FIELD PROJECT REPORTS

By

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CERTIFICATION

This is to certify that all the field projects submitted in this bound volume are the original works carried out by Dr. Jagannath Sarkar during the two field postings of six months duration each under the guidance of the faculties of the National Institute of Epidemiology (ICMR), Chennai. This is in partial fulfillment of the requirements for the degree of Master of Applied Epidemiology.

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DIRECTOR

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FIRST FIELD POSTING

Situation Analysis of Jalpaiguri district West Bengal India, 2006.

Introduction

I am a medical officer of the West Bengal public health and administrative cadre, was posted as the block medical officer of health, malbazar block, the superintendent, mal sub divisional hospital, and Assistant chief medical officer of health, mal bazar in the district of Jalpaiguri, West Bengal five years prior to joining the Master of Applied Epidemiology course in National Institute of Epidemiology (under Indian Council of Medical Research) Chennai. In the district I was public health administrator and was responsible for public health including communicable and non-communicable diseases, vital statistics and prevention of food adulteration.

During the two years of my MAE-FETP course at National Institute of Epidemiology, Chennai, I have got technical inputs through residential contact sessions of a total of six months at intermittent intervals. These will cover topics like basic epidemiology, biostatistics, disease surveillance as well as prevention and control of communicable and non-communicable diseases. During the hands-on practical field postings at three six monthly intervals in Jalpaiguri district, West Bengal, I was involved in the planning and execution of epidemiologic projects of immediate relevance to the public health needs in consultation with the district health administration as per course calendar.

As a part of field projects during the first field posting, I have carried out

A) Situational analysis of the district Jalpaiguri. The objectives of the situational analysis of the Jalpaiguri district, West Bengal were to (1) describe the geographic and demographic features (2) identify the major public health priorities (3) describe the laboratory resources available, the organizational structure and functioning of the health system and (4) outline the health care indicators with reference to the Millennium Development Goals(MDG).

Methods

We visited the office of the Chief medical officer of health, Jalpaiguri district, West Bengal, India, to understand the organizational set up of health system in the district. We obtained data on geographic and demographic features of the district from the district public health office and other offices of the district as well. We calculated the projected population for the year 2006 on the basis of the 2001 census and taking into account an annual population growth rate of 2.14% for the district. The population details including age, sex, race, socioeconomic categories was calculated as per the proportion of population in the different age groups, sex and other categories in the year 2006. We obtained information on the laboratory services at the different levels of health care from the district public health office. We collected data from different sources to outline the health and health related indicators at the country, state and district levels as per the Millennium Development Goals (MDG). We reviewed the different survey reports including the Reproductive and Child Health (RCH) Surveys for 1998 to 2005, National Family Health Survey (NFHS) – II and the Sample Registration System (SRS) report (2005) to obtain the different health care indicators. We referred to the reports of international bodies like the WHO, UNICEF, UNAIDS, World Bank and the report of the Secretary General of the United Nations on Millennium

Development goals for obtaining health care indicators at different levels. We reviewed different publications including the Health on the March (2005-2006) brought out by the State Bureau of Health Intelligence, Government of West Bengal and the West Bengal Human Development Report (2005) to obtain the reports on various diseases. We visited the offices of the district public health and family welfare programme officers and reviewed the annual reports of the different health programmes for the years 2005 and 2006 to obtain reports on the different diseases in the district. We visited the some of the sub-centers, the primary health centers, the block primary health centers, the rural hospitals, sub-divisional hospitals as well as the district hospital in the district Jalpaiguri to observe and gain information on the routine procedures. We identified the major public health priorities of the district based on the morbidity and mortality rates of the different diseases in consultation with the district health stakeholders and available departmental reports. We identified the potential topics for my MAE-FETP assignments in consultation with the district health authorities. We reviewed the number of sub-centers that were in place in the district as against the norm of one sub-centre per 5000 population in rural areas.

Results

General presentation of the location

The Jalpaiguri district is the northern district of the West Bengal State. It has three sub-divisions namely Jalpaiguri, Alipurduar and Malbazar. It is bounded by the Sikkim State of India and its sides touching Nepal, Bhutan, Bangladesh countries and the Darjeeling and Cooch Bihar district of West Bengal. Climate is typically tropical. The tea industry, tourism, forestry and agriculture are the main economic resources. It had a total population of 3401173 in 2001, projected population 3973930 in 2006 and a total land area of 1,256.6 square miles.

Population

Based on the population figures of the 2001 census and the annual population growth rate of 2.14% for the district of Jalpaiguri, the population of the district was projected as 3973930 in 2006 with scheduled cast 36.7% and scheduled tribe 18.9%. Socio economically, the above poverty level (APL) population 33% and below poverty level (BPL) population were 67%. The district has a population density of 546 persons per square km with 82% people living the rural areas and 18 % living in the urban areas. With respect to religion, 83.3% are Hindus, 4.34% Christians and 10.85% Muslims. The sex ratio is 942 females per 1000 males. Among total population male constitutes 51.50% and females 48.50%.

Laboratory resources

Primary level:

Laboratory facilities are usually available only from the block primary health centre level and above. In most of the block primary health centers, malaria slides and sputum for acid-fast bacilli are examined. In some, routine blood, stool and urine examinations are also done. The primary health centers that are functioning as microscopy centers under the Revised National

Tuberculosis Control Programme (RNTCP), sputum for acid-fast bacilli in a routine procedure.

Secondary level:

At the rural, state general and sub-divisional hospitals and district hospital, the laboratory tests available are including routine blood (e.g. TC, DC, Hb%, ESR, Sugar, bilirubin, malarial parasite examination, urine and stool tests), basic biochemical and serological tests and Gram stain. The sub-divisional hospitals of subdivision Alipurduar, malbazar and the district hospital Jalpaiguri conduct bio-chemical, serological and hematological tests, blood, cerebro-spinal fluid, urine and stool culture and anti-microbial sensitivity testing. A voluntary counseling and testing centre (VCTC) for HIV is available at the district hospital Jalpaiguri.

Tertiary level:

The North Bengal medical college and hospital at Shushrut nagar, which is 55 kilometers from Jalpaiguri, the tests facilities available are :- bio-chemical, serological and hematological tests, blood, cerebro-spinal fluid, urine and stool culture ,anti-microbial sensitivity testing, tissue biopsy. Bone marrow examination for confirmation of kalaazar is done at the North Bengal medical college and hospital. A centre for voluntary HIV counseling and testing and prevention of mother to child transmission of HIV are available at the medical college. The medical college also has facilities for histopathological examinations.

State level laboratory:

For virological studies (e.g. dengue, Japanese encephalitis, west Nile, chikungunia, hepatitis A/B/C/D/E and HIV), special bacteriological tests (e.g. leptospira antibody study) and protozoal studies (e.g.hydatid cyst disease, direct agglutination test for kalaazar) samples are sent to the School of tropical medicine, Kolkata that works as a State level laboratory.

