanketi was admitted.
- 2 May 2003 – 4 (four) officers of the Health directorate were detailed to the airport authority for screening the passengers to detect suspected SARS case. 3 (three) senior health officers were deputed to airport to enlist the passengers arriving from affected countries along with details of their whereabouts. They were also assigned with the responsibility to follow them up at their residences over telephone or physically with the help of district health authorities.
- 7 May 2003 - Honorable State Secretary of Indian Medical Association (IMA), Bengal state branch was given the WHO guidelines for dissemination among their members.
- ID & BG hospital was strengthened with portable X-ray machine, Ventilator etc. SARS ward was divided into three parts – first part of the ward was used for the patients not fully conforming to the case definition, second meant for the suspects and third for the probable cases. One Intensive therapy unit was commissioned. Universal precautions were maintained at the wards for the patients, nurses, staffs and treating doctors.
- 2 June 2003 – Communication reached from Thai consulate about the surveillance done by the Thai authority among the Thai nationals and about issuance of 'Health Passport' in relation to SARS.
- 19 June 2003 – Mr. M. Kawaguchi, Senior Consul, Consulate Genera of Japan in Kolkata, was informed that no Japanese national was reported to be infected or admitted to any hospital as a probable or suspected case of SARS. However, information about Tanshi Hiko Ueno was given.
- 26 June 2003 – Communication reached from DGHS to call off SARS screening measures undertaken at various seaports and airports. It was implemented in West Bengal with immediate effect.
- Kolkata Port Authority arranged screening of the passengers at the sand head. However, they referred no suspected case during the whole period.

- In order to disseminate the knowledge among the medical fraternity, DME organized seminars, workshops in the medical colleges and other teaching hospitals of Kolkata including SSKM hospital & Institute of Postgraduate Medical Education & Research. It was also organized in collaboration with IMA.
- NICED, Kolkata played a vital role in promptly collecting the biological samples from the patients and supplying the result of PCR test received from NIV, Pune. Later the test was done at NICED. Meetings of the expert advisory committee were held regularly either at the chamber of DME, WB or at the office of Director, NICED to discuss about patients' status including clinical and laboratory finding and to decide about the time of discharge of the patients. Total 8 meetings were held from 30-4 to 20-5-03. The last patient was discharged on 20-5-03.
- During this period, the district health authority traced household members and local contacts of the admitted patients and daily follow up was done. Daily report in this regard was submitted by concerned district official to the nodal officer at the state.
- The passengers who were asymptomatic but coming from the affected countries were enlisted at the airport. They were contacted over phone daily to know about their health status. It was kept strictly confidential. Some passengers attended the hospital by their own or motivated by their family members with vague symptoms and remained under observation for few days before being discharged.

5.3. Case definition adopted [4, 7, 17]

The case definition of SARS as revised by WHO on 1 April 2003 was adopted by the Government of West Bengal. It was as follows:

Suspect case

1. A person presenting after 1 November 2002 with history of:

- high fever (> 38^0C) and
- cough or breathing difficulty

AND one or more of the following exposures during the 10 days prior to onset of symptoms:

- close contact with a person who is a suspect or probable case of SARS
- history of travel to an affected area
- residing in an affected area

2. A person with an unexplained acute respiratory illness resulting in death after 1 November 2002, but on whom no autopsy has been performed

AND one or more of the following exposures during the 10 days prior to onset of symptoms:

- close contact with a person who is a suspect or probable case of SARS
- history of travel to an affected area
- residing in an affected area

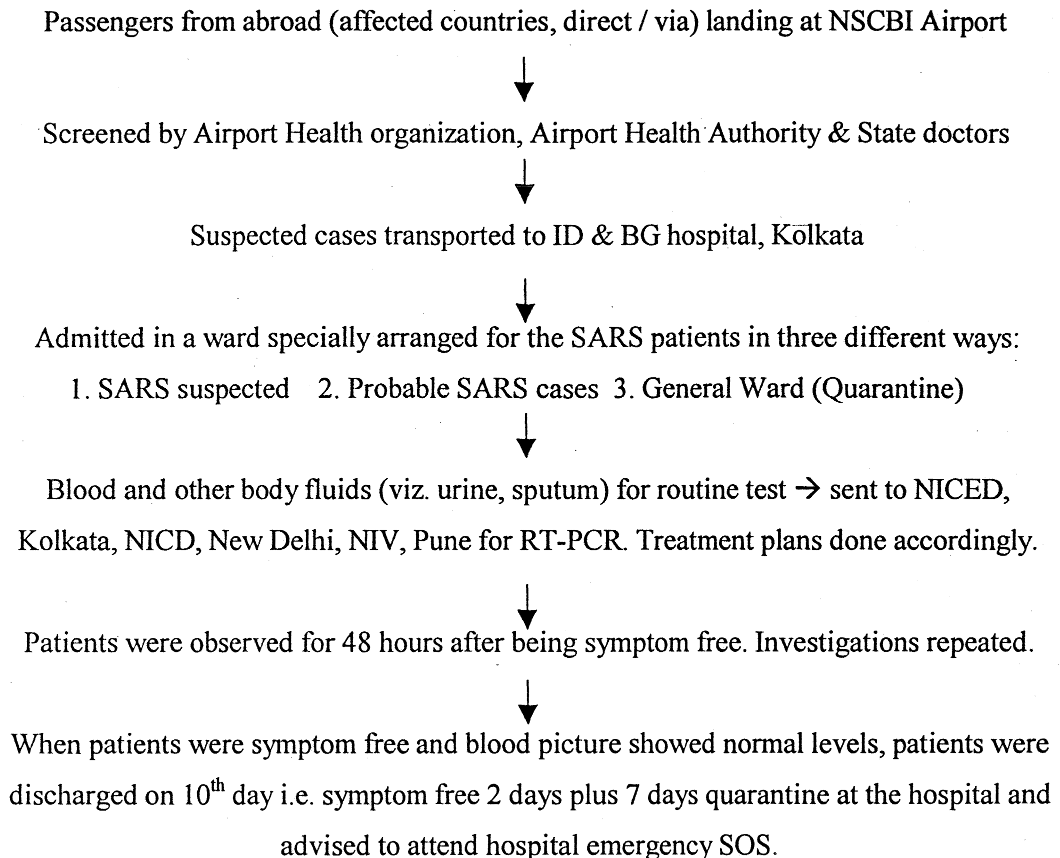
Probable case

1. A suspect case with radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome (RDS) on chest X-ray.
2. A suspect case with autopsy findings consistent with the pathology of RDS without an identifiable cause.

5.4. Management of Suspected SARS Patients

Management of suspected SARS cases was done following the guidelines of WHO circulated time to time by Government of India [18, 19, 20] or downloaded from WHO website. The flow chart of the activities done for identification of the suspect cases and their immediate management is shown in figure 1.

Figure 1. Flow chart of activities for identification of suspect cases of SARS



5.5. Management of Contacts [18, 19, 20]

Management of contacts of suspected SARS cases was done following the guidelines of WHO circulated time to time by Government of India or from WHO website.

A contact is a person who may be at a greater risk of developing SARS because of exposure to a suspect or probable case of SARS. The risky exposure include having cared for, lived with, or is having had direct contact with the respiratory secretions, body fluids and/or excretion (e.g. faeces) of a suspect or probable case of SARS.

5.6. Management of Contacts of Probable SARS cases [18, 19, 20]

Management of contacts of probable SARS cases was done following the guidelines of WHO circulated time to time by Government of India or downloaded from WHO website.

1. Information on clinical picture, transmission etc. of SARS was given to the contacts.
2. Contacts were placed under surveillance for 10 days and recommended voluntary home isolation.
3. Contacts were visited or telephoned daily by the district health authority.
4. Advised to record temperature daily.
5. Arrangements were made to transport the contact, if he/she develops symptoms consistent with SARS.
6. The most consistent first symptom was considered as fever.

5.7. Management of Contacts of Suspect SARS cases

Protocol followed was same for the probable cases. No differentiation was made as per WHO guideline.

5.8. Removal from Follow up [21]

If as a result of investigations, suspected or probable cases of SARS no longer meet the suspect or probable case definitions, then contacts were discharged from follow up.

5.9. Discharge Policy Adopted [21]

Discharge policy of suspected SARS cases was adopted following the guidelines of WHO circulated time to time by Government of India or downloaded from WHO website.

Following criteria were considered prior to making a decision regarding discharge from hospital of a convalescent case –

- Afebrile for 48 hours
- Resolving cough
- Improving chest X-ray changes

After 48 hours the patient was kept admitted in the said hospital in a separate accommodation for a period of another 7 days during which the following parameters were monitored daily.

- Temperature was recorded twice a day and other routine clinical examination done.
- During this period of 9 days, the patient was brought in minimum contact with other persons.
- At the end of 7 days, the following parameters were re-assessed.
- Patient was without fever
- All the laboratory parameters, which were earlier abnormal, have become normal
- X-ray chest showed no new abnormal finding

At the end of 10 days of observation in this manner at a hospital, the patient was considered for discharge from the hospital. During discharge, the patients were advised to report to the said hospital in the event of recrudescence of any of the earlier signs and symptoms.

5.10. Infection Control Policy Adopted [22]

Infection control policy was adopted following the guidelines of WHO circulated time to time by Government of India or downloaded from WHO website.

Outpatient Setting at Airport

1. The passengers of the affected areas who required assessment for SARS were diverted and examined at a separate area to minimize transmission to others.
2. Suspected patients were given three layered surgical masks.
3. Staff involved wore three layered surgical masks and washed hands before and after contact with any suspect.
4. Examination area was cleaned with disinfectant regularly.

Inpatient Setting at ID & BG Hospital:

1. Probable and suspect SARS cases were admitted in a specially arranged ward with three divisions for the three categories of patients - a. SARS suspect b. Probable SARS cases c. General Ward (Quarantine).
2. Suspect and Probable cases were isolated in that ward with the door closed and having own bathroom facility.
3. Barrier nursing of the patients using precautions for airborne, droplet and contact transmission.
4. All staffs were trained in the infection control measures required for the care of such a patient.
5. Disposable equipments were used wherever possible in the treatment and care of the patients and disposed of appropriately.
6. Surfaces of the ward were cleaned with broad spectrum disinfectants.
7. Movement of the patients outside the ward was not allowed.
8. Visitors, if allowed, kept to a minimum and were provided with personal protective equipments.
9. Non-essential staffs were not allowed to enter the ward.
10. Hand washing was religiously maintained before and after contact with any patient. Alcohol based skin disinfectant was used after hand washing.
11. Particular attention was paid to use nebuliser.
12. PPE use was mandatory to all staff and visitors accessing the isolation ward.
13. PPE worn in that situation were: 3 layered surgical masks, single pair of gloves, goggles, disposable gowns, Rubber made knee high covered footwear.
14. Linens of the patients were cleaned separately.

5.11. Steps followed for testing of biological specimens [23]

It was done as per instructions received from DGHS, Ministry of Health and Family Welfare, Nirman Bhavan, New Delhi and WHO guidelines on biosafety for handling SARS specimens. . It was as follows:

a) For all biological samples referred for conducting test(s) for SARS CoV, following information was collected –

- Temperature
- Cough
- Respiratory distress
- Place of travel
- X-ray chest report

The clinical details were communicated to DG, DGHS and Deputy Director, NICD over fax before 11AM everyday.

b) Only after receiving the direction from DG, DGHS, the samples were put to test(s) at NICED, Kolkata.

c) The results of the tests were communicated to DG, ICMR who would inform the Ministry of Health & FW. Only after receiving further instructions from DG, ICMR, the results were informed to State health Authorities and/or other concerned.

d) Constraint was exercised in communicating with the press.

5.12. Magnitude and spread of SARS

During the period under discussion, surveillance activity at airport terminal identified 4 suspected SARS patients and got them admitted for observation and investigation. 6 cases got admitted directly, being motivated by the relatives and other members of the community. Out of the 10 admitted, 8 had recent travel history in the affected countries. The medical team at the seaport found no cases. Details of patients admitted as suspected SARS cases are as follows:

Case No. 1

Name: SRI RAM NIGAM, S/o R.P.GUPTA

Age: 21 years **Sex:** Male

Permanent address: Bankata, P.O. Bhansta, Sikarganj, Gorakhpur, Uttar pradesh

Local address: C/o Binode Gupta, 11 Chowranghee Lane, Kolkata - 16

Travel history: From Kolkata to Bangkok on 27-3-03 by air. From Bangkok to Kolkata on 9-4-03 by air

H/O present illness: Fever and cough before travel to Bangkok. No history of contact with SARS case

Date & Time of admission: 9-4-03 at 10 PM

Date & time of discharge: 14-4-03 at 5-30 PM

Treating Physician: Dr. Anita Dutta

Investigations: Chest X-ray & Routine blood examination – NAD, Throat swab & blood samples –PCR test Negative (13-4-03)

Treatment given: Parenteral antibiotic, bronchodilator & antipyretic.

Remark: Not a case

Case No. 2

Name: SAMIR MAITY, S/O GOUR MAITY

Age: 24 Years **Sex:** Male

Permanent address: Vill. Santipara, Ps. Daspara, Dist. Midnapore

Local address: Kalighat

Travel history: No history of travel

H/O present illness: RTI seven days back

Date & Time of admission: 11-4-03 at 10 AM

Date & time of discharge: 15-4-03

Treating Physician: Dr. D. Mukherjee

Investigations: Chest X-ray – evidence of chronic bronchitis, Routine blood examination – NAD, Throat swab & blood samples –PCR test Negative (13-4-03)

Treatment given: Parenteral antibiotic, bronchodilator & antipyretic.

Remark: Not a case

Case No. 3

Name: TANSHI HIKO UENO

Age: 40 Years **Sex:** Male

Permanent address: Not available

Local address: Not available

Travel history: Returned from China 3 months back, arrived in Kolkata on 14-4-03

H/O present illness: Vague illness related to travel

Date & Time of admission: 16-4-03 at 2-25 PM

Date & time of discharge: On that day

Treating Physician: Dr. A. Dutta

Investigations: Not done

Treatment given: Nil

Remark: Not a case

Case No. 4

Name: RADHESHYAM GUPTA, C/O MOHAN GUPTA

Age: 36 Years **Sex:** Male

Permanent address: S/O Ram Brich Gupta, Gorakhpur, Uttar Pradesh

Local address: 42A Tangra Road, Kolkata - 700015

Travel history: Arrived Kolkata on 18-4-03 from Bangkok

H/O present illness: Fever & diarrhoea since 12-4-03, admitted at Samrong hospital, Bangkok from 14-4-03 to 16-4-03 with DHF as per medical certificate, on arrival at Kolkata on 18-4-03 admitted as a suspect.

Date & Time of admission: 18-4-03 at 10-05 PM

Date & time of discharge: 6-5-03 at 4 PM

Treating Physician: Dr. D. Mukherjee

Investigations: Chest X-ray & Routine blood examination – NAD, Throat swab & blood samples –**PCR test Positive** (28-4-03)

Treatment given: Parenteral antibiotic, H_2 blocker, antipyretic, bronchodilator

Remark: Not a case

Case No. 5

Name: ASITAVA PURAKAYASTHA, S/O LATE A. PURAKAYASTHA

Age: 42 Years **Sex:** Male

Permanent address: Santi Selection, Sodepur Road, Madhyagram, Ps. Barasat, N 24 Parganas

Local address: Same as above

Travel history: December 2002 – Thailand, 7 February – Switzerland, 16 March – Sri Lanka, 29 March – Mumbai to Hongkong – to Guangdong in China – return to Kolkata on 19-4-03

H/O present illness: Chest pain with sweating at 7 AM on 20-4-03 – diagnosed as MI at nursing home – admitted at ID & BG hospital on 21-4-03 – DORB on 22-4-03 and admitted at AMRI – readmitted at ID & BG hospital on 29-4-03

Date & Time of admission: 29-4-03

Date & time of discharge: 5-5-03 at 3-20 PM

Treating Physician: Dr. D. Mukherjee

Investigations: Chest X-ray – Bilateral pneumonitis (21-4-03), Mild increased vascularity in mid-zones (2-5-03), ECG – Recent antero-septal wall infarction, Blood – **PCR Positive (26-4-03)**, Rest NAD

Treatment given: Streptokinase, Diazapam, 3rd generation Cephalosporins

Remark: Not a probable case

Case No. 6

Name: RUBINA BEGAM, C/O MD. HUSSAIN

Age: 24 Years **Sex:** Female

Permanent address: 14 Patwar bagan Lane, Kolkata - 700009

Local address: Same as above

Travel history: Nothing significant

H/O present illness: Dry cough with low grade temperature and mild respiratory distress

Date & Time of admission: 25-4-03 (Referred from LDV hospital)

Date & time of discharge: 26-5-03 (Referred back to LDV hospital)

Treating Physician: Dr. Anita Dutta

Investigations: Nil

Treatment given: Antibiotic, bronchodilator

Remark: Not a case

Case No. 7

Name: JAMIL AHMED

Age: 25 Years **Sex:** Male

Permanent address: 10/2/H/26 Watganj, Kolkata - 700023

Local address: Same as above

Travel history: Went to Hongkong on 16-4-03, stayed there for 10 days, returned to Kolkata via Dacca on 27-4-03

H/O present illness: Dry cough with low grade temperature and subsequently mild respiratory distress

Date & Time of admission: 27-4-03 at 1-30 PM

Date & time of discharge: 20-5-03 at 3 PM

Treating Physician: Dr. D. Mukherjee

Investigations: Chest X-ray – Left sided mild pleural effusion with bilateral pneumonitis, Blood – Throat swab and Blood for **PCR Positive**, Rest NAD.