Central level laboratory:

For acute flaccid paralysis surveillance, stool samples are sent to the Indian Institute of Serology in Kolkata, which is the World Health Organization (WHO) accredited laboratory for the Eastern region of India. For cholera and enteric diseases (mainly for rotavirus, detection of the bacterial strain and serotyping for cholera), samples are sent to the National institute of cholera and enteric diseases (NICED) in Kolkata. For specific virological studies that are available in Kolkata (e.g. measles) serum institute at kid row WHO accredited laboratory, and also samples can be sent to the National institute of virology in Pune. For other studies not done in Kolkata (e.g. Weil-Felix test for scrub typhus), samples are sent to the National Institute of communicable diseases in New Delhi.

The potential projects that could be undertaken with the help of the district hospital that include (1) investigating outbreaks of diarrhoeal diseases due to Salmonella, Shigella, and Cholera (e.g. hanging drop test, culture and sensitivity), (2) investigating outbreaks of measles, (3) investigating outbreaks of malaria, (4) investigating outbreaks of dengue/scrub typhus/measles/anthrax and (5) study of iodine deficiency disorders.

Major public health priorities:

Acute diarrhoeal diseases, tuberculosis and malaria are the three major public health problems in the Jalpaiguri district of West Bengal, India. Though the incidence of acute diarrhoeal diseases and its mortality rate have declined considerably over the years with increased access to potable water, improved sanitation and wide use of oral dehydration solutions (ORS) during acute attacks of diarrhea, they continue to remain a major public health problem. Following the institution of directly observed treatment short course (DOTS) under the Revised National Tuberculosis Control Programme (RNTCP) for tuberculosis in the district since December 1995, and the enhanced malaria control programme in the malaria prone Jalpaiguri district in 2006, the respective disease load and disease specific mortality is expected to come down. In the tuberculosis, prevalence of tuberculosis in district, state and country was 83%, 59% and 50% respectively. Tuberculosis mortality rate was 7.4, 4, 31 per 100.000 populations in district, State and Country respectively. 100% of the patients captured under DOTS in the district, same for the State is 80% and in the country 47%. Cure rate in district was 87%, State 86% and Country 83%.Success rate was 81%, 80% and 77% in the district, State and country respectively. New sputum positive tuberculosis detected 85%, 73% and 74% in the district, State and in Country respectively. In case of malaria, the district is highly endemic with reported API as high as 23.5 per 1000 population, annual blood slide examination rate 21.3 %, and malaria deaths was 1.6 per 100,000 case patients with 97 malaria deaths in 2006. The increasing proportion of plasmodium falciparum cases 40.4% and compounded by resistance in more than 10 percent cases to chloroquine is a challenge. This drug resistant for malaria and entomological study for malaria vectors was organized by the State health team during 2004 in the district. They reported that the district had chloroquine resistant falciparum malaria and anopheles dirus as one of the vectors species in some area near by forests. Availability of potable water access 55.6%, 83.5% and 58% of the population from district, State and Country respectively.

Organization of the health system

The directorate of health services (DHS), West Bengal was created with effect from 15 August 1947. In November 1947, the health centre scheme for rural areas was initiated in the State to provide school hygiene, register vital events, prevent and control communicable diseases, promote health education, improve environmental sanitation and ensure maternity and child welfare. In 1985, the multi-purpose health scheme was initiated to integrate all National health programmes. Presently, the different National Programmes are running through disease based societies. At the district and blocks, health and family welfare bodies have been formed to supervise and monitor the different health care activities.

The chief medical officer of health (CMOH) is the district health authority with his office at Jalpaiguri. At the district level the chief medical officer of health is assisted by three deputy chief medical officers of health designated as deputy chief medical officer of health – I, II and III. Their functions are outlined in the flow chart depicting the health set-up in the Jalpaiguri district. The district had 537 sub-centers in place against a requirement of 795 as on 2006 (one sub center for 5000 population as per G.O).

As a medical officer on training (MAE-FETP) I have been placed under the chief medical officer of health, Jalpaiguri with office support at sub-.divisional hospital, Malbazar.

Organization of the health system of Jalpaiguri, West Bengal:

The chief medical officer of health (CMOH), Jalpaiguri is the overall in charge and responsible for the health care delivering system of the district. The Director of health services (DHS) of the State and District health and family welfare samity, Jalpaiguri guided him. The District health and family welfare samity is headed by the Savadhipati, Jalpaiguri-Zila Parishad as Chairman, the District Magistrate, Jalpaiguri as Vice-chairman and the chief medical officer of health as member secretary and other members from respective department took decisions on policy making, planning and implementation of different health activities as per guidance from State and National level. For assisting chief medical officer of health at the district level there are health officials namely Dy. chief medical officer of health-I (responsible for looking stores, vehicle and administration). Dy. chief medical officer of health-II (responsible for looking public health programmes), Dy. chief medical officer of health-III (responsible for looking reproductive and child health (RCH) programmes), Zonal leprosy officer (ZLO), District immunization officer and District tuberculosis officer(DTO). One asst. chief medical officer (medical and administration) was looking on accounts and day-to-day administration with guidance of the chief medical officer of health. The Superintendent who is accountable to chief medical officer of health, administers sadar hospital. At the sub-divisional level, Assistant chief medical officer of health (ACMOH) are responsible for discharging health care services in the sub division. Superintendents of the sub divisional hospital are directly accountable to chief medical officer of health of the district. The Block medical officer of health (BMOH) is overall responsible for discharging curative and preventive services in the community block. The chief medical officer health, Asst. chief medical officer of health (Sub division) and block health and family welfare samity (registered under society act of West Bengal Government) guided him to take decision and implementation of progrmmes in the block. Other medical officers (for curative and preventive services) assisted him for discharging services. Block public health nurse, block sanitary inspector, malaria inspector, social welfare officer and computer also assisted him for discharging preventive services. PHC medical officer posted as head of each primary health center (PHC) cover a population of 30,000-40,000 for health services. PHC medical officer is assisted by the health supervisor male and female for the health services. A sub center is the basic unit of preventive activity and it covered a population of 5000. Health assistants female and male discharged the public health services. Within a sub center there are some supporting personnel for every 1000 population namely anganwadi workers, community health guides, trained dhais, beneficiary mobilizers, alternate vaccine carriers and accredited social heath activists (ASHA) to help health staffs in organizing health activities in respective areas.

Weakness: some lacknesses of health system in the district are high population density, health assistant female absent in some sub centers, poor community awareness in health issues and the established sub centers are not at per Government guide line. Remote and inaccessible forests and hilly areas causing barrier of providing health services in the district.

Strength: To overcome weaknesses following steps has been taken from the State, Department of health. Untied funds allotted for capacity building and infrastructure development in the district. Non Government organization (NGO)'s and volunteers are identified and adopted to co-operate with health staffs. Panchayetee raj and general administration are also involved in health programmes. Community participation in health services involved as "Jana uddyogey jana swasthya".