Treatment given: Cefotaxim, Gentamycin, Theophyllin

Remark: May be a probable case

Case No. 8

Name: HAZARI PRASAD

Age: 32 Years **Sex:** Male

Permanent address: Sahajpur, Gorakhpur, Uttar Pradesh

Local address: 30/8 Jessore Road, Dasnagar, Howrah - 5

Travel history: Went Kampuchea 8 months back, returned via Bangkok (stay for 2 days) on 28-4-03 at late night

H/O present illness: Low grade temperature

Date & Time of admission: 29-4-03 at 2-30 AM

Date & time of discharge: 9-5-03

Treating Physician: Dr. D. Mukherjee

Investigations: Blood – **PCR Positive**, Throat swab – PCR Negative.

Treatment given: Ampicillin, cefotaxim, paracetamol

Remark: Not a case

Case No. 9

Name: SISHIR SANKETI, S/O B.S.NARAYAN

Age: 32 Years **Sex:** Male

Permanent address: E/O/1 Nayabad Avenue, Ps. Panchasayar, Kolkata - 700094

Local address: Same as above

Travel history: History of recent visit to Bangkok and Malayesia 21 days back

H/O present illness: Cold, cough and low grade (<38^0C) fever for 2 days

Date & Time of admission: 1-5-03 at 4-45 PM

Date & time of discharge: 7-5-03

Treating Physician: Dr. D. Mukherjee

Investigations: PCR not done

Treatment given: Cefotaxim, Azithromycin, Theophyllin, Paracetamol

Remark: Not a case

Case No. 10

Name: SUMIT JAIN, C/O PRADIP KUMAR JAIN

Age: 24 Years **Sex:** Male

Permanent and local address: 228/A/2 Bangur Avenue, Block – B, Kolkata - 700053

Local address: Same as above

Travel history: History of recent visit to Singapur, Bangkok & Jakarta, arrival on 8-5-03

H/O present illness: low grade fever for 2 days

Date & Time of admission: 12/5/03 at 11-07 AM

Treating Physician: Dr. D. Mukherjee

Investigations: PCR not done

Treatment given: Cefotaxim, Azithromycin, Paracetamol

Remark: Not a case

Table 2: Details of patients admitted as suspected SARS cases

Case	Suspected					Probable	PCR status	Remark
	Fever >38^{0}C	Cough or Respiratory distress	At least one of the symptoms			Radio-Graphic evidence		
			Close contact with case	Travel in affected area	Residing in affected area			
1	No	No	No	Yes	No	No	Neg.	Not a case
2	Yes	Yes	No	No	No	No	Neg.	Not a case
3	No	No	No	Yes	No	No	Not done	Not a case
4	Yes	No	No	Yes	No	No	Positive	Not a case
5	Yes	Yes	No	Yes	No	No	Positive	Suspect case
6	Yes	Yes	No	No	No	No	Not done	Not a case
7	Yes	Yes	No	Yes	No	Yes	Positive	Probable case
8	Yes	No	No	Yes	No	No	Positive	Not a case
9	No	Yes	No	Yes	No	No	Not done	Not a case
10	Yes	No	No	Yes	No	No	Not done	Not a case

5.13. Attributes of the SARS surveillance system

Surveillance of SARS was initiated in response to an anticipated epidemic. The possible routes of entry of the disease in the country were through the residents of India traveling in the affected areas and through the residents of the affected areas who came to India during that period. In this context, surveillance activities were limited to those two groups of entering into the state of West Bengal by air and sea routes along with the contacts of the suspect cases. Medical teams constituting of doctors and paramedical staffs working under health directorate, airport authority and seaport authority conducted the surveillance activities. All passengers coming from the affected countries by air were screened at the airport by the medical team. Suspected cases were referred to the ID & BG hospital earmarked for the SARS suspects. Names, address and phone numbers of the asymptomatic passengers were also collected. Screening was done on the basis of 'case definition' mentioned earlier. Detail report in a prescribed format was sent to the control room of the health directorate daily. Admitted patients were observed and treated at the hospital. Contacts of the suspected cases and asymptomatic passengers were followed up daily over phone and personally by the district health authorities. Reports of those activities were sent in prescribed formats daily to the control room.

Simplicity

The simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance system should be as simple as possible while meeting their objectives [1, 15, 16].

Case definition was very sensitive and simple to follow. However, due to panicky reaction about the epidemic and hue and cry created by the media, many of the patients were identified as 'suspect' not strictly adhering to the case definition. Reporting format was simple consisting of: name, address, travel history, clinical presentation, date of admission, treatment detail, investigation detail including PCR status and remark. Daily reporting was done to the control room in that prescribed format.

In case of 'contacts' of the suspected cases, daily communication was done directly and through district authorities personally or over phone to know whether they were

developing any suggestive clinical symptoms or not. Daily reporting was done to the control room in a format containing name, address with phone number, and name of the patient in contact and clinical status.

The asymptomatic passengers who boarded at Kolkata airport after traveling any of the affected countries were clinically examined at the airport by the medical team, given necessary advice about presenting symptoms of SARS and control of droplet infection. They were also advised to contact the control room as and when they feel it necessary. Particulars about their flight number date of arrival, travel history, address with phone number was collected in prescribed format and sent daily to the control room. The reporting format was simple enough to follow.

All the reports were sent either by fax or delivered by hand, rarely over phone (followed by hard copy). Public health managers at the control room analyzed the data. Details of admitted patients were communicated to the high power committee, mentioned earlier, to review. In response, high power used to meet daily with the concerned physician to discuss about the plight of the patients and design future action.

Names of the contacts to the patients and asymptomatic passengers with their address and phone number were sent to the respective district authority. They were directed to trace them and follow up daily. However, two officers of control room were also assigned to contact them over phone.

On the whole, the system was simple to follow, though sometimes health officials had to overreact due to pressure from the media.

Flexibility

A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible system can accommodate, for example, new health related events, changes in case definitions or technology, and variations in funding or reporting sources. Flexibility is probably best evaluated retrospectively by observing how a system responded to a new demand [1, 15, 16].

The system under discussion was flexible enough to include new case definition and new data elements. For example, initial case definition was changed by WHO in April 2003.

System readily incorporated the modified case definition modified the reporting formats on that basis. Time to time, NICD, New Delhi and Ministry of Health and Family Welfare, Government of India, asked for some additional information. Those were collected and sent without delay and necessary modifications in the reporting formats were done. Initially, PCR testing facility was not available. Subsequently, when NICED, Kolkata started to assess the PCR status of the suspected patients, it was readily integrated in the surveillance system. Reporting format was changed accordingly.

Data Quality

Data quality reflects the completeness and validity of the data recorded in the surveillance system [1, 15, 16].

In the system under discussion, percentage of unknown or blank responses to items of surveillance was minimal. As the items of the daily report formats were very specific and the immediate authorities carefully crosschecked all such reports before sending such to control room, data quality was better. However, strict adherence to case definition for identifying a person as a suspect case, had not been maintained in all cases. As a result, unnecessary referrals were done to the earmarked hospital. This was due to the panicky situation prevailing at that time and overreaction of the health officials due to pressure from the media. Thus, the quality of data in that regard suffered. The state health authority conducted no special study since the end of the outbreak surveillance to fully assess the validity and completeness of the system's data.

Acceptability

Acceptability reflects the willingness of persons and organizations to participate in the surveillance system [1, 15, 16].

The directorate of health and family welfare department of the state acted as the nodal agency to conduct the surveillance activity. The agencies which were asked to cooperate and participate in the activity process, e.g. district level health functionaries, hospital authority, airport and seaport authorities, National Institute of Cholera and Enteric Diseases (NICED), Indian Medical Association (IMA), Association of Health service Doctors, West Bengal etc. responded quickly as mentioned in chronology of events. All

the available report forms submitted by respective authorities to the control room were crosschecked. Those were duly filled with almost nil unknown or blank responses and communicated daily either by fax or by hand to the control room. It would not have been possible, if the participating functionaries and the agencies did not accept the system.

The government and the agencies through awareness generation programme involving the media duly addressed public health importance of this event. Still, it must be recognized that, particularly in the urban setting (Kolkata and its suburb), a panicky situation prevailed which sometimes hindered the smooth functioning of the public health managers and operation of the earmarked hospital.

The high power committee through its daily meet and discussion of the latest situation assessed responsiveness of the system to suggestion and comments.

The issue of ease and cost of data reporting was addressed adequately.

Protection of privacy and confidentiality was maintained with lots of difficulties in the wake of intrusion of the media people.

Participation of the community in which it was operated, was fairly good.

Sensitivity

Sensitivity of a surveillance system can be considered on two levels. First, at the level of case reporting, sensitivity refers to the proportion of cases of a disease or health related event detected by the surveillance system. Second, sensitivity can refer to the ability to detect outbreaks, including the ability to monitor changes in the number of cases over time [1, 15, 16, 24].

In the present evaluation, it had already been mentioned that the case definition devised by WHO was adequately sensitive. Though detection process of suspect cases was diluted by overreaction of doctors in the wake of panicky reaction among community and media, still the present data suggests that case definition was sensitive.

Table 3: Calculation of sensitivity of SARS surveillance system

Detected by surveillance	Condition present (Probable case)		Total
	Yes	No	
Yes	1	3	4
No	0	6	6
Total	1	9	10

Sensitivity = 100%, Specificity = 33.3%

The capacity of the surveillance system to detect outbreak was enhanced substantially as PCR testing facility was included in the system.

However, more detailed assessment of the sensitivity of the surveillance system was not possible due to non-availability of data.

Predictive value positive (PVP)

Predictive value positive is the proportion of reported case that actually have the disease or health related event under surveillance [15, 16, 24].

The assessment of sensitivity and PVP provide different perspectives regarding how well the system is operating. Depending on the objectives of the surveillance system, assessing PVP whenever sensitivity has been assessed is necessary.

In assessing PVP, primary emphasis is placed on the confirmation of cases reported through the surveillance system. The effect of PVP on the use of public health resources can be considered on two levels. At the level of case detection, PVP affects the amount of resources used for case detection. In our present study, picture is as follows:

Table 4: Calculation of PVP of SARS surveillance system

Detected by surveillance	Condition present (Probable case)		Total
	Yes	No	
Yes	1	3	4
No	0	6	6
Total	1	9	10

Predictive value positive (PVP) = 25%

The low value of PVP was possibly due to high rate of erroneous case report, the situation mentioned earlier.

When we tried to find out PVP considering the relation between travel history and any of the symptoms present, the picture is as follows:

Table 5: Calculation of PVP of SARS surveillance system

Travel history	Any of the symptoms present		Total
	Yes	No	
Yes	6	2	8
No	2	0	2
Total	8	2	10

Predictive value positive (PVP) = 75%

It showed a high PVP of 75%. It corroborates the previous finding of fewer adherences to case definition. Moreover, it also establishes that the persons with definite travel history were screened with utmost care to find out any suspect / probable case.

When we tried to evaluate PVP considering the relation between travel history and PCR status among the persons admitted, the picture is as follows:

Table 6: Calculation of PVP of SARS surveillance system

Travel history	PCR status		Total
	Positive	Negative	
Yes	4	4	8
No	0	2	2
Total	4	6	10

Predictive value positive (PVP) = 50%

PVP suggests that the 50% of the persons who had been suspected as SARS case and also having a definite travel history, were PCR positive, most possibly due to their presenting illnesses.

All these establish that though the case definition was not consistently followed, yet the surveillance system was adequately vigilant to the level of not missing a person with a minimum chance of having SARS.

Representativeness

Representativeness deals with the question: Does the overall coverage of the surveillance system correctly represent the population groups in the population?

Characteristics of the population under surveillance, Clinical course of the disease, Prevailing medical practices could provide some judgment of the representativeness of the surveillance data [15, 16].

The population under surveillance was the persons entering into West Bengal through airport or seaport after a visit in any of the affected countries and their contacts. As has been discussed earlier, they have been adequately screened medically, appraised of the possible signs and symptoms, what to do or not to do and followed up on regular basis. There was no problem so far as their access to health care was concerned.

Clinical course of the disease (e.g. latency period, mode of transmission and outcome) was duly taken care of among the persons admitted as suspects by the concerned physicians.

So far as prevailing medical practices were concerned, the treatment protocol, discharge policy, infection control policy etc. were designed as per WHO recommendations. PCR testing was done at National Institute of Cholera and enteric Diseases (NICED), Kolkata,

one of the premier institutions of India under Indian Council of Medical Research (ICMR).

Timeliness

Timeliness reflects the speed between steps in a public health surveillance system [15, 16]. Flow chart (Figure 3) shows briefly the activities, flow of information and agencies involved. The surveillance system was developed on a war footing to prevent possible spread of an epidemic. Flow of information from all quarters (peripheral medical team to Ministry of Health and FW) was on daily basis including zero reporting.

On the whole, the system was developed in such a way that minimum time was wasted between the steps of surveillance activities.

Stability

Stability refers to the reliability (i.e. the ability to collect, manage and provide data properly without failure) and availability (i.e. the ability to be operational when it is needed) of the surveillance system [15, 16].

As has been discussed earlier, both of these aspects were adequately addressed during the surveillance period.

6. Conclusions

Surveillance system for severe acute respiratory distress syndrome (SARS) that was initiated in the state of West Bengal during 2003 to prevent the spread of the SARS pandemic in this part of country functioned with sufficient sensitivity. The surveillance system was simple, flexible and acceptable. Data collection and reporting was on daily basis. The quality of data was good. The system reacted timely to all related incidents and changes in the system over the time were also done promptly. Overall, the surveillance system was stable. Reporting system was satisfactory and feed back system linking the state with center and WHO was proper. Only one patient was identified as a probable case of SARS. The state followed WHO guidelines for the surveillance. The department of health, airport authority, ICMR institute and state teaching institutions played their role satisfactorily. The supply of drugs, instruments and other logistics for the treatment of

suspected cases was good. Specialist personnel were deployed. Infection control measures were taken. State initiated awareness campaign regarding SARS.

7. Recommendations

Firm conclusions about whether SARS will re-emerge cannot be made without further knowledge of the natural ecology of the virus, particularly after the recent cases in China. There should be no question of complacency. In the post-outbreak period, all countries must remain vigilant for the recurrence of SARS and maintain their capacity to detect and respond to the re-emergence of SARS, should it occur. The WHO case definitions during the outbreak period relied heavily on epidemiological criteria to increase the specificity of syndromic clinical criteria for atypical pneumonia or respiratory distress syndrome (RDS). However, epidemiological links to cases of SARS and areas reporting recent local transmission are no longer of use in helping to define incident cases. Furthermore, the non-specific clinical features of SARS, the lack of a current rapid diagnostic test, that can reliably detect SARS-CoV in the first few days of illness, and the seasonal occurrence of other respiratory diseases, including influenza, may confound any surveillance of SARS or demand a level of quality and intensity which few health care systems worldwide can sustain.

WHO has posted guidelines for alert, verification, and public health management of SARS during the post-outbreak period. The guidance includes advice on risk assessment, a definition of what constitutes a SARS Alert, clinical and laboratory case definitions, and recommended public health management of a SARS alert. It also includes recommendations for surveillance that are specific to three levels of risk that SARS might recur in a given geographical area, and underscores the need for continued vigilance [14]. We recommended the government of West Bengal to act according to the directives of World Health Organization. Suggested design of the surveillance system is as follows:

7.1. Risk assessment [14]

Ideally, every country should determine the intensity of surveillance for SARS in the post-outbreak period on the basis of a risk assessment. World Health Organization has

defined three major areas that take into account the experience during the recent outbreak of SARS and potential for re-emergence.

Potential zone of re-emergence of SARS CoV

- Identified as source(s) of the previous outbreak in November 2002 or areas with an increased likelihood of animal to human of SARS CoV infection.

Nodal areas

- Sustained local transmission experienced during the previous outbreak or entry of large number persons from the potential zone of re-emergence of SARS CoV.

Low risk areas

- Never reported cases, reported only imported cases or experienced only limited local transmission during the previous outbreak.

West Bengal and also India as a whole lies in the third group i.e. low risk areas.

7.2. Staged approach to surveillance [14]

Potential zone of re-emergence of SARS CoV

- SARS Alert and
- Enhanced surveillance for SARS and
- Special studies for SARS CoV infections in animal and human populations

Nodal areas

- SARS Alert and
- Enhanced surveillance for SARS

Low risk areas

- Surveillance for clusters of 'alert' cases among health care workers, other hospital staff, patients and visitors in the same health care unit.

West Bengal and also India as a whole has to follow the third approach of surveillance i.e. what prescribed for the low risk areas.

7.3. SARS Alert [14]

It is an operational definition to ensure that appropriate infection control and public health measures are implemented until SARS has been ruled out as a cause of the atypical pneumonia or RDS. The definition of SARS Alert is as follows:

Two or more health care workers in the same health unit fulfilling the clinical case definition of SARS and with onset of illness in the same 10-day period

Or

Hospital acquired illness in three or more persons (health care workers and/or patients and/or visitors) in the same health care unit fulfilling the clinical case definition of SARS and with onset of illness in the same 10-day period.

7.4. Clinical case definition [14]

A person with a history fever (38^0C and above) and one or more symptoms of lower respiratory tract illness (cough, difficulty breathing, shortness of breath) and radiographic evidence of lung infiltrates consistent with pneumonia or RDS or autopsy findings consistent with the pathology of pneumonia or RDS without an identifiable cause and no alternative diagnosis that can fully explain the illness.

7.5. Laboratory case definition [14]

The laboratory case definition has been developed by WHO. It states that a person with symptoms and signs that are clinically suggestive of SARS and with positive laboratory findings for SARS CoV based on one or more of the following diagnostic criteria:

A) PCR positive for SARS CoV

PCR positive using a validated method from:

- At least two different clinical specimens (e.g. nasopharyngeal and stool) or
- The same clinical specimen collected on two or more occasions during the course of the illness (e.g. sequential nasopharyngeal aspirates) or
- Two different assays or repeat PCR using a new RNA extract from the original clinical sample on each occasion of testing.