Indicators towards the millennium development goals:

India has been able to make improvements since 1990. In 2006 by decreasing the prevalence of underweight children to 48.78%, under 5 mortality rates to 59.6 and 74.3 per 1000 children in State and Country respectively. The infant mortality rate 36 per 1000 in the district, 38 per 1000 in the State and 57 per 1000 in the Country. the measles vaccination coverage has been increased up to 87.95%, 87.71% and 67% in the district, State and Country respectively. Proportion of births by skilled birth attendants to 7%. From the health indicators available for West Bengal and the Jalpaiguri district, the district situation is better with respect to some of the indicators, though the comparison of the different indicators for the state and the district with what stood in 2006 could not be done in the absence of some data. At the district level, we generated indicators based only on data from the public health sector. The initiatives of the Government in the health sector, the Millennium Development Goals (MDG) with respect to prevention of underweight children, under 5 mortality, infant mortality rate, maternal mortality rate, proportion of one year old children immunized against measles, proportion of births attended by skilled birth attendants.

Discussion

The Jalpaiguri district, which consists of tea gardens, forests, hill and plain areas, has a slightly different disease profile in the areas due to the different socioeconomic and climatic conditions. The district has a reasonable organizational structure of the health system. Though it has the laboratory networking facilities for diagnosis of priority diseases at the primary health care level, the facilities need to be extended. The major public health problems of the district are control and prevention of tuberculosis, waterborne diseases, including acute diarrhoeal diseases, and malarial incidence and deaths.

The district has got trained health personnel from the secondary level up to the sub-centre level. The sub-center is the lower most strata of the public health care set-up. However, the number of sub-centers in place is 32% short than that is actually required as per the Government guidelines. As shortage of sub-centers is likely to affect the implementation of the different health programmes at the village level, there is the need to have more sub-centers.

There are no facilities for routine blood, stool and urine examination at some of the block primary health centers. The laboratory technician is posted in some of the primary health centers to tests malaria blood slides and Sputum for acid fast bacilli for DOTS only. There is the need for extending facilities for routine blood, stool and urine tests at the primary health care level. The Integrated disease surveillance project (IDSP) that is currently being introduced in the State. It recommends that the malaria slides to be tested in peripheral laboratories, including Primary health centers (PHC), block primary health centers (BPHC) and rural hospitals (RH).

Most of the indicators with respect to the millennium development goals, for the Jalpaiguri district, were estimated from data obtained only from the Government health units, as health related data from private health care institutions are still not available to the Government system. The millennium development goal health indicators available are those for immunization status, infant mortality rate, maternal mortality rate, antenatal and natal care, malaria, tuberculosis. However, indicators, especially those related to HIV/AIDS, prevalence of underweight children, proportion of people with uncomplicated malaria getting treatment for malaria as per guidelines within 24 hours of symptoms, percentage of pregnant women who have taken treatment for malaria, proportion of malaria cases treated in private sector and proportion of population having access to essential drugs on a sustainable basis are not available at present. There is the need to improve our capacity for data collection, collation, analysis and reporting of the different diseases and diseased conditions to enable us to generate most of the indicators with respect to the millennium development goals.

Our study had one limitation. We abstracted the morbidity and mortality rates of various diseases on data available only from the public health sector at the district level. The data from private sector are not included. As such we may underestimate the different disease rates. However, as more than 80% of in-patient care is provided by the public health facility in West Bengal, our estimates of the disease rates would be fairly near to the actual occurrence of events.

The district health facilities has reasonable infrastructure and personnel for generating reports on most of the health care indicators related to the millennium development goals. However, it needs to enhance the number of sub-centers at the rural level for better implementation of the different public health programmes. There is the need to extend routine laboratory facilities at the primary health care level to facilitate management of common diseases and correct reporting. We need to provide training to the concerned health personnel at different levels for increasing knowledge of useful health care indicators to help us for planning and implementation of health interventions effectively as well as monitor and evaluate the outcome.

During my MAE-FETP experience, I plan to (1) share my experiences with my colleagues and guide the health personnel in data collection, compilation, analysis, outbreak detection, investigation and surveillance (2) arrange for early detection, reporting, investigation and control of outbreaks (3) arrange for the coordinated appraisal of the different health indicators at regular intervals and appropriate interventions at the district level and (4) work on different priority diseases during my different field assignments related to the MAE-FETP course.

Table 1: Characteristics of the population of the Jalpaiguri, West Bengal, India, 2006.

Population group	Population size	Proportion of the total
Population 0-4 years of age	427992	10.77%
Population 5-9 years of age	527341	13.27%
Population 10-14 years of age	521777	13.13%
Population 15- 19 years of age	386663	9.73%
Population 20-24 years of age	331823	8.35%
Population 25-29 years of age	336989	8.48%
Population 30-34 years of age	296058	7.45%
Population 35-39 years of age	297250	7.48%
Population 40-44 years of age	218566	5.50%
Population 45-49 years of age	181609	4.57%
Population 50-54 years of age	84700	3.03%
Population 55-59 years of age	91003	2.29%
Population 60-64 years of age	81863	2.06%
Population 65years and above	154586	3.89%
Male population	1927356	51.50%
Female population	2046574	48.50%
Population above poverty level	1311396.9	33%
Population below poverty level	2662533.1	67%
General caste	N/A	N/A
Schedule caste	1458432	36.70%
Schedule tribe	751073	18.90%
Other backward caste	N/A	N/A
Total population size	3973930	100

Table 2: Key public health priorities in Jalpaiguri district, West Bengal, India, 2006

Public health priority	Key elements	Ongoing prevention and control programmes
Acute diarrhea diseases	Cumulative annual incidence rate of 27 per 1000 population in 2004. Acute diarrhoeal disease mortality rate of 11 per 1000 population	Diarrhoeal disease control programme according to WHO recommendations since 1980. National oral rehydration therapy programme since 1985-86
Tuberculosis	In 2005 % estimated new smear positive cases detected 111 per lacs population Tuberculosis mortality rate of 7.4 per 100,000 population	Directly Observed Treatment Short Course (DOTS) under the Revised National Tuberculosis Control Programme since 1995.
Malaria	Cumulative annual incidence rate (API) of 23.5 per 1000 population in 2006.Annual blood examination rate was 21.3% Proportion of Plasmodium falciparum cases exceeding 40%. Reported malarial deaths are 97 in 2006 More than 10% of the Plasmodium falciparum cases were Chloroquine resistant. Specific malaria mortality rate of 1.8 per 100,000 population	National Anti-Malaria Programme(NAMP) since 1990. National Vector Borne Disease Control Programme (NVBDCP) since 2006. Enhanced Malaria Control Programme with the support of the global fund for AIDS, tuberculosis and malaria has launched in the district.