B) Seroconversion by ELISA or IFA

- Negative antibody test on acute serum followed by positive antibody test on convalescent phase serum tested in parallel or
- Fourfold or greater rise in antibody titer between acute and convalescent phase sera tested in parallel.

C) Virus isolation

- Isolation in cell culture of SARS CoV from any specimen and PCR confirmation using a validated method.

Testing should be undertaken in a national or regional reference laboratory as per WHO recommendations.

7.6. Public health management of a SARS Alert [14]

When a SARS Alert is raised:

1. Patient(s) should be immediately isolated and transmission-based precautions instituted, if not already in place.
2. The diagnosis should be expedited.
3. Contacts of persons under investigation for SARS should be traced and quarantined until SARS has been ruled out as the cause of the illness.

a) A contact is a person who is at greater risk of developing SARS because of exposure to a SARS case. Risky exposures include having cared for, lived with, or have had direct contact with the respiratory secretions, body fluids and/or excretions (e.g. faeces) of cases of SARS.

b) Individuals with risky exposures to a person or persons in a SARS alert cluster should be managed as contacts until SARS has been ruled out as the cause of illness.

c) Contacts within the health care setting should be managed in the following way:

- o Inpatients contacts should be isolated or cohorted away from unexposed patients and transmission-based precautions instituted. They should be placed on fever surveillance.

- Exposed staff should be placed on active fever surveillance, and either cohorted to care for exposed patients or placed on home quarantine depending on local circumstances.

d) Community contacts should be:

  - Given information on the clinical picture, transmission etc. of SARS.
  - Placed under active surveillance for 10 days and voluntary home quarantine recommended.
  - Visited or telephoned daily by a member of the public health team.
  - Temperature recorded daily.
  - If the contact develops disease symptoms, they should be investigated locally at an appropriate health care facility.
  - The most consistent first symptom that is likely to appear is fever.

7.7. International reporting of SARS [14]

WHO defined a new outbreak as the occurrence of one or more clinically compatible, laboratory confirmed cases of SARS in any country based on definitive laboratory investigation. The reappearance of SARS in the human population would be considered a global public health emergency.

For the purpose of the international reporting of SARS in the post-outbreak period, member states are requested to inform WHO of laboratory-confirmed case only. Laboratory confirmed cases of SARS could be detected through a SARS alert verification process but also as sporadic case(s) of acute respiratory illness on which SARS CoV testing was undertaken. Reporting to WHO should include both of these scenarios, but should exclude asymptomatic persons with a positive laboratory test or symptomatic persons without laboratory confirmation. No nil reporting is required.

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GLOSSARY

ADHS (EC, NC & ES)	Assistant Director of Health Services (Epidemic Control. Natural Calamity and Emergency Services)
CMOH	Chief Medical Officer of Health
DDHS (PH & CD)	Deputy Director of Health Services (Public Health & Communicable diseases)
DGHS	Directorate General of health services
DHS	Director of Health Services
DME	Director of Medical Education
GOI	Government of India
H & FW	Health and Family Welfare
HOD	Head of the Department
ID & BG	Infectious Disease & Beliaghata General
IMA	Indian Medical Association
ITU-ICU	Intensive Therapy Unit-Intensive Care Unit
NICD	National Institute of Communicable Diseases, New Delhi
NICED	National Institute of Cholera and Enteric Diseases
NIE	National Institute of Epidemiology, Chennai
NIV	National Institute of Virology
NSCBI	Netaji Subhas Chandra Bose International
SARS	Severe Acute Respiratory Syndrome
STM	School of Tropical Medicine, Kolkata
WHO	World Health Organization

Prospective Cost Analysis of the Reformed Multipurpose Health Scheme under Implementation in West Bengal, India

1. Introduction

The health status of the people is influenced by the public health programs and related practices. However, the success of such depends on the extent of participation of the people in various preventive and promotive health care measures [1]. The decentralization of health services represents a strategy to reform health systems towards achieving that goal. In most countries of the third world, decentralization has emerged since the beginning of 1980s as a response to the inefficiency, inequity, high cost, low coverage and scarce effectiveness of health services associated with centralism.[3] In parts of Botswana, Brazil, Colombia, Bolivia, Jordan, South Africa, where decentralization has worked, impressive achievements have been made including: faster responses to local needs, more accountability and transparency, less corruption, improved delivery of the basic services, better information flow, more sustainable projects, stronger means for resolving conflicts, increased energy and motivation among local stakeholders.

In India some states, like Kerala, Karnataka, Maharashtra and West Bengal, have been practicing decentralization policy in development sectors including health with different degree of success[4]. In West Bengal, the local self-government institutions have been treated as the nodal bodies where power of governance was decentralized in phases. Present reform in multipurpose health (MPH) scheme is a part of that whole design. The rural population (70% in census 2001) in West Bengal depends greatly for their health care on this infrastructure. Any reform in this network will immensely influence the health outcome of the rural area [5-8].

2. Objectives

Based on this rationale, we conducted the present study with the following objectives:

1. To estimate the cost incurred for the salaries of the staffs in the present set up of multipurpose health scheme in West Bengal.
2. To estimate the cost to be incurred in the reformed multipurpose health scheme in West Bengal.
3. To estimate the money to be generated by community financing.
4. To compare the costs of the present and the reformed multipurpose health scheme.

3. Methods

We collected details of the present and the reformed set ups of MPH Scheme from the Planning and Development section of the Health Directorate; described and compared the human resource involvement in both. We attempted to ascertain projected benefits in health programs based on it.

We calculated the number of staffs based on the sanctioned posts in different tiers of the present scheme. Vacant posts were included. In the reformed system, we excluded the posts, which will be abolished; and included the volunteer health workers, one from each village level public body, to be appointed by the local self-government units. First tier supervisors and above were not included in the calculation, as those will remain same in both the schemes.

In West Bengal, approximately 74% of the expenses incurred by the government in health sector accounts for salary of staffs [9]. Assuming the expenses other than salary would remain same in both the systems, we compared the costs in salary/honorarium head (for second and third tier supervisors, health assistants, health volunteers) between the present and the reformed system. Salaries of first tier supervisors and above were not computed, as it would remain same in both the systems. The government estimated that 70% of the health assistants are enjoying the scale 6 and the rest scale 8 and 80% of the

health supervisors are enjoying the scale 8 and the rest scale 10. Average monthly salaries (Mid scale basic pay + Dearness allowance + House rent allowance + Medical allowance) in these scales have been used for computation of total expenditure of the state government in the salary head per year (Average monthly salary X Number of employee in that scale X 12 months). Total honorarium for honorary health volunteers was calculated at the rate of Rs.500 ($ 11) per month per volunteer, as proposed by government. It was assumed, on an average, 1000 persons (average 200 families) in a village unit will participate in the community-financing program. It will cover 80% of the rural population of the state; 20% being non-participants. Rs.2 will be collected from each family per month i.e. Rs.24 ($0.5) a year. We calculated income to be generated by community financing based on it.

4. Results

4.1. Description of the reformed scheme

The organogram (Table 1) describes present scheme. The structure from and above first tier supervisor will remain same and so not showed. Multipurpose health scheme serves the rural area of the state (Population: 58 million) through 9184 sub-centers (lowermost health facility tier manned by paramedics). Present population coverage per sub-center is 6286. The sub-centers are divided in 1531 sectors (average 6 sub-centers/sector) Supervisors in tier II and III remain responsible for the monitoring and supervision of the sub-centers in a sector. In the reformed system, this sector system will be abolished. The sub-centers will be reallocated according to the geographic jurisdiction in 3354 local self-government units i.e. two to three sub-centers/unit. Sub-center situated at headquarter of local self-government unit will perform all the existing functions of a sub-center and will serve as the center for monitoring and supervision of sub-centers. Health and education sub-committee of local self-government and the health department functionaries will do it jointly. Health supervisor will be stationed at this center. The second and the third tier of supervisors will be merged to form a single tier. (Table 1 and 2)

There are 45000 village level public bodies in the state under the local self-government units. Self Help Groups (SHG) working in the public body area will be associated with

the activities of the sub-centers. They will link sub-centers and the community. Village level public bodies will nominate male and female health volunteers from these groups. These volunteers will be attached to the local sub-center. The SHGs through these volunteers will collect from each household Rs.24.00 ($ 0.5) per year per family for the services rendered. Detailed guidelines about mode and criteria of recruitment of health volunteers including payment of performance-based honorarium are yet to be published. However, the health department assumes honorarium will be Rs.500 ($ 11) per month maximum. (Table 1)

Table 1: Organogram of present and reformed multipurpose health schemes

Present scheme

Second tier supervisors

Third tier supervisors

(In charge of sectors)

Sub center

(One female and one male health assistant)

Reformed scheme

Supervisor (merged second and third tier) in charge of area under local self-government unit (*gram panchayet*) posted at head quarter sub center

Sub center at the head quarter of local self-government unit (*gram panchayet*); One female and one male health assistant.

Non-head quarter sub center (One female and one male health volunteer)

Female honorary health volunteers; one from each village attached to the sub center of that locality nominated by village level public body

4.2. Calculation of costs

In the reformed scheme total persons involved will be 66722 and that in the present one is 22453. The reformed scheme will reduce 731 (18%) of the sanctioned posts of supervisors (second and third tier). Male health volunteers will fill up 5830 (64%) of the sanctioned posts of male health assistants. Female health assistants will remain same in both the schemes. 45,000 female health volunteers will be appointed one for each village level public body. (Table 2)

Table 2: Paramedical manpower set up in the present and reformed multipurpose health scheme, West Bengal, India, 2003 (from second tier supervisor and below)

Manpower involved	Present scheme	Reformed scheme
Second and third tier supervisor	4085	3354
Female health assistant	9184	9184
Male health assistant	9184	3354
Male health volunteer	--	5830
Female health volunteer	--	45000
Total	**22453**	**66722**

Table 3 suggests total yearly cost in the present system is around Rs.2181 million ($ 48.5 million) and that in the reformed scheme will be Rs.1859 million ($ 41.3 million). Expected 90,00,000 families in 45000 public bodies will be benefited by community financing scheme. The users fee by community financing in a year will be: 90,00,000 X Rs.24 = Rs.21, 60,00,000 ($ 4.8 million). [Value of one USD ($) = Rs.45]

Table 3: Yearly salary and honorarium costs of present and reformed multipurpose health scheme, West Bengal, India, 2003

Manpower	Scale of pay	Yearly salary / honorarium cost	Total
Present scheme			
Health assistants, male and female (n=18368)	Scale 6: 70% (n=12858) Rs.7140 (per month)	Rs.1101673440	Rs.1709977440 ($ 38 million)
	Scale 8: 30% (n=5510) Rs.9220 (per month)	Rs.608304000	
Health supervisors (n=4085)	Scale 8: 80% (n=3268) Rs.9220 (per month)	Rs.360787200	Rs.471572400 ($ 10.5 million)
	Scale 10: 20% (n=817) Rs.11300 (per month)	Rs.110785200	
Reformed scheme			
Health assistants, male and female (n=12538)	Scale 6: 70% (n=8777) Rs.7140 (per month)	Rs.752013360	Rs.1167227760 ($ 25.9 million)
	Scale 8: 30% (n=3268) Rs.9220 (per month)	Rs.415214400	
Health supervisors (n=3354)	Scale 8: 80% (n=2683) Rs.9220 (per month)	Rs.296203200	Rs.387066500 ($ 8.6 million)
	Scale 10: 20% (n=671) Rs.11300 (per month)	Rs.90987600	
Male health volunteer (n=5830)	Honorarium: Rs.500/month	Rs.34980000	Rs.304980000 ($ 6.8 million)
Female health volunteer (n=45000)	Honorarium: Rs.500/month	Rs.270000000	

The total yearly costs of the present and reformed schemes indicate that government has to spend Rs.322 million ($ 7.2 million) lesser in the reformed scheme despite increase of manpower involvement by 44269 persons (increase by 197%). Adding net savings from salary (Rs.322 million) and earning from community financing (Rs.216 million), the overall gain comes to Rs.538 million ($ 12 million). Cost per staff (Total cost in salary/honorarium head divided by number of staff involved) in a year for maintaining village level health care service in the present scheme is Rs.97161 ($ 2159), whereas in the reformed scheme it will be Rs.27866 ($ 619); a decrease by 71% compared to existing scheme. Yearly cost of the service rendered to per person in the population (Total cost in salary/honorarium head divided by total population) in the present scheme is Rs.37.8 ($ 0.8), whereas in the reformed scheme it will be Rs.32.2 ($ 0.7), a decrease in 14.8% compared to the existing scheme. (Table 4)

Table 4: Comparison between costs of present and reformed multipurpose health scheme, West Bengal, India, 2003

Multipurpose health scheme	Total cost	Cost per staff	Cost per person in the population
Present scheme (n=22453)	Rs.218, 15,49,840 ($ 48.5 million)	Rs.97161 ($ 2159)	Rs.37.8 ($ 0.8)
Reformed scheme (n=66722)	Rs.185, 92,74,260 ($ 41.3 million)	Rs.27866 ($ 619)	Rs.32.2 ($ 0.7)

5. Discussion

The state has a sub-center network in the rural area covering 6286 persons per sub-center. National target is 5000/sub-center in general area and 3000/sub center in hilly and tribal area [10]. It indicates that more sub-centers are to be established in the state for rendering health care to the rural populace.

Organogram of the present and reformed multipurpose health scheme suggests that merger of two supervisory tiers of the present scheme will trim the pathway of supervision. Attachment to local self-government units will make them more accountable. Replacing sector concept by local self-government unit concept will lead to supervision units, 50% smaller in size. (Table 1)

The total manpower engaged in the reformed scheme will be 197% higher than the present one; increased mostly at the base level through female health volunteer (Table 2). It signifies that the reformed scheme will be able to implement the health programs more intensively and render health care at the family level through the voluntary health workers. Involvement of local self-government units and village level public bodies in planning, rendering support to health programs, in recruitment of voluntary health workers and involving self-help groups will increase the community participation to a great extent. However, nothing has yet been told about the recruitment eligibility (apart from being a local resident) of a health volunteer. Quality of their work will depend on their level of educational, social orientation and level of training imparted.

Despite 197% increase in the health manpower, the reformed scheme costs 14.8% ($ 7.2 million) less than the present one. Yearly cost per staff will be 71% less in the reformed scheme. Government may consider investing this savings in the salary head to other priority areas of the scheme, such as establishing more sub-centers, bettering supply of drugs, equipments and other facilities etc. Cost of service rendered to per person in the population will be 14.8% less in the reformed scheme. Even the budget allocation to multipurpose health scheme remains unchanged; government may divert saved Rs.322 million ($ 7.2 million) from salary head and increase per head allocation of rural population for preventive health care by Rs.5.6 ($ 0.12). (Table 4)

The projected benefits of the reformed scheme may be as follows:

a) Nominations of the health volunteers by the village level public bodies and training them within that system will reduce the cost of salaries, training, travel and housing. Direct involvement of the local self-government units will increase community vigilance leading to proper utilization of the resources, better implementation of the programs and reduction of losses due to corruption and nepotism.

b) Intensive interaction with the community resulting in increased interventions by advice or nominal treatment.

c) Reduce the cost of curative services; decrease load and ensure better utilization of the secondary and tertiary care centers. This would help in the reallocation of skewed health resources.

d) Reduce the out-of-pocket expenditure on health care, which includes the cost of transportation, food, loss of working hours or days of the patients and their companions apart from the cost of medical care.

e) Economic gain from savings from the salaries and community financing may be used for betterment of preventive health care.

f) Involvement and accountability of the community will be greater being an active partner in ascertaining the health needs and the efforts to realize them.

Decentralization of governance is central to the understanding of the government of West Bengal behind all social sector reforms including health. It has started paying dividends. The state has secured a place in the upper quartile among all states in terms of maternal mortality rate (MMR), infant mortality rate (IMR), birth Rate, crude death rate and near elimination of Leprosy and Kala azar [19]. The IMR declined from 92/1000 in 1977 to 48.7/1000 in 1999. Presently crude death rate is 8.3 (India: 9.7); neonatal mortality rate is 31.9 (India: 43.4) [20]. The total fertility rate (West Bengal: 2.49; India: 3.07) is steadily decreasing, expecting to reach the replacement level within 2013 [21]. During 1981 to 2001, adult literacy status also improved from 48.6% to 69.2%, which possibly has positive effect on the health outcome [17, 20].

In Kerala, a state in India, democratic decentralization is part of a struggle for self-reliance. State government devolved 35-40% of state plan funds to village and municipal bodies. In its first two years the campaign led to the construction of 98,494 houses, 240,307 sanitary latrines, 17,489 public taps and 50,162 wells – all far more than in previous years. Major health indicators also improved, as these basic needs were addressed [24].

Karnataka experience shows improved representation of the poor people, but participation is less effective and responsiveness is low. Impact on social aspects including health and economic poverty is not adequate. It did little to help pro-poor growth or equity [22, 26].

In Mumbai, local community involvement is said to have substantially improved follow up on immunization [24].

District level decentralization of Agra district in early 1980s was credited with improving allocations to agriculture, education and social welfare. School construction increased from an average of seven per year from 1977 to 1981 to 98 new schools in 1982 [24].

In Liberia, more than 300 miles of roads were constructed in the 1970s with the help of local development councils, twice the rate of previous decade [24].

From 1987 to 1993, following decentralization the north Brazilian state of Ceara registered an annual growth of 3.4 percent (national rate: 0.87 percent); measles vaccination rate went from 25% to 90%; the infant mortality rate declined from 102 to 65 per thousand. Several experiments in Africa as far back as 1950s produced remarkable success at building basic infrastructure including roads, schools, clinics, bridges and markets [24].