Chart- 3: Flow chart of health administration – Jalpaiguri district, West Bengal, India 2006

The chief medical officer of health.

District Tier

ACMOH (PH &FW)&DTO **ACMOH(Medl&Admen)** **ACMOH(Sadar)** **ACMOH(APD)** **ACMOH(Mal)** **DPHNO-Jalpaiguri**

Dy CMOH-I **Dy CMOH-II** **Dy CMOH-III** **DLO** **DMCHO**

Block Medical Officer of Health.

MO BPHC **MO PHC** **BSI** **SWO** **MI** **BPHN** **SI** **PHN**

Gram Panchayat Tier.

HS (M) **HS (F)**

HM(M) HA (F)

Sub-centres Level

CHG,TD, Beneficiary mobilizer , Alternate Vaccine Transporters, Link Person

DDC/ FTD

Village Level

(+) Beneficiary Mobilizer/ Alternate Vaccine Transporters / Link Person / DDC(drug depot centre)/ FTD(fever treatment depot). Other than public sector private health facilities are as follows: Medical practitioners- Allopath- 78, Homeopath- 237, Ayurbed- 51, RMP (Registered medical practitioner)- 339. Laboratory- high facility11, medium- 29, minimum facility- 107. nursing homes- 13. Tea gardens hospitals- 51, Railways hospitals- 5. Charitable health centers- 8.

Abbreviations: -

ACMOH (PH &FW)& DTO =Assistant chief medical officer of health(public health and family welfare and district tuberculosis officer.

ACMOH(Medl&Admen)= Assistant chief medical officer of health(medical and administration)

ACMOH (Sadar)= Assistant chief medical officer of health (sadar)

ACMOH (APD)= Assistant chief medical officer of health(Alipurduar)

ACMOH (Mal) =Assistant chief medical officer of health (Mal)

DPHNO= District public health nurse of Jalpaigur

Dy CMOH-I=Deputy chief medical officer of health- I

Dy CMOH-II=Deputy chief medical officer of health- II

Dy CMOH-III =Deputy chief medical officer of health- III

DLO =Ditrict leprosy officer

DMCHO=district maternity and child health officer

MO BPHC=medical officer, block primary health center

MO PHC = medical officer, primary health center

BSI = block sanitary inspector

SWO = social welfare officer

MI = malaria inspector

BPHN = block public health nurse

SI = sanitary inspector

PHN= public health nurse

HS (M) = health supervisor (male)

HS (F) = health supervisor (female)

HW (M)= health worker (male)

HW (F)= health worker (female)

TD = trained dhai

CHG = community health guide

DDC = drug depot center

FTD = fever treatment depot.

Table 3: Indicators of progress for the health related millennium development goals, in the Jalpaiguri District of West Bengal, India, 2006.

Goal	Indicator	Values of the indicators: Jalpaiguri District (2006)	State of West Bengal (2006)	India (2006)
Goal 1	Prevalence of underweight children < 5 years of age	N/A	48.7%	47%
	Proportion of population below minimum level of dietary energy consumption	N/A	N/A	24%
	% of children 6-59 month of age who received one dose of vitamin A in the past six months	N/A	43.4%	27%
	Proportion of infants under six months who are exclusively breastfed*	N/A	48.8%	37%
Goal 4	Under-five mortality rate (2005)	N/A	59.6 per 1000 live births	74.3 per 1000 live births (2005-06)
	Infant mortality rate (2006)	36 per 1000 live births	38 per 1000 live births	57 per 1000 live births
	Measles immunization among children under one (2006-07)	87.95.%	87.71%	67.%

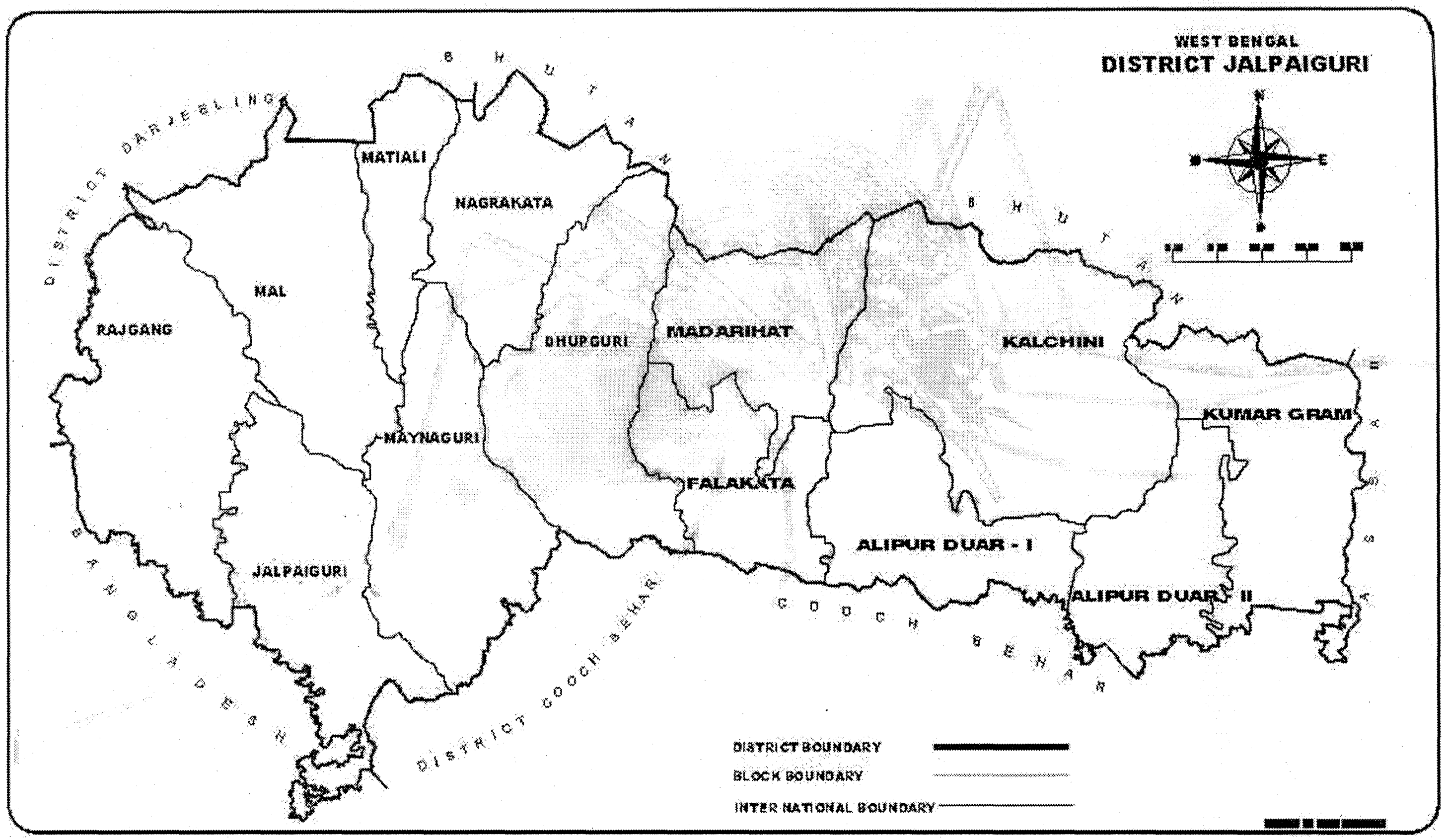
*

Goal 5	Maternal mortality ratio	N/A	14.8 per 100,000 live births	27.4 per 10,000 live births
	Proportion of births attended by skilled health personnel	N/A	44.2%	42.3%
	Contraceptive prevalence rate in %	51.5	66.6	47.0
	% of women receiving antenatal care	51.3%	90%	65.4%

Goal 6 (HIV)	HIV prevalence among 15-24 years old pregnant women[†]	0.024%	0.50%1	0.7%
	Condom use rate of the contraceptive prevalence rate	N/A	N/A	N/A
	Number of children orphaned by HIV/AIDS	N/A	N/A	1.2 million
	% of people using a condom during most recent higher risk sexual encounter	N/A	N/A	59.0%
	% of clients with Sexually Transmitted Infections (STIs) who are diagnosed and treated according to guidelines	N/A	N/A	N/A
	Percentage of HIV-positive women receiving anti-retroviral treatment during pregnancy to prevent mother to child transmission of HIV	N/A	N/A	N/A
Goal 6 (Malaria)	Malaria mortality rate	1.60 per 100,000	0.37 per 100,000	0.087 - 3.0 per 100,000
	Proportion of people with uncomplicated malaria getting correct treatment at the health facility and community levels, according to the national guidelines, within 24 hours of the onset of symptoms	N/A	N/A	N/A
	Percentage of pregnant women who have taken chemoprophylaxis or drug treatment for malaria	N/A	N/A	N/A
	The proportion of households having at least one insecticide treated bed nets	N/A	N/A	20.0%

	Prevalence of tuberculosis	83 per 100,000	59 per 100,000	50 per 100,000
	Tuberculosis mortality rate	7.4 per 100,000	4per 100,000	31 per 100,000
Goal 6 (TB)	Proportion of tuberculosis cases detected through DOTS approach	100%	100%	47.0%
	DOTS cure rate	87%	86%	83%
	DOTS success rate	81%	80%	77.0%
	Percentage of estimated new smear-positive tuberculosis cases registered under the DOTS approach	85.7%	73%	74.0%
Goal 7	Proportion of population with sustainable access to an improved water source (urban and rural)	55.6%[2]	83.5%[2]	80.0%
	Proportion of urban population with access to improved sanitation	69.8%[2]	63.6%[2]	58.0%
Goal 8	Proportion of population with access to affordable essential drugs on a sustainable basis	N/A	N/A	0-49%

Map-I. Boundary Map of district Jalpaiguri with block demarcation.



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Secondary data analysis of surveillance data of malaria, Jalpaiguri district, West Bengal, India, 1992 -2006.

Introduction:

Malaria is a protozoal disease caused by infection with genus plasmodium and is transmitted to humans by bite of some species of infected female Anopheline mosquitoes.[1] Malaria is endemic in the poorest countries in the world.[2] According to the World health organization (WHO), the annual global burden of malaria was 300 to 500 million clinical cases occurrence with more than one million deaths worldwide during the year 2005.[2] Tropical Africa is estimated to account for more than 90% of all the malaria cases in the World. Of the remaining cases, 75% are concentrated in nine countries: India, Brazil, Afghanistan, Sri Lanka, Thailand, Indonesia, Vietnam, Cambodia and China.[2]

India accounted for 60% of the total number of malaria cases of south-East Asia Region (SEAR) in 2006.[2] In India on average 1000 malaria deaths were reported annually in last five years. Malaria is common in all the parts of the country except in areas with an elevation exceeding 1300 meters above sea level. Orissa, Andhra Pradesh, Madhya Pradesh, West Bengal, Assam, Arunachal Pradesh, Mizoram and Rajasthan are the malaria-affected states of India. The proportion of plasmodium falciparum (PF) among malaria cases reached ~47% in 2003 in the country. The National Malaria Control Programme (NMCP) operates under the National Vector- Borne Disease Control Programme (NVBDCP) in 5-year strategic plans (current plan 2002–2007) and coordinates strategic decisions with the national technical advisory committee on malaria and with state health authorities.[7] The National anti-malaria programme (NAMP) has four main components. First, cases are detected as early as possible by active and passive surveillance. Second, malaria patients receive radical treatment with chloroquine and primaquine. Third, the vector is controlled through indoor residual spray (IRS) with DDT and larvivorous fish's cultivation. Fourth, health education promotes personal protection methods, including insecticide-treated bed nets (ITBN) promotion and use.[3, 7]

The national health policy of 2002 reinforced the commitment to malaria control and set a goal to reduce malaria mortality by 50% by 2010 and the efficient control of malaria morbidity. After the implementation of the NAMP, nationwide, the reported incidence of laboratory-confirmed cases has declined from 3.0 million in 1996 to 2.1 million in 2001 and to 1.78 million in 2003.[9] However, there was no further decline in the trend of malaria. About half of the malaria cases are caused by plasmodium falciparum.

The State of West Bengal is not highly endemic for malaria. The state accounts for six and three percent of the total malaria and plasmodium falciparum cases respectively of the country. However, certain districts like Jalpaiguri, Purulia, Cooch Bihar and Kolkata are endemic for malaria.

The annual parasite incidence (API) in Jalpaiguri has been increasing since 2003. Two outbreaks occurred in the district during 2003 and 2006 with 149 and 97 deaths respectively.[9] Against this background, we analyzed malaria surveillance data for the year 1992 to 2006 in order to direct the control measures. The objectives of the analysis were to (1) estimate the malaria burden (2) examine trends of malaria incidence (3) calculate monthly outbreak threshold for the district and (4) propose recommendation for malaria control in the district.

Methods:

We analyzed the malaria surveillance data of the district Jalpaiguri for the year 1992 to 2006,

Study population: According to the census report 2001, the population was 3,401,173.[6] The projected population for the year 2006 was 3,973,930 considering the growth rate of 1.64%.

Case definition: We defined a case of malaria as the fever cases diagnosed as (1) "suspect cases, all fever cases without any obvious causes (2) "probable cases" RDK test positive for malaria" or clinically with sign and symptoms of malaria by clinician (3)"confirmed cases" microscopically presence of malaria parasites on slides, in a resident of Jalpaiguri district, West Bengal, India between 1992 and 2006.