Some negative outcomes seem available. In Chile, the limited decentralization carried out under the authoritarian Pinochet regime. In health, it was accompanied by cuts in resources and introduction of user charges: hospitals got more income while clinics got less. In Philippines, immunization rates declined after a rapid decentralization. In Papua-New Guinea, provincial and district health staffs were almost unanimous that the health services were worse off than before decentralization [24].

It is true that decentralization cannot be a panacea to all issues of social deprivation and equity problems. It neither does away with, nor engenders, social conflicts, which exists anyway and is a fact of life. But it provides an opportunity to the poor to assert themselves in a way that bureaucratic decision-making would not have made possible. Decentralization, by empowering elected bodies, puts life into a whole range of institutions on the basis of which more equitable society can be built. It is a means to ensure greater accountability of the state in social sector development. Present reform of the multipurpose health scheme in West Bengal may be assessed in this context.

Community financing is a new concept in public sector health care of the state. However, question of social equity is to be addressed in this regard. Bamako Initiative promoted by UNICEF attempted to address the problem of financing primary health care in the face of economic recession, structural adjustment program and cuts in public spending. UNICEF has tried to make the initiative user-friendly and community-controlled, and the program does have a number of positive features. But, when health workers knew that their salaries and health posts are financed through drug sales, many of them over-prescribed. The people for whom the initiative was designed ultimately suffered [11]. The studies in some countries suggested that when cost recovery has been introduced, utilization of health centers by high-risk groups has dropped [12]. An editorial in *The Lancet* in 1994 suggests that the introduction of user fees may be contributing to the rapid spread of AIDS in Africa [13]. Whatever their apparent impact, the introduction of these cost recovery schemes have disturbing social and ethical implications; unless sufficient care has been taken during it's planning [1].

6. Limitations

The present study had no scope to measure the effectiveness of the reformed scheme as it is presently in the initial phase of implementation.

The government has made certain assumptions regarding cost recovery through community financing. Present study has not dealt with the feasibility of those assumptions.

It is difficult to hypothesize the quality of the service to be rendered by health volunteers, as we are not aware about the minimum level of education needed for being recruited and modules of the training program to be imparted to them.

7. Recommendations

Design the monitoring and evaluation mechanism of the reformed scheme and spell out a clear timeline of its implementation.

Declare the recruitment criteria of health volunteers and the plan of training them.

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SECTION.3

OUTBREAK INVESTIGATIONS

Outbreak of influenza in Murshidabad District, West Bengal, India, June 2003

Introduction

Influenza is an acute respiratory infection caused by influenza virus. It is of three types – A, B and C. It may occur in pandemics every ten to fifteen years due to major antigenic changes [1, 2]. Twentieth century visualized three major pandemics in 1918, 1957 and 1968. All these known pandemics were caused by influenza A virus. In between pandemics, epidemics tend to occur at intervals of two to three years in case of A virus and four to seven years in the case of influenza B. But, the periodicity is not regular, because several strains of the virus may be in simultaneous circulation. It means outbreaks of influenza may occur every year; sometimes, even twice a year [3, 4]. At present three types of influenza viruses are circulating in the world: A (H1N1), A (H3N2) and B viruses. WHO global surveillance activities have identified human infection with a new strain of influenza virus called A (H5N1) in Hong Kong in 1997 and 2003 [5]. Earlier pandemics resulted in massive loss of human lives. Different sources estimated that in 1918, twenty to fifty million and in 1968 one million to four million people died due to influenza. WHO estimate on the impact of the next pandemic is: two to seven million would die and tens of million would require medical attention [6].

In India, influenza like illness is common. Most of them remain undiagnosed. From 1980, national institute of Virology, Pune investigated 16,000 influenza like cases from outbreaks all over the country. They found a total of 418 influenza virus isolates of types A and B comprising 43 antigenic variant strains [7].

In response to the request of Government of West Bengal, a team of National Institute of Cholera and Enteric Diseases (NICED), Kolkata consisting of two others and myself

investigated the outbreak of fever, respiratory symptoms with high case fatality in Murshidabad district on 8 to 10 June 2003. The objectives of the investigation were to describe the nature and extent of the outbreak, identify its cause and propose control measures.

Methods

We met the district health authority and collected the latest surveillance data on occurrence of similar cases in previous years. We also enquired about the index case, onset, the affected areas, presenting features of the case-patients, treatment protocol, and outcome of treatment. We then visited local health facilities and clinically examined the patients.

Descriptive study

We selected Kuchidanga and Kadamtala villages for the study, as ten out of nineteen deaths occurred there. It was observed that the disease mainly occurred among children and adolescents. We defined a case as the occurrence of fever among persons up to 15 years of age since 15 May 2003 at Kuchidanga and Kadamtala villages, Lalgola block, Murshidabad district, West Bengal. We designed a questionnaire and searched for cases by door-to-door visits with the help of local health workers. For each identified case, we collected information regarding age, sex, day of onset, signs and symptoms and outcome. We constructed the epidemic curve and prepared a map to understand the geographical distribution of cases.

The only available age structures of the villages under study are their total population and the population under 5 years. We calculated the population in the age groups (<1 year, 1-2 years, 3-5 years and 6-15 years) based on national averages and the data available. Similarly, we found out the sex distribution of the said age groups based on the sex ratios among less than 6 years and adult age groups, as per Census 2001. Then, we calculated attack rates by age and sex.

Environmental study

We inspected the housing, sanitation of the affected villages, distance from the nearest health facility and also searched for exposures relevant to occurrence of cases.

Laboratory study

We and the team of National Institute of Virology, Pune collected a total of 40 serum samples, seven peripheral blood smears, one cerebrospinal fluid specimen and 30 throat swabs from the case-patients and their contacts. The specimens were sent to National institute of Cholera and Enteric Diseases, Kolkata and National Institute of Virology, Pune for analysis.

Results

The examination of the surveillance data suggested that there were no similar episodes of fever cases with such a high case fatality in previous five years. In this context, we confirmed the outbreak.

Descriptive study

The study reported 86 patients in two above-mentioned villages. One patient was excluded, as it was not befitting with the case definition; six patients were excluded, as they were not residents of the villages under study. The data was analyzed based on the findings of 79 cases. The distribution of cases by date of onset (Figure 1) suggested the outbreak to be common source continuous exposure in nature. The first case occurred on 23-5-03 with a peak on 2-6-03. Since then, it was slowly coming down. However, it was difficult to predict the stage and future course of outbreak, as it was ongoing.

The epidemic curves (Figure 2) of the two affected villages suggested that the outbreak started earlier at Kadamtala and it was continuing on the day of investigation. Number of cases was higher in comparison to Kuchidanga.

Figure 1. Distribution of fever cases (n=79) by date of onset, Kuchidanga and Kadamtala, Murshidabad, West Bengal, 2003

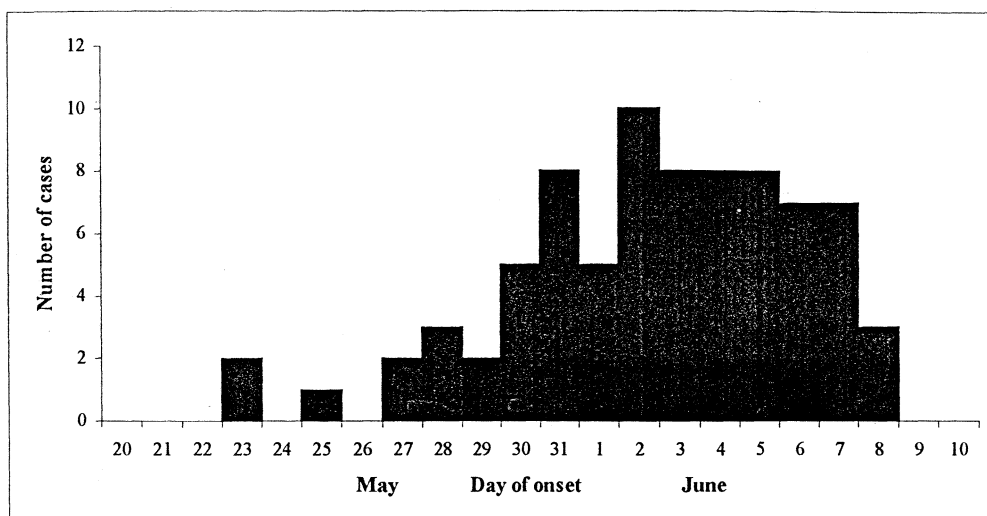
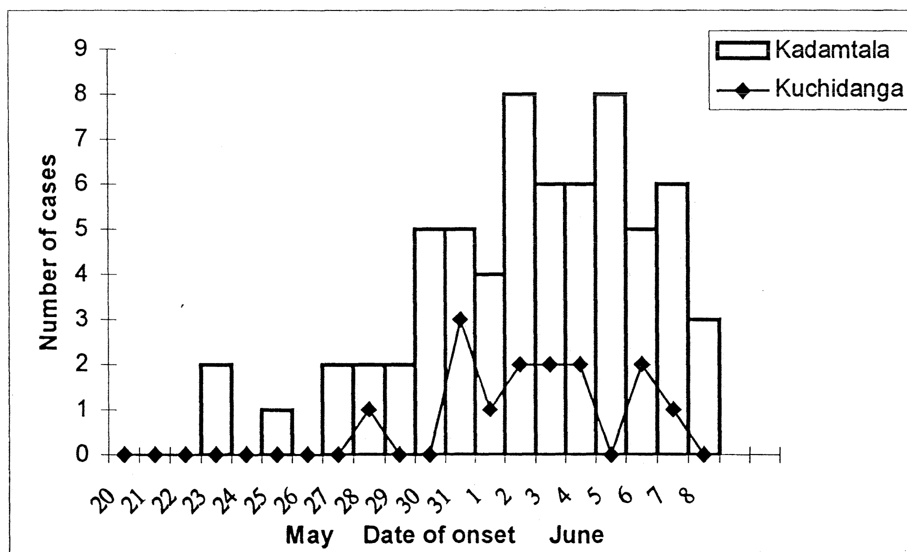


Figure 2. Distribution of fever cases (n=79) by date of onset, Kuchidanga (n=14) and Kadamtala (n=65), Murshidabad, West Bengal, 2003



Minimum incubation period among case-patients were three days in Kuchidanga village and two days in Kadamtala village, overall being two days.

Overall attack rate was 5.2% (79/1516) and overall case fatality rate was 12.7% (10/79). Attack rate and case fatality rate in Kuchidanga was 2% (14/701) and 21.4% (3/14) respectively and those in Kadamtala were 8.1% (65/803) and 10.8% (7/65) respectively. Attack rate was highest (23.9%) among children between one and two years of age. Case fatality was highest (17.4%) among three to five years. groups. A total of 56 (71%) cases belonged to 0-5 year age group. 80% (8/10) deaths occurred in the same age group. We found sex specific attack rates similar; male 5.2% (41/783) and female 5.2% (38/733). Sex wise proportions of cases also were almost same; male 48.1% and female 51.9%. (Table 1)

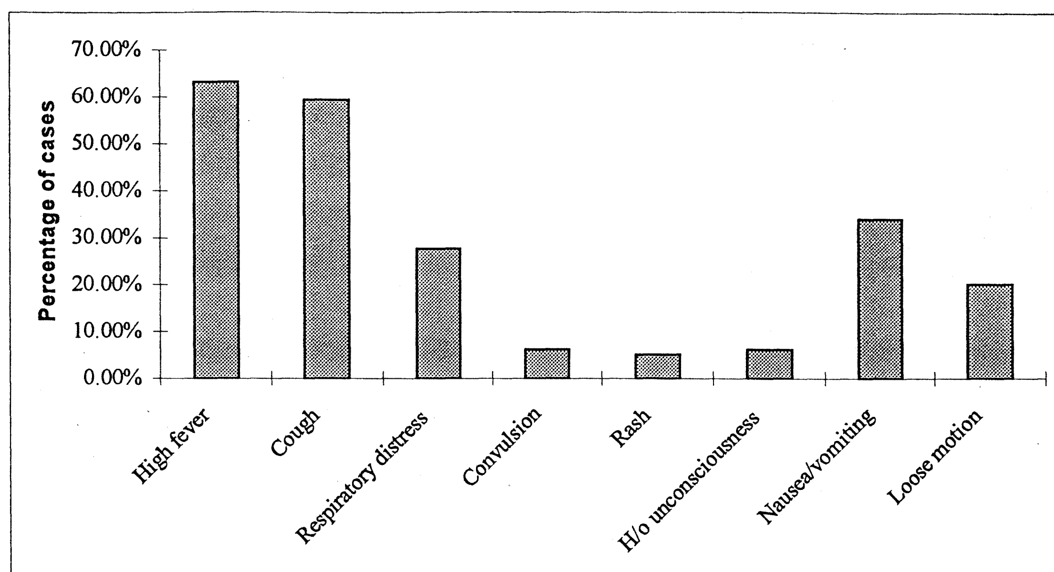
Table 1: Distribution of fever cases by age and sex, Kuchidanga and Kadamtala, Murshidabad, West Bengal, 2004

Age in years		**Population**	**Cases**	**% of total cases**	**Attack rate (%)**	**Death**	**Case fatality rate (%)**
<1		123	6	7.6	4.9	0	0
1-2		113	27	34.2	23.9	4	14.8
2-5		333	23	29.1	6.9	4	17.4
6-15		947	23	29.1	2.4	2	8.7
Sex	Male	783	41	48.1	5.2	5	12.2
	Female	733	38	51.9	5.2	5	13.2
Total		1516	79	100.0	5.2	10	12.7

Mean duration of illness was 5.14 days. Most of the patients presented with high fever with respiratory symptoms. Some presented with convulsion with or without respiratory symptoms. Mortality was high among those cases.

Mean duration of illness was 5.14 days. Most of the patients presented with high fever with respiratory symptoms. Some presented with convulsion with or without respiratory symptoms. Mortality was high among those cases.

Figure 3. Clinical presentation of the fever cases (n=79), Kuchidanga & Kadamtala, Murshidabad, Murshidabad, West Bengal, 2003



The combinations of clinical symptoms were: fever with cough 98.5%; fever, cough with respiratory distress 27.8% and high fever with convulsion 6.3%.

The cases were scattered throughout the two villages. We found clustering of cases in many households. The children of adjacent houses were affected.

Environmental study

The affected villages are situated in the Lalgola community development block of Murshidabad district situated about 50 Km away from the district headquarter at the bank of the river Bhagirathi. The nearby health facility is Krishnapur Rural Hospital, about 7 km. away from the affected villages. The quality of road from the villages to the hospital

was not good. The vehicles for transport were bullock carts, rickshaws and few motor vans.

Investigation of death cases

All the 10 death cases were investigated and details were collected from the records and by interviewing their family members. It was observed that the durations of illness of the cases were very short in almost all the cases, few hours to 3 days. Presentations were mostly with respiratory distress with or without convulsion. Five male and five female children were the victims.

Table 3. Clinical findings of cases died, Kuchidanga and Kadamtala, Murshidabad, West Bengal, 2003

Sl. No.	Name and address	Age (year)	Sex	Clinical findings	Date of onset	Date of death
1.	Najkura Khatoon Kuchidanga	2	F	Fever, cough, respiratory distress	28.5.03	31.5.03
2.	Kutubuddin Kuchiidanga	1.5	M	Fever with cough with respiratory distress	31.5.03	2.6.03
3.	Manirul Islam Kuchidanga	1 yr. 8 mth	M	Fever with cough, respiratory distress with convulsion	4.6.03	6.6.03
4.	Fitu Seikh Kadamtala	7	M	High fever with respiratory distress	31.5.03	31.5.03
5.	Fatema Khatoon Kadamtala	3	F	High fever with respiratory distress	1.6.03	2.6.03
6.	Mousumi Kadamtala	3	F	High fever with abdomen pain and respiratory distress	5.6.03	5.6.03
7.	Almgir Seikh Kadamtala	6	M	High fever with convulsion	28.5.03	29.5.03

Sl. No.	Name and address	Age (year)	Sex	Clinical findings	Date of onset	Date of death
8.	Sufia Kadamtala	3	F	Fever with convulsion with respiratory distress	28.5.03	29.5.03
9.	Saidur Rahman Kadamtala	1 yr. 8 mth	M	High fever with respiratory distress with convulsion	28.5.03	29.5.03
10.	Safira Khatoon Kadamtala	3	F	High fever with respiratory distress with convulsion	29.5.03	30.5.03

Laboratory study

Examination of blood slides done at the NICED, Kolkata suggested mild leucocytosis with neutrophilia. All blood samples were inoculated into glucose broth and taurocholate broth and then sub-cultured on to blood agar and MacConkey agar for isolation of Salmonella typhi and paratyphi, Escheretia coli, Staphyllococcus aureus, Streptococcus pyogenus, pneumoniae and agalactiae. No organism was isolated after incubation of inoculated blood samples at 37^0 C for 5 days.

The NIV, Pune tested one CSF specimen and 30 sera collected from the case-patients and 11 sera from the contacts of death cases for IgM antibodies to Japanese Encephalitis, West Nile fever and Dengue by MAC ELISA test. IgM antibodies to these viruses were absent in any of the specimens. IgM ELISA for Measles was done on 21 representative samples. All were negative. Electron microscopy examination of one CSF sample and three throat swabs by negative staining did not show any evidence of virus like particles in the fields scanned.

Reverse transcriptase polymerase chain reaction (RT-PCR) test was done on all the thirty throat swabs collected from the cases and contacts to detect the presence of Influenza A, B and Paramyxoviruses. Sixteen specimens (11 hospitalized and 5 contacts of dead cases) were positive for Influenza virus A and none were positive for Influenza B and

Paramyxoviruses. Direct sequencing of PCR products of two specimens yielded Influenza A sequences thereby confirming initial PCR results. PCR for Enteroviruses was negative in 10 representative specimens.
Tissue culture isolated Influenza A virus, H3N2 strain [7].