Malaria indicators: We calculated the following indicators of malaria:

(1) Annual blood examination rate (ABER): dividing the total number of blood slides examined for malaria by the total population under surveillance and expressed it as a percentage. This parameter reflects the coverage of the case detection by the programme. A minimum of 10% of population per year is recommended for blood examination by the National anti malaria Programme.

Health department targeted 20 active blood slides collection for every health worker per month in the district.

(2) Annual parasite incidence (API): dividing the total number of slide positive malaria cases in a year by the total population under surveillance and expressed it per 1000 population. This parameter depends on the annual blood examination rate. If the annual blood examination rate is adequate (at least 10%), then it is the most important criteria to assess the progress of the malaria control programme. It is also used to determine the areas to be brought under DDT spray operations (recommended in areas with annual parasite incidence exceeding two per 1,000 populations).

(3) Slide positivity rate (SPR): dividing the total number of slides positive for malaria by total number of blood slides examined and expressed as a percentage. It is more reliable than the annual parasite incidence (API) to assess the malaria control programme in areas where the annual blood examination rate (ABER) fluctuates from year to year.

(4) Proportion of plasmodium falciparum (PF %): dividing the total number of slide positive for plasmodium falciparum malaria by the total number of malaria positive slides and expressed as a percentage. Increase in the proportion of plasmodium falciparum cases indicates the need for intensification of intervention measures to combat plasmodium falciparum infections that are primarily responsible for malaria related mortality of the district.

(5) Case fatality rate due to falciparum malaria (CFR of P.F): proportion of deaths occurred due to falciparum malaria, calculated as number of total malaria deaths divided by total falciparum cases multiplied by hundred.

We also calculated, **Epidemic thresholds for malaria:** Using the historical data method proposed by WHO.[7] we determined the outbreak alert threshold for each month as the mean plus two standard deviation (The monthly threshold values captured 95% of the malaria cases in normally distributed data). We calculated the monthly malaria outbreak thresholds on the basis of the number of cases of malaria reported in the Jalpaiguri district during 2001-2005. We graphically represented the monthly average of the district malaria cases and the monthly epidemic thresholds of malaria outbreak.

Descriptive epidemiology: We graphically represented the seasonal trend of overall and *falciparum* malaria by plotting the average incidence of malaria cases per month between 2001 and 2005. We represented the geographical distribution of malaria in the district through a map showing the average yearly incidence of malaria in the different blocks in 2006.

Results

Malaria indicators:

Number of blood slides collected: The total number of blood slides collected increased from 167,265 in the year 1992 to 785,593 in the year 2006. There was a peak in 2003 during which 842406 blood slides were collected.

Malaria Incidence over time:

The API increased from 7.5 per 1,000 populations in 1992 to 23.5 per 1,000 populations in 2006. The annual blood examination rate (ABER) increased from 5.8% in the year 1992 to 21.3% in 2006 (Fig 2). The proportion of slides positive for P. falciparum ranged from 13.5% (1998) to 50% (2003). The case-fatality among PF cases ranged between 1.2% (2002) to 6.6% (1993) (Table-1). Maximum API of 35 per 1000 was in the year 2003 (Fig-1). Cases of malaria were reported from all months with peak during July, August and September. This coincided with the rainy season in the area (Fig 2).

Incidence by area

During 2006, 91 of the 149 Gram Panchayets (GP) in the district were high risk (API of 2 or more). 38 GPs among 58 GPs, which had API of less than 2 in 2005, became high risk areas in 2006 (map-1 and 2), 35 GPs among 91 high risk GPs in 2005 became not high risk in 2006, forming 94 GPs were high risk in 2006. Out of 13 blocks in the district, 10 blocks had API of more than 10 in the year 2006. We observed that the blocks are of bordering with Cooch Bihar and Darjeeling district of West Bengal, Assam State, Bhutan and Bangladesh countries that is endemic for malaria (Fig 3).

Deaths in the district by age and sex

Malaria deaths occurred in all age groups. Over all death rates was 1.2, ranged from 0.9 to 1.6 per 10,000 populations in the district. Deaths rates were higher among individuals aged 5 to 9 years (1.6 per 10,000 population) and males (1.2 per 10,000 population) (Table-2).

Discussion

Analysis of the malaria surveillance data for 1992-2006 indicated a rising trend of malaria in the district. All the blocks in the district were high-risk blocks with API of 2 or more. Ten of the 13 blocks had API of 10 or more. A large proportion of malaria cases are due to P. falciparum.

The Annual Parasite Incidence in the district increased three-folds over last 15 years. This increase in API was unlikely to have been secondary to any artifact. There was no significant change in the population size. Surveillance practices improved with an annual blood examination rate that increased from 5.8% in 1992 to 21.3% in 2006.[9] The slide positivity rate which is not affected by the intensity of case detection, also increased over last 15 years, thereby indicating increasing trend of malaria transmission in the district. The geographical distribution of API indicated that all the blocks in the district are at risk of malaria, among them 91 gram panchayets were high risk with API of more than 2 and or deaths. 58 of total 149 gram panchayets (GP) that were not at high risk in 2005, 48 of them have become high risk gram panchayets with API of more than 2 and or with deaths in 2006. 45 GPs among 91 high risk GPs in 2005 have become not high risk making a total of 94 high risk GPs in 2006.[5]These findings indicate that there is need for strengthening malaria control activities in the district.

The proportion of plasmodium falciparum cases exceeded 40% in 2006.[5] This could be due to mass use of chloroquine and primaquine. Mass presumptive treatment with chloroquine and primaquine may selectively destroy the gametocytes of plasmodium vivax resulting in the predominance of plasmodium falciparum (PF %) that is resistant to these drugs. In 2004, drug resistance studies revealed that ~10% of the plasmodium falciparum cases in the district were resistant to chloroquine.[4] The increasing proportion of plasmodium falciparum cases and the reported plasmodium falciparum resistance to chloroquine had predisposed the district to increase severe malaria and deaths. In the district malaria affected all age groups, suggesting a low level of immunity against malaria in the population.

Very little information is available about the predominant vectors of malaria in the district and their resistance to insecticides. Entomological studies conducted in 2004 revealed that Anopheles dirus was one of the main vectors of malaria in forests and tea gardens areas of the district. Since these mosquitos used to bite during daytime and does not rest indoor, indoor residual spray might not be effective for control of this vector. Since large proportion of population (~30% of district population) is residing in areas of tea gardens and nearby the forest,[8] malaria control in these areas needs to focus on early diagnosis and prompt treatment of fever cases and personal protection measures.

Considering large number of malarial deaths and revealed drug resistance, the first line of anti-malaria drugs for management of malaria in district was changed from chloroquine + primaquine to SPACT (artemisinine based combination therapy) in the RDK test positive cases. For this purpose RDK supplied to use from sub centre level to higher facilities. Rising trend of ABER over last 15 years was indicates increased blood slide collection in the district. The monthly epidemic outbreak thresholds would be useful for early warning signals that triggered timely prevention and control measures resulting in the early management of the outbreak.

In conclusion, malaria is on the rise in Jalpaiguri district. This rise may be explained by a combination of a breakdown in vector control measures and management failure. The increasing proportion of chloroquine resistant plasmodium falciparum cases aggravates this situation. Overall, the area is now at risk for malaria outbreaks and deaths.

On the basis of these finding, we formulated a number of recommendations. First, strengthen malaria control activities in 10 highly endemic blocks of the district. Second, adequate supply of RDK and artemisinin-based combination therapy (SPACT) to be made available in all health facilities including sub-centers. Investigate to know the risks factors associated for the malaria deaths in the district

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Table 1: Slides collected and positive for plasmodium species with operational indicators for the malaria programme, Jalpaiguri district, West Bengal State, India, 1992-2006

				Plasmodium falciparum		Plasmodium vivax		Total infections				
Years	Population	Total blood slide examined	Annual blood examination rate(ABER)	Number of slide positive	Proportion of the positive slides (%)(SFR)	Number of slide positive	Proportion of the positive slides (%)	Number of slide positive	Slide positivity rate(SPR) %	Annual parasite incidence per 1000(API)	number of deaths	PF case fatality rate per 1000 PFcases
1992	2860475	167265	5.8	7142	33.4	14261	66.6	21403	12.8	7.5	40	5.6
1993	2921689	160664	5.5	5334	30.9	11914	69.1	17248	10.7	5.9	35	6.6
1994	2984213	266911	8.9	10792	25.6	31434	74.4	42226	15.8	14.1	35	3.2
1995	3048075	205532	6.7	7668	22.3	26775	77.7	34443	16.8	11.3	18	2.3
1996	3113304	232509	7.5	8925	28.6	22239	71.4	31164	13.4	10	26	2.9
1997	3179938	170821	5.4	2239	14.6	13143	85.4	15382	9	4.8	6	2.7
1998	3247979	189055	5.8	2187	13.5	14006	86.5	16193	8.6	5	13	5.9
1999	3217486	303702	9.4	12987	33	26402	67	39389	13	12.2	42	3.2
2000	3388480	260,459	7.7	6543	31.9	13989	68.1	20532	7.9	6.1	16	2.4

2001	3401173	380,112	11.2	15673	46.1	18327	53.9	34000	8.9	10	38	2.4
2002	3456952	583,397	16.9	34832	44.5	43514	55.5	78346	13.4	22.7	42	1.2
2003	3513646	842,409	24	62159	50	62159	50	124318	14.8	35.4	189	3.0
2004	3571270	681,774	19.1	44815	35.9	80097	64.1	124912	18.3	35	88	2.0
2005	3629839	655799	18.1	20058	26.1	56673	73.9	76731	11.7	21.1	36	1.8
2006	3689368	785593	21.3	24739	28.6	61796	71.4	86535	11	23.5	97	3.9

Table- 2. Malaria death rates per 10,000 population by age and sex in five years (2002- 2006) in Jalpaiguri, West Bengal, India.

Demography Age group	No. of deaths	Average Population	Death rate (per 10,000 population)due to malaria
1- 4 years	54	381657	1.4
5- 9 years	73	470250	1.6
10- 14 years	52	465289	1.1
15- 44 years	171	1364328	1.3
45- 59 years	44	350473	1.3
>60 years	20	210851	0.9
Male	217	1825010	1.2
Female	197	1718698	1.1
Total	414	3543708	1.2

Chart.1, Some selected malaria parameters for the years 1992 to 2006 of Jalpaiguri, West Bengal, 2007.

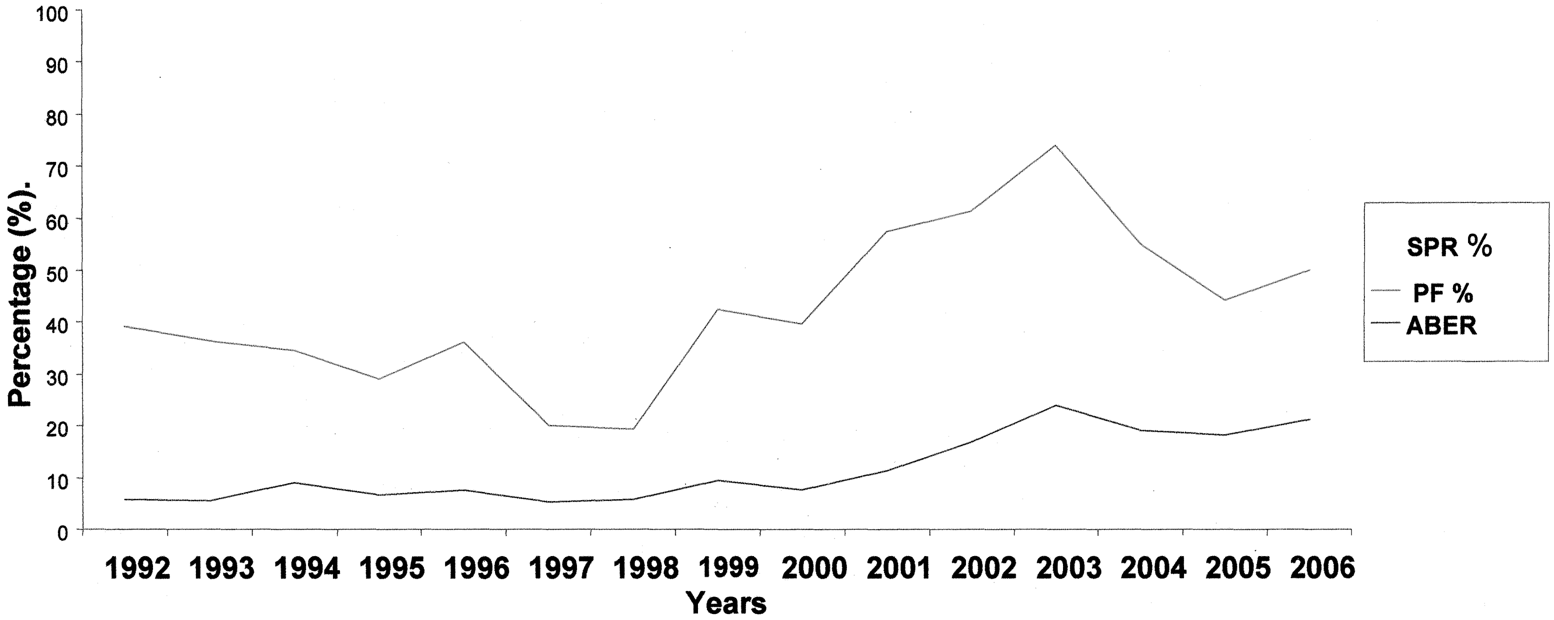


Chart- 2, Blood slides collected by months for 2001- 2005 in Jalpaiguri, West Bengal, India.
Vomiting