Discussion

The clinical and epidemiological observations and laboratory findings suggest that the outbreak was possibly caused by *Influenza A* virus circulating in the area at the time of investigation. The source of infection was the respiratory secretions of the cases transmitted through air following coughing and sneezing of the case-patients.

The epidemic curve and clustering of cases suggest the outbreak to be of common source type with continuous exposure. Age specific attack rates and proportion of cases by age groups indicate that most of the cases belonged to population = 5 year of age, particularly one to two years age group. Case fatality was highest among three to five years, closely followed by one to two years. There was no sex differentiation among cases and deaths. Most of the patients had respiratory symptoms along with fever.

Investigation of dead cases suggests majority of them had signs of encephalopathy manifested by convulsion and respiratory distress. Durations of illness prior to death in those cases were very short and all died at home before being attended by a qualified medical practitioner either at hospital or outside. It indicates the severity of the disease and implicates the absence of prompt medical care being one major cause of the deaths.
The clinical presentation and distribution of the cases indicated the possibility of a respiratory pathogen as the cause of the outbreak. The commonest possible route of spread of a respiratory pathogen is by droplet infection or droplet nuclei i.e. air borne. Clustering of cases found in the study supports this possibility.

Influenza is reported to be associated with high-grade fever and convulsions in children. At least 14% of the cases are associated with respiratory tract symptoms. It is important to emphasize that Influenza A and B viruses are a significant cause of serious lower

respiratory tract disease in children. Children may develop primary viral pneumonia abruptly after the onset of Influenza illness. It progresses within 6-24 hours to a severe pneumonia with rapid respiration rate, tachycardia, cyanosis, high fever and hypotension. The illness may rapidly progress to hypoxemia and death in one to four days [8, 9]. A wide spectrum of central nervous system (CNS) involvement has been observed ranging from irritability, drowsiness and confusion to the more serious manifestations like psychosis, delirium and coma. The pathogenesis of these CNS symptoms is unclear. Hypoxia developed due to severe pulmonary infection may result those. Influenza encephalopathy occurs at the height of Influenza illness and may progress to death [9, 10]. We found the signs and symptoms of the death cases similar to the clinical features of a case of primary viral pneumonia. But since the ten reported deaths in the study area had already occurred before the day of our investigation and also no specimens from those cases were available for the laboratory analysis, the question whether those deaths were caused by *Influenza A* could not be answered by this data. In this regard, the present etiological evidence might have to be treated as circumstantial.

The National Institute of Virology, Pune conducted serological surveys in 1981-82 and 1999 to determine the prevalence of antibodies (immunity status) to the pandemic and epidemic strains of influenza. The reports indicated broadening of antibody response to a greater number of strains and low to moderate prevalence of antibodies to epidemic strains. The study also demonstrated absence of antibodies to the pandemic strain of H2N2 in younger persons less than 25 years of age. The potential of its reintroduction cannot be ruled out as H2 variants are circulating in wild birds and immunity in human population is decreasing [7].

All the epidemiological findings of this outbreak suggest it to be an influenza outbreak. Laboratory investigations confirmed it by RT-PCR tests and isolating *Infuenza A (H3N2)* virus from throat swabs of the patients and their contacts. Most of the influenza like illnesses is not investigated in the state. Laboratory investigations are not done until it assumes a massive proportion. The laboratory facility of isolation of influenza virus is not available within the state. All these with the waning immunity of the community to

certain strains suggest the necessity to react promptly to a similar situation; ensure treatment facilities to reduce mortality and find out the cause of such outbreaks.

Recommendations

Short term

- Detect cases early and treat actively.
- Ensure supply of drugs and placement of trained personnel at the health care facility nearest to the affected area.
- Arrange vehicle for early referral of patients with complications from the affected area to the nearest health facility.
- Ensure isolation of the patients at least at the health facility.
- Take measures to prevent secondary infection to the patients.

Long term

- Orient existing surveillance for early prediction of such outbreak.
- Equip a reference laboratory at the state level for virus isolation.

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Outbreak of cholera in Panihati municipality, North 24 Parganas district, West Bengal, India, July 2003

Introduction

Cholera is endemic in many parts of India [1]. Epidemiological studies indicated that cholera is responsible for about 5-10% of all acute diarrhoea cases in non-epidemic situation [2]. Epidemics of cholera are common, striking adults as well as children. The classical severe epidemics with high case fatality are now uncommon [3]. Reported cases and deaths in India in recent years showed a declining trend in morbidity and mortality [4, 5, 6]. *El tor Vibrios* were first isolated in 1964 [7] and has been the predominant biotype responsible for cholera epidemics since then. Outbreaks due to Non-agglutinating *Vibrio 0139 Bengal type* have been reported from various parts of the country [8, 9, 10].

The "North 24 Parganas" district is the largest district of the state of West Bengal, India (2001 population: 8.9 million) [11]. The Panihati municipality (2001 population: 0.35 million) is one of the most densely populated areas of the district (population density 17958/sq.km.) [11], with a high potential for outbreaks. Between January 2002 and March 2003, 27 outbreaks of diarrhoeal disease were reported in the district. Out of those, five were documented as cholera and 11 occurred in urban areas. Flood and water logging in Bongaon and Basirhat sub-divisional areas and contamination of water supply due to poor maintenance of pipe line in urban area, high water table of the district may be other probable causes for occasional outbreaks. On 30 July 2003, Panihati Municipal authority and superintendent of local hospital reported 14 cases of acute watery diarrhoea in Bosepukur-Baruapara area to the district health authority and requested their assistance. We investigated on 31 July 2003. The objectives of that investigation were to describe the nature and extent of the outbreak, identify its cause and suggest possible control measures.

Methods

We visited the hospital and examined the admitted cases and evaluated their response to treatment. Then, we reviewed the surveillance data of diarrhoeal diseases of that locality available at the hospital and the office of local health authority.

Descriptive study

Based on the clinical findings of the patients examined, we defined a case as the occurrence of three loose or watery stools in any person living in Bosepukur and its neighborhood between 20 July and 31 July 2003. We did a door-to-door case search of the more affected area (Bosepukur-Baruapara) and its less affected neighborhood (Rabindrapalli-Parthapur). We enumerated the population by age and sex and collected information about the cases by a pre-designed questionnaire. Distribution of cases over time and geographical area was done.

We compared the incidence of the disease in Bosepukur-Baruapara area with that of the neighborhood. We also compared the age and sex wise incidence of the disease.

Environmental study

We checked the pipeline of the water supply system, pipe water supply points at the households and tube wells used by the community. We also searched for other exposures relevant to the outbreak.

Laboratory study

We colleted rectal swab specimens in Cary Blair transport media and water samples from the water sources used regularly by the patients and community. The laboratory of the School of Tropical Medicine, Kolkata, West Bengal directly inoculated the stool samples in McKonkey, Salmonella Shigella agar and thiosulphate citrate bile sucrose agar plates. Then the specimens were enriched in alkaline peptone water and fluid selenite cystine medium and sub-cultured. We did Gram staining to note motility and slide agglutination test with specific high titer sera to identify the serotype.

We counted the coliform bacteria in water specimens to determine whether they exceeded the World Health Organization maximum permitted number (MPN) of 0 in 100 ml for total coliform, fecal coliform and fecal streptococce [12].

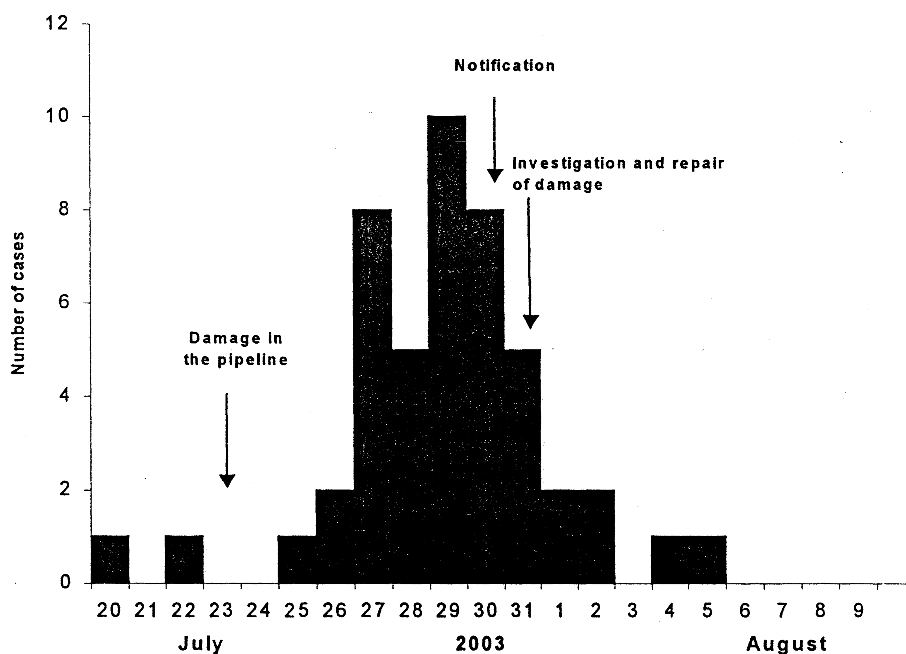
Results

The surveillance data indicated an increased incidence of the diarrhoea over time in that locality, thus confirming the outbreak.

Descriptive study

The cases of watery diarrhoea were reported between 20 and 31 July 2003 with a peak on 29 - a total duration of 12 days. Later we followed up the outbreak up to its termination (Figure 1). The distribution of cases over time suggested a common source outbreak with continuous exposure.

Figure 1. Distribution of cases by date of onset, Bosepukur-Baruapara, North 24 Parganas District, West Bengal, India, 2003



We identified 41 cases (population at risk: 753) and 0 death by door-to-door search in Bosepukur-Baruapara area (Attack rate: 5.4%). A total of 32 more cases were identified in that effort. Attack rate was higher among 0 - 5 years age group (11.4%) followed by >60 years (7.5%). The number of cases was higher among 15-45 years age group (46.3%); females were more affected (56.1%) than males (Attack rate 6.1% versus 4.8%). (Table 1)

Table 1: Age and Sex specific Attack rates (%) of cholera cases, Bosepukur-Baruapara, North 24 Parganas, West Bengal, India, 2003

		Cases	% Total	Population	Attack rate (%)
Age in years	0-5	8	19.5	70	11.4
	6-14	7	17.1	141	5.0
	15-45	19	46.3	406	4.7
	46-60	4	9.8	96	4.2
	>60	3	7.3	40	7.5
Sex	Male	18	43.9	378	4.8
	Female	23	56.1	375	6.1
Total		41	100	753	5.4

We found five cases (population at risk: 561) and 0 death in Rabindrapalli-parthapur area (Attack rate: 0.9%), the adjacent less affected neighborhood. We found the incidence in Bosepukur-Baruapara area significantly (χ^2=20.2, degree of freedom=1, p<0.00001) higher.

Table 2: Comparison of incidence of cases between Bosepukur-Baruapara area and Rabindrapalli-Parthpur area, Panihati municipality, North 24 Parganas, West Bengal, India, 2003

Area	Total population	Number of cases	Attack rate (%)
Bosepukur-Baruapara	753	41	5.4
Rabindrapalli-Parthapur	561	5	0.9

Source of drinking water supply in both affected and less affected neighborhood was mainly from nearby water reservoir supplied intermittently through pipe. No other exposure (e.g. common event, food) was found commonly shared by the case-patients in the affected area and less affected neighborhood.

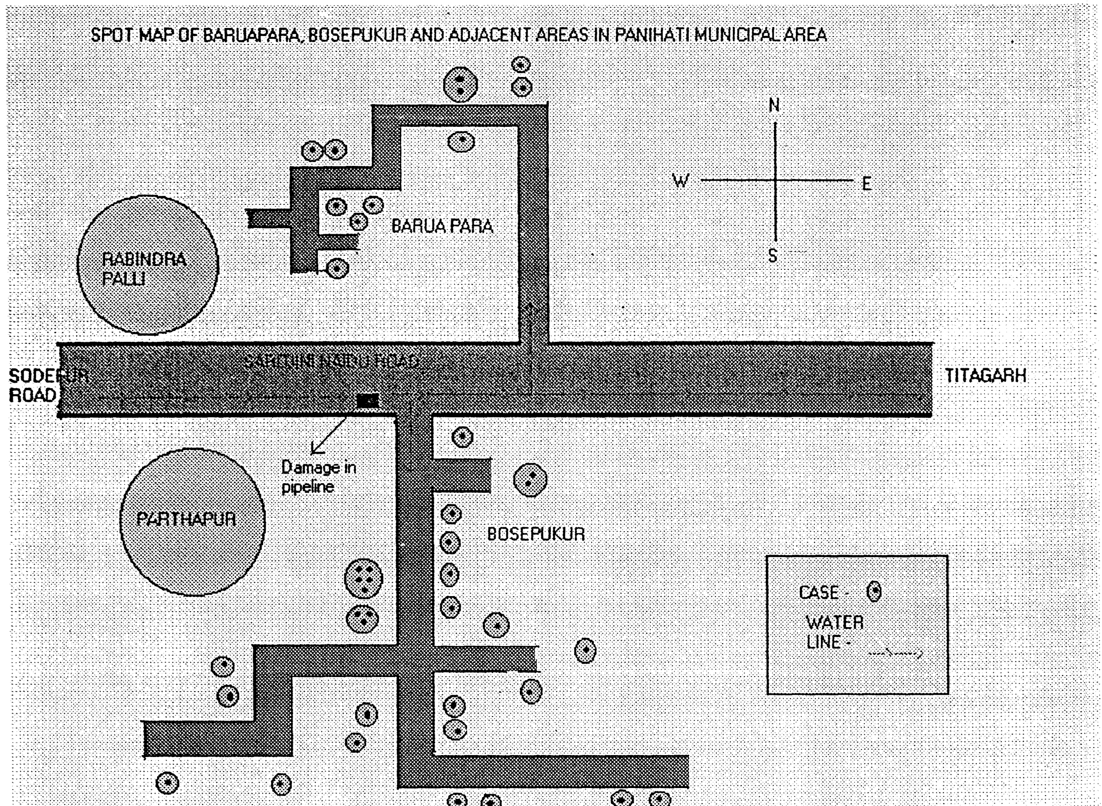
The Mean duration of illness was 2.9 days. 70.7% patients presented with moderate to severe dehydration. 14 patients (30.4%) were admitted in the hospital with severe dehydration. Median daily number of stools at the onset of illness was 6 times per day.

The geographical distribution of cases (Figure 2) indicated that cases were scattered in Bosepukur-Baruapara area with clustering in some households.

Environmental study

Environmental assessment identified that water pipe line was damaged (Figure 2) on 24 July 2003 due to passage of a heavy vehicle. We noted that people living in Bosepukur-Baruapara area, distal to the damage, were more affected than Rabindrapalli-Parthapur area situated proximally.

Figure 2: Geographical distribution of cholera cases, Bosepukur-Baruapara and neighborhood, North 24 Parganas, West Bengal, India, 2003



Laboratory study

We isolated *Vibrio Cholerae 01, El Tor Ogawa* from the two stool samples collected during field investigation. No pathogens could be isolated from the stool samples of two patients admitted in the hospital who had received antibiotics. Out of four (4) water samples, maximum permitted numbers (MPN) of coliform bacteria were found 17, 28 and 11 per 100 ml. in three specimens indicating fecal contamination.

Discussion

Clinical epidemiological observations and laboratory findings suggest that the outbreak was caused by *Vibrio cholerae 01, El Tor Ogawa*. The source of infection was possibly

the contaminated water supplied distal to the damage in the pipeline. The local authority repaired the damaged pipeline as soon as we identified it, which led to the termination of the outbreak.

The pipeline was damaged on 24 July 2003. We found that number of cases of watery diarrhoea increased in the area distal to the damage from 26 July and peaked on 29th July. We also noted that the area proximal to the damage was less affected. Attack rate in the affected area was significantly higher (?^{2}=20.2, degree of freedom=1, $p<0.00001$). Both the reas received water through municipal supply. No other exposure (e.g. common event, food) seems to explain this geographical distribution of cases. The pipeline was repaired on 31July 2003. The incidence of the disease decreased following that day. The rapid decline of cases can be explained by the incubation period of cholera, (few hours to five days, usually two to three days) [13]. Isolation of cholera from stool specimens confirmed the etiology of the outbreak. Water specimen test results showing high coliform count indicated the lack in the quality of the water supplied through pipe. Above findings supports the hypothesis that source of infection might be the water supplied through pipe contaminated owing to damage in the pipeline. Rapid decline of cases following repair of the damage also suggests that the outbreak could have been prevented if the pipeline was repaired within 24-48 hours.

In North 24 Parganas District outbreak caused by contaminated water supplied through poorly maintained pipeline is not uncommon. Between 1 January 2002 and 31 March 2003, the district surveillance system implicated contaminated water supplied through pipeline as the cause of 11 outbreaks (Out of 27 detected) of diarrhoeal diseases in 6 municipalities. Out of those, 5 outbreaks were due to *Vibrio Cholerae El Tor 01 Ogawa*. We also identified that most of those outbreaks (7 out of 11) occurred in the municipalities of Barrackpur sub-division [14], where 38% population of the district reside. Those municipalities came into being in the pre-independence era (Before year 1947) sequel to industrialization along the river Ganges. Since then, population of that sub-division had increased many folds, but little had been done to upgrade and maintain the age-old water supply system. Routine disease surveillance activity in the urban area is mostly hospital-based. There is very weak infrastructure to do field level disease

surveillance and private sector is little involved in the surveillance activity. These indicate the possibility of under-reporting from the urban area. Outbreak reports indicate that 50% (5 out of 11) of those outbreaks was due to cholera. However, in 15 out of 27 outbreaks stool and water samples were not sent for laboratory investigation [14], due to lack in laboratory back up at the district level and proper orientation in investigating an outbreak. All the above findings signify that cholera is also an urban problem in the district. Age-old ill maintained pipe water supply system was identified time and again as the source of infection of diarrhoeal outbreaks in the urban municipalities. Fixing up of the water pipelines will reduce the incidence of diarrhoeal diseases in the urban area and will prevent outbreak.

The investigation was limited in certain aspects. We had not conducted a case control study to prove the hypothesis generated. We found the age specific attack rate among 0-5 years age group high (11.4%). It might be due less specific case definition. We collected only four rectal swab and four water specimens from the affected area for laboratory investigation. We failed to collect water and stool specimens from the less affected neighborhood.

Recommendations

Investigate and repair promptly all leaks reported in the municipal water supply.

Use this outbreak as an example of rapid intervention to make sure that all municipalities act promptly on reported leaks.

Ensure routine chlorination of the municipal water supply. This chlorination should reach 0.5 mg/litre for all sampling points in a piped water system, 1 mg/litre at all stand posts and 2 mg/litre at filling if the water is distributed with tankers [15].

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Cholera Outbreak in Kanchrapara Municipality, North 24 Parganas District, West Bengal, India, 2004

ABSTRACT

Introduction

Global cholera situation during 1991 to 1999 showed increase in incidence as well as number of countries involved. Such a fatal disease is endemic in India with frequent outbreaks. Following reports of high hospital admission of acute watery diarrhea in October 2004 from ward four and five of Kanchrapara Municipality, North 24 Parganas district, we investigated the outbreak on 15 October 2004.

Methods

We described the Epidemiology of the outbreak; collected stool and water samples for bacteriological analysis and conducted a retrospective cohort study to find association between different exposures and being ill.

Results

Epidemic curve and clustering of cases suggested a common source outbreak. Overall attack rate was 14.9% (0 death) with no significant difference by sex and age; highest (19%) among above 60 years. 54% cases belonged to 15-45 year age group. Exposures other than water use habit were not different among case-patients. Authority repaired two leaks in the municipal water pipe immediately after being identified and chlorinated the water sources.

Cohort study indicated higher (χ^2=49.8; df=1; p<0.0001) attack rate (23.9%) and relative risk of 2.5 (CI: 1.9-3.3) among those consuming municipal piped water.
Vibrio Cholerae 01 El Tor Ogawa was isolated from all stool samples. Water samples collected after chlorination showed no coliform bacteria.

Conclusions

The outbreak was caused by *Vibrio Cholerae 01 El Tor Ogawa*, transmitted through municipal water supply system contaminated due to leaks in the pipeline. Steps taken by the authority led to the termination of the outbreak.
We recommended thorough checking of water supply system and regular water quality testing along with maintenance of desired chlorine level in water.

Keywords

Outbreak, Cholera, El Tor Vibrio, Watery diarrhea, contaminated water supply.

Introduction

The global incidence of cholera increased between 1991 and 1999 [1]. *El tor Vibrios* were first isolated in 1964 and has been the predominant biotype responsible for cholera epidemics with lower case fatality since then [1, 2, 4].

Six pandemics originated in Indian subcontinent. The seventh pandemic caused by *V. Cholerae 01 biotype El Tor* started from Indonesia in 1961 and reached India in 1964. By the end of 1965, it largely replaced the age-old *V. Cholerae 01 biotype classical.* A review of cholera outbreaks in India from 1975 to1989 identified some characteristic features. First, *V. Cholerae 01 El Tor* caused most of the outbreaks. Second, in most, the source of infection and mode of spread were not identified. Third, most were identified at a late stage and reported through the press. Fourth, case fatality rates were low when ORS was used early and adequately. Fifth, some strains were resistant to commonly used antibiotics including Furazolidone, nalidixic acid, streptomycin, norfloxacin and ciprofloxacin [1, 5, 6-11]. Several studies in various parts of the country reported that non-agglutinating *Vibrio 0139 Bengal type*, a newer strain, was responsible for many of the outbreaks [16-18]. Epidemiological studies in India indicated that cholera is responsible for 5 to 10% of all acute diarrhoeal cases in non-epidemic situation [12]. Epidemics of cholera are common, affecting adults and children. However, under reporting may be a problem [1].

The "North 24 Parganas" district is the largest district of West Bengal, India with a population of 8.9 million (Census 2001) and population density 2181/sq. km [19]. Between January 2002 and March 2004, 38 outbreaks of diarrhoeal disease were reported in the district. Of these, nine were confirmed as cholera and 21 occurred in urban areas. Factors that may increase the risk of cholera in the district include flood, water logging, contamination of water supply due to poor maintenance of pipeline in urban areas and high water table of the district. The Kanchrapara Municipality with a population of 130,000 is one of the most densely populated (13905/sq.km) areas of the district [19], with a high potential for outbreaks. On 13 October 2004, the superintendent of Jawharlal Nehru Memorial Hospital, Kalyani reported the admission of 84 cases of acute watery diarrhoea

in the last three days to the district health authority. The patients were residents of Kulia Road-Ambagan-Dharmanagar colony area of Kanchrapara Municipality. On 15 October, following a request from the municipal authority we investigated the outbreak with the objectives to describe the nature and extent of the outbreak, identify its cause and propose control measures.

METHODS

We examined the patients admitted in the hospital and evaluated their response to treatment. Along with municipal representatives we also visited the area from where the cases were reported and examined the surveillance data of diarrhoeal diseases of that locality.

Descriptive study

We defined a case as the occurrence of acute watery diarrhea in a patient aged five years or more living in Kulia Road-Dharmanagar Colony-Ambagan area of Kanchrapara Municipality between 5 and 15 October 2004. We designed a questionnaire and searched for cases by door-to-door visits. For each identified case, we collected information regarding age, sex, date of onset, signs and symptoms, outcome, food consumption and water use habit. We used the door-to-door visit as an opportunity to conduct a census of the population by age and sex. We calculated attack rates by age and sex, constructed the epidemic curve and prepared a map to understand the geographical distribution of cases.

Environmental Study

We inspected the housing, sanitation and water supply systems of the area and the canal bordering the locality. We also enquired about the state of water logging during heavy rain in the week preceding the outbreak.

Analytical study

We designed a retrospective cohort study and visited all the households of the affected area and collected information from each individual regarding the exposure status of all

residents about their drinking water sources and development of symptoms. We compared the incidence of cases among exposed and non-exposed, calculated the relative risk and tested the significance of the association using Chi-square test.

Laboratory Study

We collected seven rectal swabs in Cary Blair transport media from the patients residing in the affected area and admitted at the hospital. At the time of collection of specimens none had received any antibiotic. We also collected seven water samples from water sources potentially infected. The laboratory of the School of Tropical Medicine, Kolkata, West Bengal directly inoculated the stool samples in McKonkey, Salmonella Shigella agar and thiosulphate citrate bile sucrose agar plates. Then the specimens were enriched in alkaline peptone water and fluid selenite cystine medium and sub-cultured. We did Gram staining to note motility and slide agglutination test with specific high titer sera to identify the serotype.

We counted the coliform bacteria in water specimens to determine whether they exceeded the World Health Organization maximum permitted number (MPN) of 0 in 100 ml for total coliform, fecal coliform and fecal streptococce [20].

Results

Descriptive study

There were 287 households with a total population of 1404 persons in the affected area. A total of 1301 persons were five years of age or older. The median age was 21 year and the proportion of male was 696/1301 (53.5%). We identified a total of 194 cases.

Among 1301 population aged five years or more, the overall attack rate was 14.9%. Attack rates among males and females were 15.1% and 14.7%, respectively (Table 1). The highest attack rate (19%) was observed among above 60-year age group. More than half (54.1%) of the cases occurred in 15-45 years age group. Of the 194 case-patients, 103 (53.1%) were admitted in hospital. There was no fatality. A total of 112 (58%)

patients reported vomiting along with watery diarrhea. Case-patients were not exposed to any community feast or to any particular food item.

The first case was reported on 8 October and the last on 18 for a total duration of 11 days (Figure 1). The distribution of cases over time indicated that the majority of the cases were reported between 11 with the peak on 13, suggesting a common source outbreak with continuous exposure.

The area affected of Kanchrapara Municipality comprised of three small localities: Kulia Road, Ambagan and Dharmanagar Colony. The distribution of cases by place of residence indicated that 179 (92%) of the cases clustered around Kulia Road and Dhrarmanagar Colony area (Figure 2).

Environmental Study

There were two water supply systems (municipal and railways) in the area. The municipal pipeline supplied water through seven taps located in Kulia road and Dharmanagar colony area. The railway supplied water through five taps located in Ambagan. There were two tube wells in the Kulia Road area. None of the systems regularly chlorinated the water. Some of the households in both the areas had in-house pipeline connection from either municipality or railway authority.

The residents of the affected area detected two leaks (Figure 2) in the municipal pipeline on 11 October. They informed the municipal authority that repaired the leaks and heavily chlorinated the water sources on 12 October. We observed that pipelines of both water supply systems were located in close proximity to open drains, which constituted the main sewage system of the locality. Water logging due to heavy rain was reported in Kulia Road area in the previous week. At that time, the canal overflowed and it's water got mixed with the accumulated rainwater.

Analytical study

Based on observations of the descriptive and environmental study (epidemic curve, clustering of cases, water use habit of the population, absence of any other exposure commonly shared by the people, leaks in the municipal pipeline and gradual termination of the outbreak following repair of the leaks and chlorination of water sources) we formulated the hypothesis that the outbreak to be a common source one; contaminated water supplied by municipality possibly being the source of infection. We tested the hypothesis in a cohort study.

The retrospective cohort study indicated that 490 (37.7%) of the population drank water supplied by municipality, 370 (28.4%) population water supplied by railway authority and 441 (33.9%) tube well water for drinking purpose. The attack rate among population drinking municipal water (23.9%) was higher (χ^2=49.8, df=1, p<0.0001) than the attack rates among persons drinking railway supply and tube well water. Attack rate among persons consumed water from railway supply was 1.3% and that of tube well water was 16.3%. Persons who drank water supplied by municipality were at higher risk (Relative Risk: 2.5; CI: 1.9-3.3) to develop cholera than the ones who drank water from railway supply or tube well (Table 2).

Laboratory study

All the seven rectal swab specimens grew *Vibrio Cholerae 01 El tor Ogawa*. The antibiotic sensitivity was tested for tetracycline, norfloxacin and ciprofloxacin. The strain was sensitive to all. All the seven water samples collected from different sources (after the chlorination) were of excellent grade i.e. 0/100 ml for total coliform, fecal coliform and fecal streptococce.

Discussion

Clinical epidemiological observations and laboratory findings suggest that the outbreak was caused by *Vibrio cholerae 01, El Tor Ogawa*. Other studies [6,7,9,10,23-28,30,31] also identified this strain causing outbreaks. The source of infection was possibly the

contaminated water supplied by municipality through the damaged pipeline. The local authority repaired the leaks in the pipeline as soon as those were identified, which led to the termination of the outbreak.

Cholera is transmitted almost exclusively through contaminated food or drinking water [21]. A review of the studies revealed that municipal areas supplied with inadequately chlorinated piped water are at risk for epidemic cholera [8, 10, 25]. The present outbreak occurred in a municipal area predominantly supplied with piped water from two systems and also two tube wells. It was observed that the incidence of cases was higher (92% of all cases) with clustering in the area supplied by municipal water and tube wells. We found that there were two leaks in the municipal pipeline, one proximal to the affected area and the other within. The pipelines are in close proximity to open drains. There was water logging for two days in Kulia Road due to heavy rain in the week preceding the outbreak, when canal water got mixed with rainwater accumulated in drains and roads. We suspected that the municipal water might be contaminated by drain water through these leaks. The gradual termination of the outbreak following repair of the leaks in the pipeline and chlorination of the water sources supported this notion. We considered the possibility of spreading the disease through tube well water contaminated due to water logging. However, it does not explain the high incidence and clustering of cases in Dharmanagar colony area, as there was no water logging and the residents of that area used solely the municipal water for drinking. All the above findings led to the hypothesis that municipal water may be the incriminated source of infection. Absence of any other exposure (like any social gathering where case-patients were exposed to community feast or to any particular food item) further strengthened this hypothesis. Significantly higher attack rate among population drinking water from municipal supply in reference to the attack rates among population drinking from other sources and a relative risk of 2.5 (95% CI: 1.9-3.3) support this inference. The higher attack rate (16.3%) among persons consuming tube well water and a relative risk of 1.15 (95% CI: 0.9-1.5) was possibly due to occasional and concomitant use of municipal water for drinking purpose, which has not been elicited by the study. Water logging might also contaminate tube well water sources, which we could not identify due to chlorination.

In North 24 Parganas such an outbreak of cholera spread through contaminated piped water is not uncommon. Between 1 January 2002 and 31 March 2004, nine outbreaks were documented due to *Vibrio Cholerae El Tor 01 Ogawa* out of 38 diarrhoeal outbreaks. Fifteen (40%) of those outbreaks occurred in eleven municipalities of Barrackpur sub-division (Population: 34 million), where piped water was the incriminated source of infection [32]. Kanchrapara municipality is one of them. These municipalities were created in the pre-independence era (before year 1947) as a consequence to industrialization along the river Ganges. Since then, population of that sub-division had increased substantially, but little had been done to upgrade and maintain the age-old water supply system. Absence of regular chlorination of supplied water by the municipal authorities increased the risk [32]. In this context, authorities may consider regular surveillance of the water pipelines coupled with prompt maintenance, phased replacement of the defective pipeline prioritizing the high-risk areas and regular chlorination of the water at source. It will, likely, reduce the occurrence of outbreaks and morbidity due to diarrhoeal diseases.

The present study is limited in two aspects. First, it has considered the predominant water use habit of the population as the exposure. However, the persons may drink water from multiple sources. Such mixed water use habit may confound the association elicited in the study. Second, the study failed to generate hypotheses considering exposures other than water use from different sources.

Based on the findings of the present investigation and the routine surveillance system, we recommended Kanchrapara municipal authority to thoroughly check water supply system and ensure regular water quality testing along with maintenance of desired chlorine level in water.

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Figure 1: Distribution of cholera cases by date of onset, Kanchrapara Municipality, North 24 Parganas District, West Bengal, India, 2004

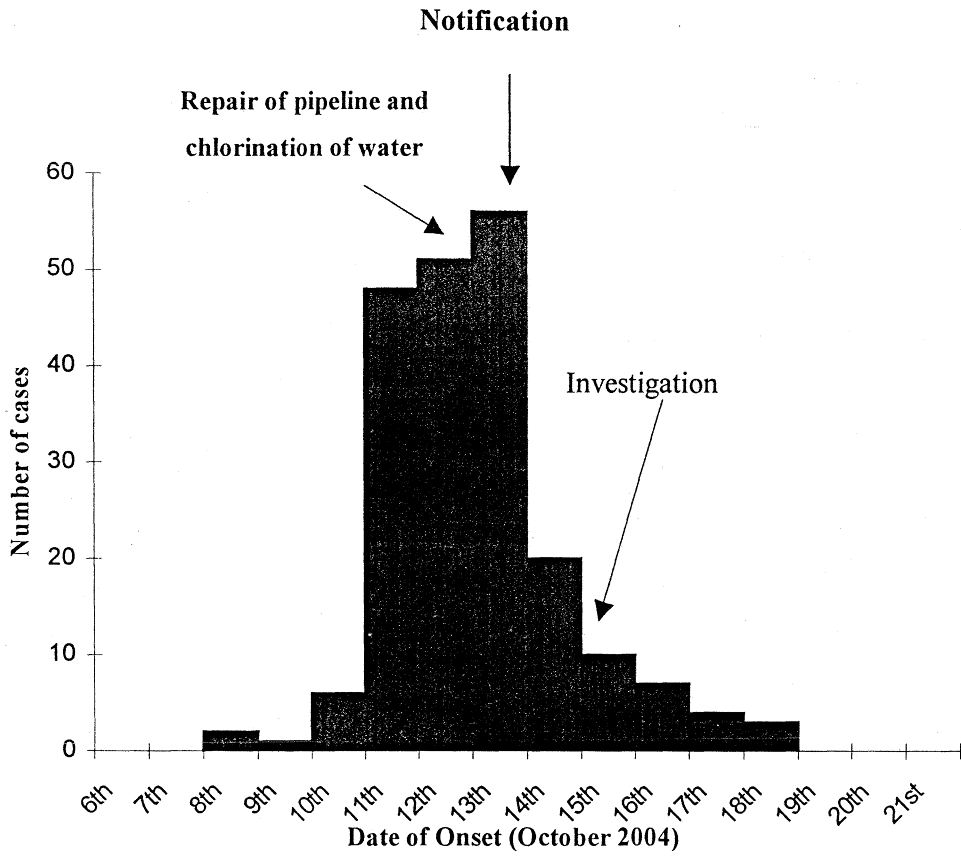


Table 1: Distribution of cholera cases by age and sex, Kanchrapara Municipality, North 24 Parganas, West Bengal, India, 2004

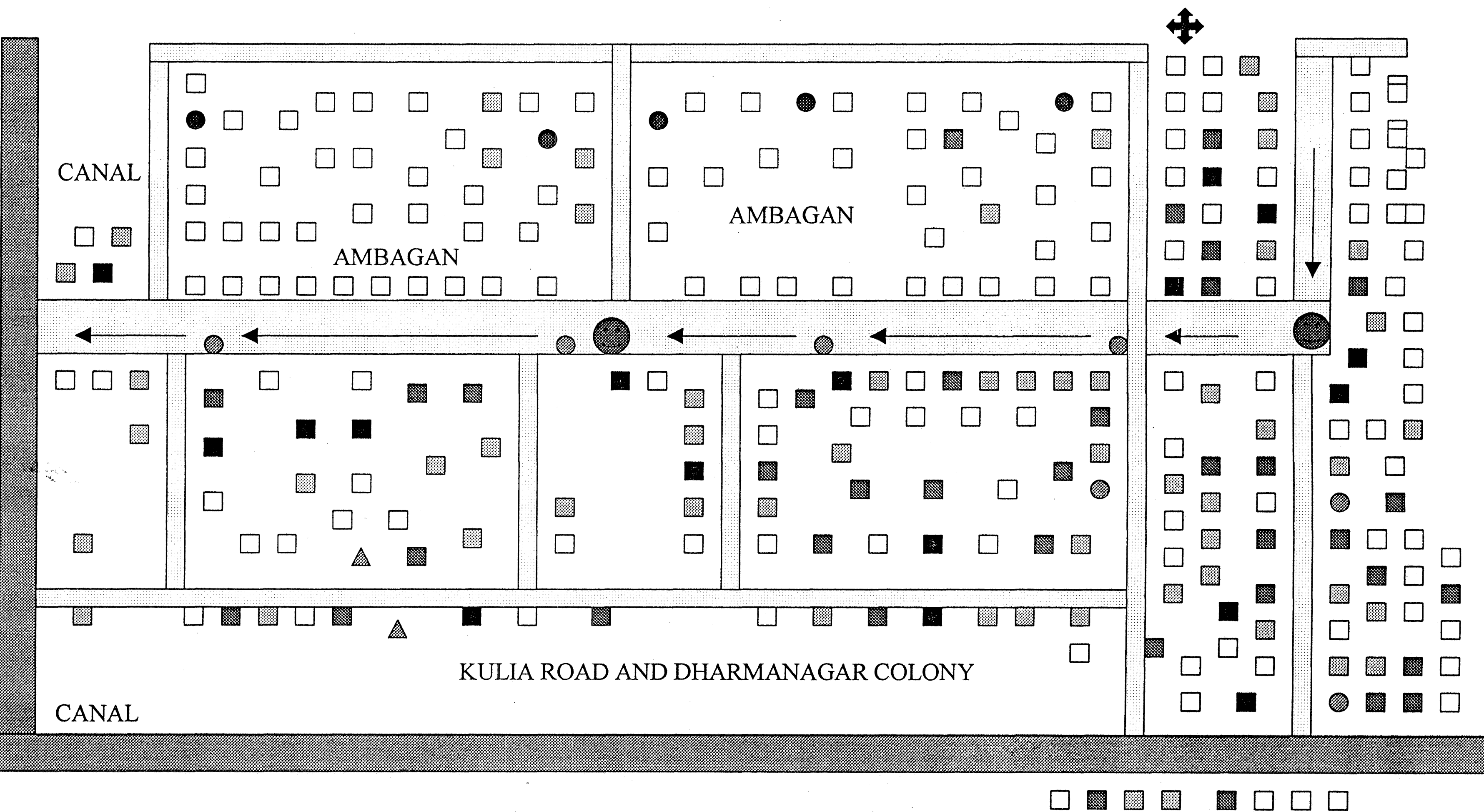
		Population	Cases	% of total cases	Attack rate (%)
Age in years	5-14	327	54	27.8	16.5
	15-45	748	105	54.1	14.1
	46-60	184	27	14.0	14.7
	>60	42	8	4.1	19.0
Sex	Male	696	105	54.1	15.1
	Female	605	89	45.9	14.7
Total		1301	194	100	14.9

Table 2: Attack rates among population exposed to different sources of water, Kanchrapara Municipality, North 24 Parganas District, West Bengal, India, 2004

Drinking water source	Population: With diarrhea	Population: Without diarrhea	Total population (%)	Attack rate (%)	Relative Risk	95% CI
Municipal tap water						
Exposed	117	373	490 (37.7)	23.9*	2.5	1.9-3.3
Not exposed	77	734	811(62.3)	9.5		
Railway tap water						
Exposed	5	365	370 (28.4)	1.3	0.07	0.03-0.2
Not exposed	189	742	931 (71.6)	20.3		
Tube well water						
Exposed	72	369	441 (33.9)	16.3	1.15	0.9-1.5
Not exposed	122	738	860 (66.1)	14.2		

*(χ^2=49.8, df=1, p<0.0001)

Figure 2. Distribution of cases (n=194) by place of residence, Kanchrapara municipality, North 24 Parganas, West Bengal, India, 2004



SECTION.4

CRITQUING AND REVIEW OF SCIENTIFIC LITERATURE

Critical Review of a Case Control Study of Screening Sigmoidoscopy and Mortality from Colorectal Cancer

1. Introduction

Joe. V. Selby and others had done a case control study on the efficacy of sigmoidoscopic screening in reducing mortality from colorectal cancer. They determined the frequency of screening by rigid sigmoidoscopy among cases and controls and compared it to reach the conclusion that a lower frequency of screening among those who died, thus providing evidence in support of a protective influence of screening on mortality.

Title of the study suggests that it is a highly relevant study as it would prevent or delay progression of carcinoma in the colorectal area.

Objective of the study was to test for an effect of screening on mortality from cancer.

2. Description of evidences

2.1. Exposure

In this study, the exposure was the periodic screening by rigid sigmoidoscopy for persons 45 years of age and older done at the facilities of the Kaiser Permanente Medical Care Program of Northern California (in Hayward, Oakland and San Francisco). 261 cases were selected that could have been detected by rigid sigmoidoscopy i.e. all cancers of the rectum and recto-sigmoid area and cancers of sigmoid colon that were visualized by rigid sigmoidoscopy or described as within 20 cm. from the anus on the basis of defined inclusion and exclusion criteria.

Same exposure status i.e. the use of sigmoidoscopy screening was assessed in 868 control subjects matched with the case subjects for age (within 1 year), sex and date of entry into the plan (within 1 year).

To deal with the possible confounders, information was collected from both cases and controls about 1) a history of adenomatous polyps or colorectal cancer before the 10 year review period, 2) a family history of colorectal cancer noted before the case was diagnosed, 3) a diagnosis of ulcerative colitis or hereditary polyposis at any time before the diagnosis of fatal cancer and 4) the number of personal health examination during the 10 year period under review.

A separate analysis was done with 268 cases having lesion above 20 cm. of anus i.e. not detectable by rigid sigmoidoscopy and compared the findings with that of respective control group.

2.2. Outcome

The outcome under investigation was the efficacy of sigmoidoscopic screening in reducing mortality from colorectal carcinoma in the study population. The initial hypothesis of the study was that a lower frequency among those who died would provide evidence in support of a protective influence of sigmoidoscopic screening on mortality. The major outcome of the study was:

1. A significantly ($p=<0.0001$) smaller proportion of cases (8.8%) than controls (24.2%) had undergone screening by rigid sigmoidoscopy during the 10-year period (Table 1).
2. The number of sigmoidoscopy was strongly correlated with the number of periodic health examinations ($r=0.50$) in the control group, and to a lesser extent with the number of rectal examinations ($r=0.34$) and occult blood tests ($r=0.13$).
3. The Odds ratio after being adjusted for the potential confounders was 0.41 implying a 59 percent reduction of mortality (Table 2).
4. The association did not differ significantly according to sex and age at diagnosis.
5. Little evidence of the efficacy of the screening was found among the fatal colorectal cancer cases and their controls, where lesions were beyond the usual reach of the rigid sigmoidoscope.
6. A screening sigmoidoscopic examination every 10 years was found as efficacious as tests that are more frequent.

7. Sigmoidoscopy sounds reasonable as it saves cost without affecting quality of care.

2.3. Design

It was a case control study.

2.4. Study Population

Case subjects included medical care program members 45 years of age and older who were found to have adenocarcinoma of the colon or rectum (within 20 cm. from the anus) between 1971 and 1987 and who died of the cancer by the end of 1988. Persons with less than 1 year of membership before diagnosis were excluded. By examining medical records of all 1712 patients, 261 patients of fatal colorectal carcinoma were enlisted as 'case' subjects.

The diagnostic criterion was by histology. The criteria of selection of cases sound reasonable.

It was decided that four control subjects would be drawn per case from the same medical care program membership lists matched with the case subjects according to age (within 1 year), sex and date of entry into the health plan (within 1 year). Each control subject had to be alive and member of the health plan when the case subject died.

Subjects with history of adenomatous polyp or nonfatal colorectal cancer were rightly included in the control group, though clarification of such inclusion was not given.

However, for some case subjects, fewer than four controls met all the matching and inclusion criteria. The composition of the control group was as follows: 136 with 4 controls, 81 with 3 controls, 37 with 2 controls and 7 with 1 control. Maximum increase in the sensitivity in the contrast between cases and controls is obtained when 4 controls per case is considered.

Finally, 868 patients were enlisted as 'control' subjects.

In a separate analysis, 268 patients having fatal cancer beyond 20 cm. from the anus and similar number of control patients were compared.

2.5. Main Results

Table 1: History of screening tests during the 10-year period before the diagnosis of fatal cancer within reach of the rigid sigmoidoscope in the case subjects

Variables	Case subjects (N=261)	Control subjects (N=868)	P value
	Screening sigmoidoscopy – No. of subjects (%)		
0	238 (91.2)	658 (75.8)	
1	16 (6.1)	118 (13.6)	< 0.0001
> 1	7 (2.7)	92 (10.6)	
Mean no. of screening digital rectal examination	1.64	2.50	< 0.0001
Mean no. of screening occult blood tests	0.18	0.40	0.003
Mean no. of periodic health check up	1.3	2.5	< 0.0001

Table 2: Odds of having had at least one screening sigmoidoscopy during the 10-year period before the diagnosis of fatal cancer in the case subjects

Adjustment	Case subjects (N=261)	Control subjects (N=868)	Odds ratio (95% CI)
Cancer within reach of the sigmoidoscope		**Number (%)**	
Unadjusted	23 (8.8)	210 (24.2)	0.30 (0.19-0.48)
H/O colorectal cancer or polyp, F/H of colorectal cancer	--	--	0.25 (0.16-0.42)
H/O colorectal cancer or polyp, F/H of colorectal cancer, no. of periodic health check up	--	--	0.41 (0.25-0.69)
Cancer above reach of the sigmoidoscope			
Unadjusted	56 (22.9)	67 (25.0)	0.80 (0.54-1.19)
H/O colorectal cancer or polyp, F/H of colorectal cancer	--	--	0.80 (0.54-1.19)
H/O colorectal cancer or polyp, F/H of colorectal cancer, no. of health check up	--	--	0.96 (0.61-1.50)

Table 3: Screening sigmoidoscopy in case subjects and controls during the 10 years before the diagnosis of fatal cancer within reach of the sigmoidoscope in the case subjects

Years before diagnosis	No. (%) undergoing sigmoidoscopy		Matched Odds ratio (95% CI)
	Case (N=261)	Control (N=868)	
0-2	6 (2.3)	68 (7.8)	0.28 (0.12-0.65)
2-4	10 (3.8)	73 (8.4)	0.43 (0.22-0.87)
4-6	9 (3.4)	89 (10.3)	0.33 (0.16-0.67)
6-8	6 (2.3)	72 (8.3)	0.25 (0.11-0.60)
8-10	5 (1.9)	59 (6.8)	0.26 (0.10-0.66)

Table 4: Most recent screening sigmoidoscopy in case subjects and controls before the diagnosis of fatal cancer within reach of the rigid sigmoidoscope in the case subjects

Years before diagnosis	Case (N=253)	Control (N=762)	Matched Odds ratio
	Number (%)		(95% CI)
1-2	4 (1.6)	27 (3.5)	0.41 (0.14-1.22)
3-4	5 (2.0)	20 (2.7)	0.74 (0.27-2.01)
5-6	5 (2.0)	30 (4.2)	0.44 (0.17-1.15)
7-8	1 (0.4)	27 (3.2)	0.11 (0.01-0.83)
9-10	1 (0.4)	21 (3.2)	0.12 (0.02-0.93)

3. Non-causal Explanations

3.1. Bias

The most persuasive scientific evidence for the benefit of a cancer screening comes from randomized controlled clinical trials (RCT) where the end point is a reduction in mortality from (or incidence of) the disease of interest. Three RCTs of fecal occult blood test for early detection of colorectal cancers involving more than 250,000 people showed consistent results [1-5]. For other colorectal cancer screening methods, i.e., sigmoidoscopy, colonoscopy, barium enema etc., there is no adequately completed trial that provides a valid estimate of the effect of screening. It is likely that all are effective. However, the extent to which they reduce mortality (or incidence) is not known. Thus it is difficult to

accurately assess the cost-effectiveness of those tests or to determine the appropriate screening interval.[6]

A randomized trial would require a very large number of subjects, a long duration or both to detect any appreciable reduction in mortality. Non-compliance would have been another problem in such study. Case control approach, despite its certain limitations, could be recognized as an efficient alternative design for the evaluation of screening tests and preventive maneuvers.

Present study was a case control study. There have been case control studies [7-15] on sigmoidoscopy screening and all have suggested a benefit. Although the U. S. Preventive Services Task Force determined that the evidence from case–control studies of sigmoidoscopy was sufficient to include this test in their screening recommendations, they did not specify a screening interval [16]. Present study concluded that sigmoidoscopic screening every 10-year is as efficacious as more frequent tests.

A fundamental problem of case control study is selection bias, which occurs because those who are screened are self-selected and those who have not been screened have refused the offer of screening or for some other reason have not been offered screening. As screening is not randomly assigned in a case control study, selection factors related to both the likelihood of undergoing a screening sigmoidoscopic examination and the risk of dying from colorectal cancer might confound estimates of efficacy. In general, case control studies may over-estimate the effectiveness of the screening test relative to the RCT. Demisse et al.[17] compared results from RCTs for breast cancer screening with result from case control studies of breast cancer screening and found that the case control studies provided statistically significant lower risk estimates (i.e. they demonstrated a more favorable screening effect) than the RCTs.

However, in the present study control subjects were selected not because the lives had been saved, but also they were representative of the general population (matched with case subjects according to age and sex). The purpose was to determine the deficit of screening among the case subjects relative to that in the population from which they came. Moreover, the absence of a comparable deficit of screening among the case subjects who had fatal colon cancers above the reach of the rigid sigmoidoscope provided

a strong argument that confounding based on self-selection factors did not explain the association.

There was no mention of the estimated sample size of the study. However, all known fatal cases in the population were ascertained. Therefore, biases of ascertainment, selection, or detection seemed unlikely.

At least, in case of 7 out of 11 patients whose fatal cancers were diagnosed within three years after a negative screening, the lesions arose in the part of the bowel judged to have been visualized and free of tumors. The lesions were either missed or developed and progressed to an incurable state within one to three years.

3.2. Confounding

Several possible confounding factors were recorded in the study. These included a history of adenomatous polyp or colorectal carcinoma before the 10-year period, a family history of colorectal cancer noted before the cancer was diagnosed, a diagnosis of ulcerative colitis or hereditary polyposis at any time before the diagnosis of the fatal cancer, the number of health examinations during the 10-year period.

However, different life style factors like smoking, dietary habits, physical activity profile and socio-economic status might be the other confounders in this study, which had not been taken into account. No such data was found from the medical records. The potential for selection bias (or confounding) is illustrated in a study by Stanley et al.[7], in which people who reported having a screening sigmoidoscopy were more likely to consume a diet higher in folate, fiber and calcium and lower in red meat and fat than people who reported having no screening sigmoidoscopy. Kavanaugh et al.[8] found similar associations. These issues can be addressed provided the investigators collect data on life style factors that could confound the relationship between screening and the disease and consider those factors in analysis.

In this case control study, data was analyzed and Odds ratio and Confidence interval were calculated for understanding association. On the whole, these data is worthy for analysis. The unadjusted Odds ratio was 0.3 (0.19-0.48), which when adjusted for the confounders (a personal or family history of colorectal cancer or polyps), the estimate of risk

decreased to 0.25 (0.16-0.42). When it was further adjusted for the number of periodic health examinations, the estimate of the Odds ratio increased to 0.41 (0.25-0.69).
History of ulcerative colitis was a potential confounder in this study. Nothing was mentioned to neutralize this confounder.

4. Positive features of causation

4.1. Internal Validity

All the features of causation showed that most likely the sigmoidoscopic screening as done in this case control study had a protective effect in the reduction of mortality from colorectal cancer by facilitating early diagnosis and intervention. Moreover, the study design depicts that cases and controls were similar in relevant factors by matching and analyses were done to assess the confounding effect of some variables. However, dose response relationship and specificity were not fully established. It had definite possibility of being confounded by different life style factors.

4.2. External validity

No mention is made in this paper about the representativeness of the 40-50 years and older persons registered with the Kaiser Permanente Medical Care Program of Northern California (in Hayward, Oakland and San Francisco) with reference to the population in Hayward, Oakland and California. So it is difficult to generalize results to the population beyond those registered.

5. Ethical aspects of the study

Only ethical aspect of the study was confidentiality of information. That should have been briefly mentioned in the present paper.

6. Limitations of the study

Authors mentioned about the non-availability of the data on various life style factors, which might have some influence on the outcome of the study. The low frequencies of

repeat screening in both the case subjects and the controls posed serious limitations in comparing various screening intervals directly.

7. On the inference of the study

The consideration of screening by flexible sigmoidoscope, by which 60 cm. from the anus could be visualized, is encouraging. It was concluded that sigmoidoscopic screening every 10-year is as efficacious as more frequent tests. Considering the dynamics of development of colorectal carcinoma, the logic is hardly acceptable. Newcomb et al.[18] attempted to address this issue of screening interval in a population-based case–control study of individuals' aged 20–74years. The results suggested that the incidence of distal cancers was reduced by 70% among those reporting a single screening sigmoidoscopy and by 76% among those who ever had a sigmoidoscopy (including those who had multiple screening tests). This effect was observed for up to 7 years for the single test and for up to 10 years for any test. The observed incidence reduction in the distal colon would translate to an overall incidence reduction of 35%–42% from a single test, assuming that 50%–60% of cancers are detectable by sigmoidoscopy. Adjusting for noncompliance and possible biases (if this was possible) might further reduce this estimate. A further consideration is the age group that Newcomb et al. studied. Case patients were 20–74 years old. Current screening recommendations apply to people 50 years old or older. Extrapolating the findings from the Newcomb et al. study to a population that was 50 years old or older would further reduce the overall screening effect because the percentage of lesions beyond the reach of the flexible sigmoidoscope appears to increase with age *(32,33)*, thus a greater percentage would be missed in the older population.

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Critical Review of a Prospective Study on the Effect of Home-based Neonatal Care and Management of Sepsis on Neonatal Mortality

1. Introduction

Abhay T Bang and others had done a study on the effect of home-based neonatal care and management of sepsis on neonatal mortality through a field trial in 86 villages of Gadchiroli district in Maharashtra, India during 1993 to 1998. During 1993 to 1995, baseline data had been collected in the study area. The proper interventions took place in 39 villages in phased manner from 1995 to 1998, where as 47 villages in the same area had been taken as control villages.

2. Description of evidences

2.1. Exposure

In this study, exposure or intervention was a package of home-based neonatal care applied to the neonates of 39 intervention villages of Gadchiroli district in Maharashtra in a phased manner over a period of 3 years (April, 1995 to March, 1998).

In the first year (1995-96), female village health workers listed pregnant women in the village, collected data by home visits in the third trimester, observed labor and neonates at birth, visited the home on days 1, 2, 3, 5, 7, 14, 21, 28 and on any other day if the family called, to take history and examine mother and child, weighted the child each week, and managed minor illnesses and pneumonia in the neonates. They followed up the neonates for 28 days after birth, until the mother left the village, or until the neonate died, whichever was earlier.

In the second year (1996-97), after a survey of 280 parents, the female workers were trained in home-based management of neonatal illnesses. They used to diagnose sepsis on the basis of certain laid down criteria described in the paper and offered at home after written consent Injection Gentamycin twice daily in doses according to body weight for 7 to 10 days and Syrup cotrimoxazole twice daily for 7 days. They gave such care from April1996 and managed neonatal sepsis from September 1996, in addition to earlier tasks.

In the third year (1997-98), health education of mothers and grandmothers about care of pregnant women and of neonates was added to the program.

2.2. Outcome

The outcome under investigation was neonatal mortality rate of the intervention and control villages.

The initial hypothesis of the study was that the intervention would reduce the neonatal mortality rate by at least 25% in 3 years. Primary outcome was Neonatal Mortality Rate and secondary outcome was Infant mortality Rate and Perinatal Mortality Rate.

In the third year, 93% of neonates received home-based care. Neonatal, Infant and Perinatal mortality rates in the intervention area (net percentage reduction) compared with the control area were 25.5 (62.2%), 38.8 (45.7%) and 47.8 (71.0%) respectively ($p<0.001$).

Case fatality in neonatal sepsis declined from 16.6% (163 cases) before treatment to 2.8% (71 cases) after treatment ($p<0.01$).

In 1997-98 such care averted one death (fetal or neonatal) per 18 neonates cared for.

2.3. Design

It was a non-randomized community field trial.

2.4. Study Population

Neonates of 39 intervention and 47 control villages of Gadchiroli district in Maharashtra during April 1995 to March 1998 are the study population.

2.5. Main Results

Table 1: Effect of intervention on mortality rates

Indicators	Intervention Area				Control Area			
	Baseline (1993-95)	*Year 1 (1995-96)*	*Year 2 (1996-97)*	*Year 3 (1997-98)*	*Baseline (1993-95)*	*Year 1 (1995-96)*	*Year 2 (1996-97)*	*Year 3 (1997-98)*
Crude Birth rate*	25.4	25.3	19.8	23.7	26.6	24.5	21.1	24.4
Still Birth Rate#	32.0	32.4	34.8	25.9	23.6	41.1	36.9	44.0
Early Neonatal mortality rate@	37.5	32.5	31.1	22.5	42.3	51.2	33.0	49.6
Late Neonatal mortality rate@	24.5	18.7	5.0	3.1	15.4	14.0	17.0	9.9
Neonatal mortality rate@	52.0	51.2	36.1	25.5	57.7	65.2	50.0	59.6
Infant mortality rate@	161	74	38	38	175	96	64	83
Perinatal mortality rate@	68.3	63.8	64.8	47.8	64.9	90.2	68.7	91.5

Data are number except * per 1000 population, # per 1000 births, @ per 1000 live births

Table 2: Change in case fatality by birth weight and maturity in Intervention Area

	CF (%) 1995-96	CF (%) 1996-97	CF (%) 1997-98	% Change in CF (1995-96 to 1997-98)	P
			Birth weight (g)		
<1500	69.2 (9/13)	46.2 (6/13)	25.0 (4/16)	-63.9	0.045
1500-1999	29.5 (18/61)	8.5 (4/47)	10.6 (5/47)	-64.1	0.033
2000-2499	3.7 (9/246)	1.6 (4/243)	1.6 (4/258)	-56.8	0.230
2500 or above	0.2 (1/417)	0.5 (2/365)	0.9 (5/574)	+350.0	0.395
Unknown	11.5 (3/26)	0 (0/17)	22.2 (4/18)	-	
			Gestation (Wks)		
<34	51.7 (15/29)	12.5 (3/24)	33.3 (7/21)	-35.6	0.315
35-37	21.7 (10/46)	5.7 (3/53)	2.8 (2/72)	-87.1	0.003
>37	2.1 (14/673)	1.7 (10/597)	1.4 (11/801)	-33.3	0.398
Unknown	6.7 (1/15)	0 (0/11)	10.5 (2/19)	-	
Total	5.2 (40/763)	2.3 (16/685)	2.4 (22/913)	-53.8	0.003

Table 3: Change in cause specific neonatal mortality rate in the intervention area (1995-96 to 1997-98)

Cause of death	Neonatal mortality rates*		Absolute change in rate	Change (%)
	1995-96	1997-98		
Prematurity	7.9	6.6	-1.3	-16.5
Birth asphyxia	10.5	5.5	-5.0	-47.6
Neonatal sepsis	27.5	6.6	-20.9	-76.0#
Other	1.3	1.1	-0.2	-15.4
Not known	5.2	4.4	-0.8	-15.4

* Per 1000 live births, # p = < .005

Table 4: Neonatal Mortality Rate (NMR) and Relative Risk in Intervention and Control Area, 1995 to 1998

Year	NMR in Intervention area	NMR in Control area	Relative risk
1995-96	51.2	65.2	0.8
1996-97	36.1	50.0	0.7
1997-98	25.5	59.6	0.4
1995-98	37.8	58.6	0.6

Basic descriptive tables given by the authors did not show causes of death in the control area, so it could not be compared with that of intervention area.

3. Non-causal Explanations

3.1. Observation bias

The study is a non-randomized trial. It was done with the help of a NGO – Society for Education, Action and Research in Community Health (SEARCH). The field research area comprised of 100 villages already under care of SEARCH. It comprised of an action area of 53 villages and an adjacent control area of 47 villages.

The methodology of choosing the action and control area has not been mentioned. There is a possibility of selection bias as the villages were selected in a non-random manner.

Inclusion and exclusion criteria were not specified clearly. Intervention area was the action area of that NGO and exclusion of villages from the intervention area was done based on low population and non-availability of suitable female health worker.

However, the baseline data collected from the intervention area (39 villages), control area (47 villages) and the excluded villages (14 villages) from the intervention area were similar.

Impact of refusals and lost to follow up cases on the study were not described in detail.

The possibility of further observation bias was taken care of in the study design by clearly defining live births, neonatal deaths and infant deaths according to International classification of diseases.

The female health workers were trained from October 1994 to March 1995 to take histories of pregnant women, observe the process of labor, and examine the neonates as well as record findings. They were also trained to detect and manage a case of pneumonia among children including neonates.

However, there could be measurement bias as information collected by village women of 5-10 years school education. Variation in educational level may affect the quality of data collection.

3.2. Confounding

Probable confounders might be characteristics related to socio-economic conditions, access to existing health facilities, birth weight and period of gestation. Other possible

confounders could be cultural differences if any, educational status of mother, gravida status before delivery, history of previous still birth or loss of baby etc.

During baseline survey it had been found that the socio-economic characteristics in the intervention and control area were more or less similar. It was unlikely that those had changed so radically between the two components of the study population during the study period of 3 years that it influenced the mortality rates. However, no information in this regard had been furnished. The same argument may be applied on the issue of access to existing health facilities.

There is no information whether there was any ongoing program of awareness generation activity on MCH care by the general health system in the study area and whether there was any disparity between the dissemination of such messages between intervention and control area. It is important as it might influence the mortality rates.

It was also observed that during the 3 years of study number of neonates below 1500 grams were more or less same, whereas % change in CF in this group during the same period was significantly lowered by 63.9% ($p = 0.045$). In the birth weight group of 1500-1999 grams, the number of neonates reduced considerably from 1st year (61 in 1st year, 47 in 2nd & 3rdyears). It can be applied to the subsequent groups. So, it can be concluded that during these 3 years, proportion of LBW babies had not changed significantly, where as case fatality of LBW babies had changed significantly at least up to 2000 gram of birth weight. In this context, it is unlikely to act as confounders in those weight groups.

So far as period of gestation is concerned, the absolute numbers of neonates born under 34 weeks of gestation in the study period were not widely different and % change in CF was also not statistically significant. In 35-37 weeks group, absolute numbers of neonates had increased every year and % change in CF was also statistically significant. The proportion of neonates born after 37 weeks of gestation varied between 87% and 89% from 1st year to 3rd year. The change in CF was not statistically significant. In this context, it may be concluded that period of gestation is unlikely to be a confounder in this study.

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Data on other possible confounders e.g. cultural differences, educational status and gravida status of mother before delivery, H/O of previous stillbirth or loss of baby etc. most possibly had not been collected and so their effects could not be assessed.

4. Positive features of causation

4.1. Time relationship

It was observed during 3 years study period, the status of NMR, IMR in intervention villages decreased considerably with the passage of time in comparison with the baseline level, where as in the control villages most of the indicators deteriorated during the same time period. In this context, it can be said that specific intervention of neonatal home based care, which preceded such change in the intervention villages had an appropriate temporal relationship with the outcome achieved.

4.2. Strength

At the inception of the study, it was hypothesized that the intervention would reduce the NMR in the intervention villages at least by 25%. The sample size had been calculated with that understanding. At the end of the study, the result in the 3rd year showed that it had decreased by around 50%. It established the robustness of the intervention. Percentage changes in the NMR, IMR and PMR in the intervention villages in comparison to the control villages were statistically significant.

Moreover, the year wise relative risks of neonatal mortality in the intervention area in comparison to the control area showed that it had steadily decreased from 0.8 in the 1st year to 0.7 in the second year and finally 0.4 in the 3rd year. The RR was 0.6 if whole of the study period was taken into account. It established without doubt the profound beneficial effect of the home-based neonatal care in reducing the NMR in the study area.

4.3. Dose response

The intervention was done in a phased manner in the action area as described earlier. It was observed that with the increase in the level of intervention in successive years, the NMR (51.2, 36.1, and 25.5), IMR (74, 38, and 38) and PMR (63.8, 64.8 and 47.8) had improved more and more in the intervention villages.

4.4. Consistency

As mentioned by the authors, there are very few studies on home-based neonatal care available to compare the results of this study. Two preliminary reports of similar studies from Guatemala and Slums of New Delhi showed similar results. The authors did another study in the same district. They managed the neonatal sepsis by cotrimoxazole and injection gentamycin. The study showed considerable decrease in the case fatality. An uncontrolled field study near Pune, India of detection of high-risk neonates and home-based management of pre-term babies (not management of sepsis) showed decrease in case fatality by 25.1%.

Moreover, it has been presumed that by this intervention the reduction of NMR in the action area would be by at least 25%. At the end of the study, it was found to be around 50%, much in excess than what had been presumed.

All these supported the view that the present study had adequate consistency in relation to internal and external validity.

4.5. Specificity

The intervention was designed in three phases – in the first year by observing labor and neonates at births, home visits at regular interval examining mother and child, recording weight and treating minor illnesses, in the second year by home-based management of neonatal illnesses including sepsis and in the third year by health education to mothers and grand mothers about the care to pregnant mothers and neonates. Though most of the socio-economic factors including female literacy were more or less similar between intervention and control villages, there was no mention about the level of environmental hygiene and the knowledge of the parents (mother, in particular) about the need of

cleanliness and asepsis in neonatal care between the intervention and control villages. These factors could influence the NMR and IMR.

To conclude, specificity of the intervention had not been fully established in this study.

4.6. Summary of internal validity

All the features of causation showed that most likely the intervention as done in this field trial had a causal relation in reduction of NMR, however, it had certain possibility of confounding by birth weight and other factors and lacked specificity to some extent.

4.7. External validity

To the eligible population

The coverage by the interventions were 75.1% in the 1st year, 85.2% in the 2nd year and 93.3% in the 3rd year with very few losses to follow up. However, impact of refusers and loss to follow up cases were not described in detail.

In spite of these weaknesses, the study indicated that it had considerable validity among the eligible population.

To the source population

The general information showed that the related indicators of the study area were more or less similar to those of the country as a whole. However, it mostly represented the underprivileged section of the society. The findings of this study had a good chance of replicability among this section of the society. Whether the outcome would be similar among the better privileged could not be ascertained from this study.

4.8. Consistency

Not an adequate number of studies had been found to test the consistency of this study with full satisfaction. However, the available limited studies showed results consistent with the findings of the present study.

4.9. Specificity

Time sequence, progressive improvement with additional technical input, strength of association taken together lends support to specificity. In this context, the study has adequate specificity.

4.10. Plausibility

Neonatal sepsis is one of the major causes of neonatal death in our country. The management of the neonatal sepsis as done in this study is according to scientific principle. Apart from the active management of sepsis since 2nd year, intervention in the 1st year by close monitoring, taking weight of the neonates and in the 3rd year by imparting health education to mothers and grand mothers have a rational basis in the process of reduction of neonatal mortality.

So, it can be concluded that the outcome due to interventions as done in this field trial had adequate biological plausibility.

4.11. Summary of external validity

As the results of the study showed that it had a high validity among the neonates hailing particularly from the lower socio-economic group, it is likely to apply to the neonates of the general population having the same socio-economic characteristics.

5. Ethical aspects of the study

Ethical aspects were not mentioned in detail in the document. It being an important area particularly in respect to a non-randomized control trial should have been described in detail.

6. Limitations of the study

Authors did not mention limitations of the study in the document under review and so could not be assessed.

7. On the inference of the study

Authors intended to generalize their findings for all developing countries. Probably this cannot be done as a number of factors are involved in it, like variability in accessibility of health care and acceptability of intervention done, variability in cultural differences, literacy and awareness status, economic factors. The perspective of diagnosing sepsis (septicemia, pneumonia and meningitis) by the health workers having primary and secondary educational level and treating them in the field condition for 7-10 days with multidose injectable antibiotic need to be considered with utmost care before being implemented in the community.

An injectable drug like Gentamycin might be used (not a single dose regimen) as an intervention to control sepsis in field condition for a specified population for a specified time. But, most possibly it could not be implemented in a mass program that would be implemented throughout the country.

Use of cotrimoxazole between 0 and 2 months raises the question of rational use of drug and safety of the neonates.

Authors concluded that this intervention is cost effective and so can be replicated in other developing countries. It needs to be evaluated further.

SECTION.5

PRESENTATION

Investigation of a cholera outbreak in Panihati municipality, North 24 Parganas district, West Bengal, India, July 2003

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ABSTRACT

Introduction

Twenty-seven outbreaks of diarrhoeal diseases were reported during January'02 – March'03 in North 24 Parganas district. Following reports of 14 cases in July 2003 from Bosepukur-Baruapara area of Panihati municipality, North 24 Parganas district, West Bengal, we investigated the outbreak on 31st July 2003.

Methods

We described the Epidemiology of the outbreak. We defined a case as the occurrence of three loose or watery stools in any person living in Bosepukur-Baruapara area and its neighborhood between 20 July and 31 July 2003 and used it for identification of cases by door-to-door search. We collected stool and water samples for bacteriological analysis. We then compared the incidences of disease in affected area and its neighborhood.

Results

Cases were reported from 20 July to 31 July 2003 with a peak on 29. Distribution of cases over time suggested a common source outbreak. A total of 41 cases and 0 death was reported (Attack rate: 5.4%) in Bosepukur-Baruapara area. 71% cases presented with severe dehydration, mean duration of illness being 2.9 days. There was clustering of cases in some households. Environmental assessment identified damage in the drinking water pipeline. The attack rate, 5.4% (41/753) in the area exposed to drinking water distal

to the damage in the pipeline was significantly (?^{2}=20.2, degree of freedom=1, p<0.00001) higher than the attack rate, 0.9% (5/561) in the area proximal to the damage. *Vibrio Cholerae 01 El Tor Ogawa* in stool samples and faecal coliforms in water samples were identified.

Conclusions

The outbreak was caused by Vibrio Cholerae 01 El Tor Ogawa, possibly transmitted through water supply contaminated because of damage in the pipeline. The local authority repaired the damaged pipeline immediately, which led to the termination of the outbreak.

We recommended review of the water supply and sanitation system including quality control and monitoring, strengthening of the disease surveillance.

Keywords

Outbreak, Cholera, El Tor vibrio, Watery diarrhoea, contaminated water supply

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