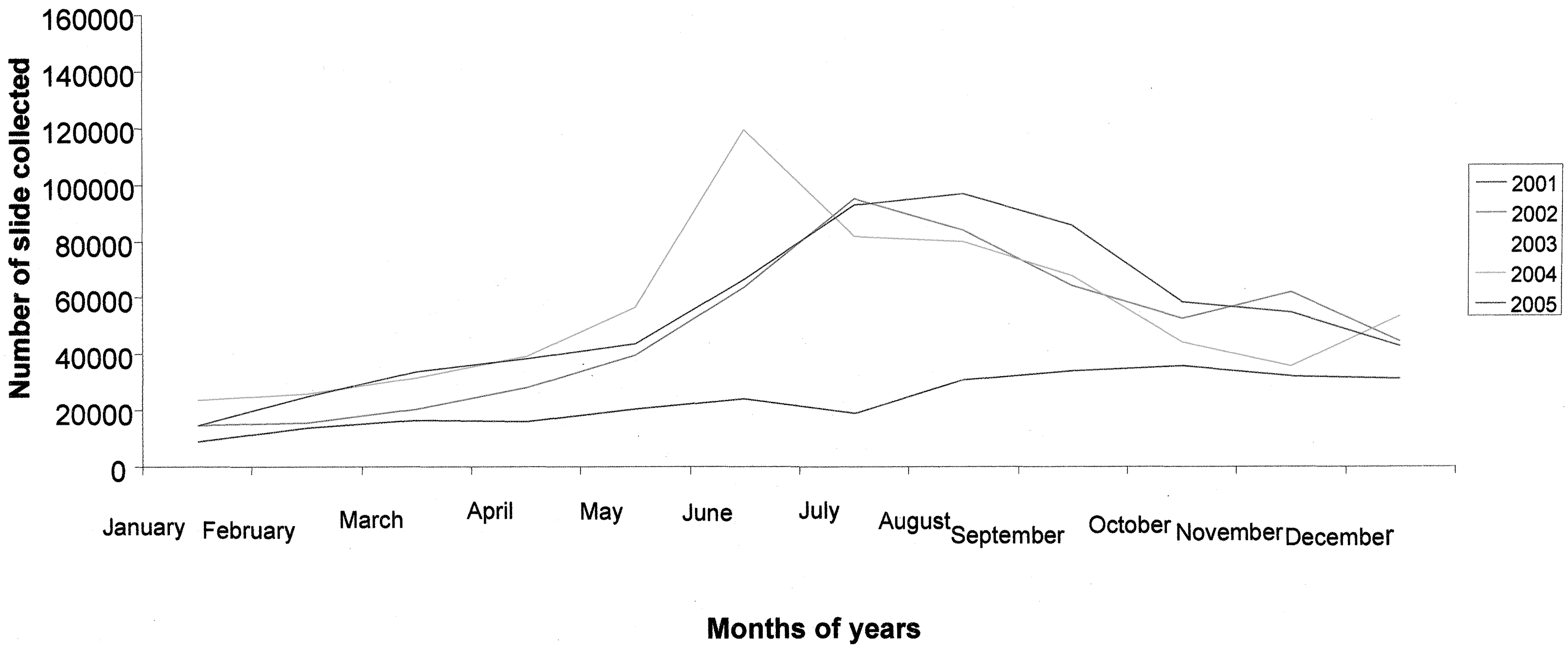


Chart 3.Avarage blood slide collection by months for 2001-2006, in Jalpaiguri West Bengal 2007.

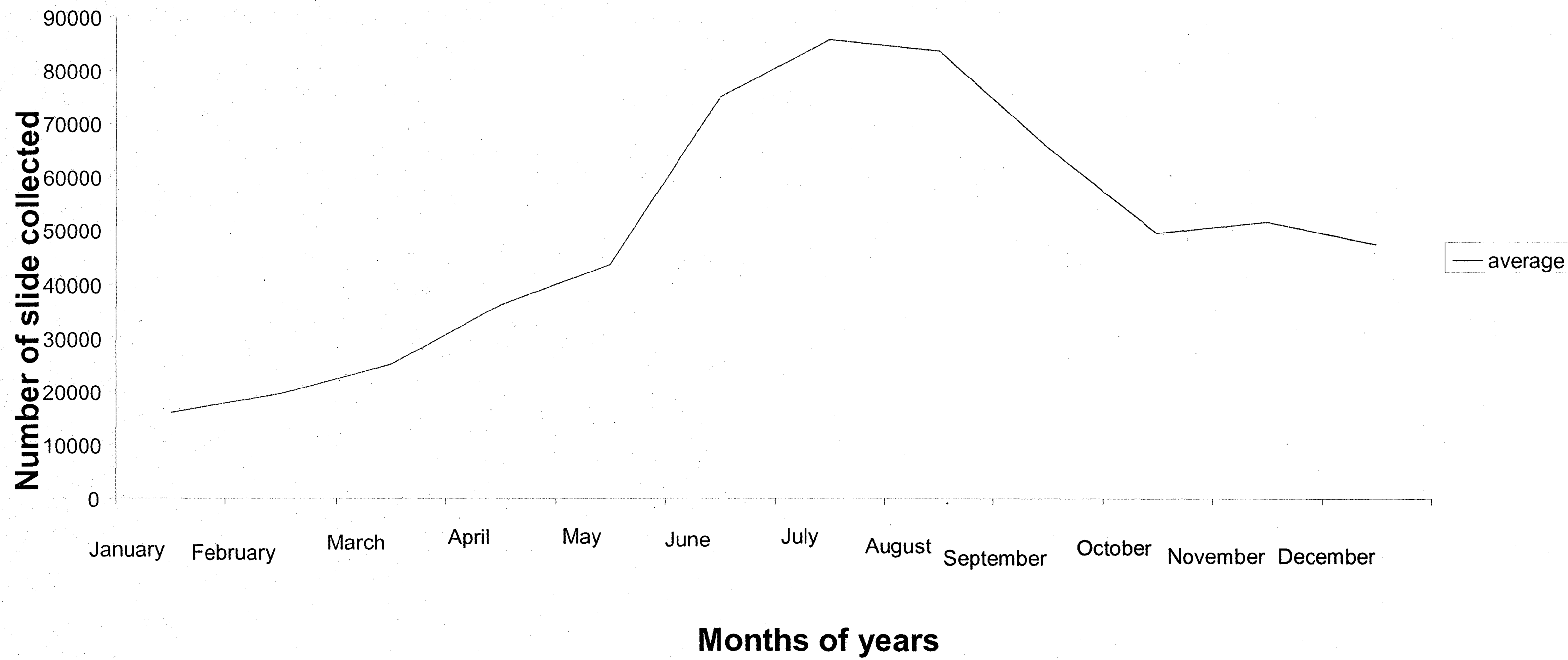


Chart-4. Malaria outbreak threshold by months of Jalpaiguri, West Bengal, India. 2006

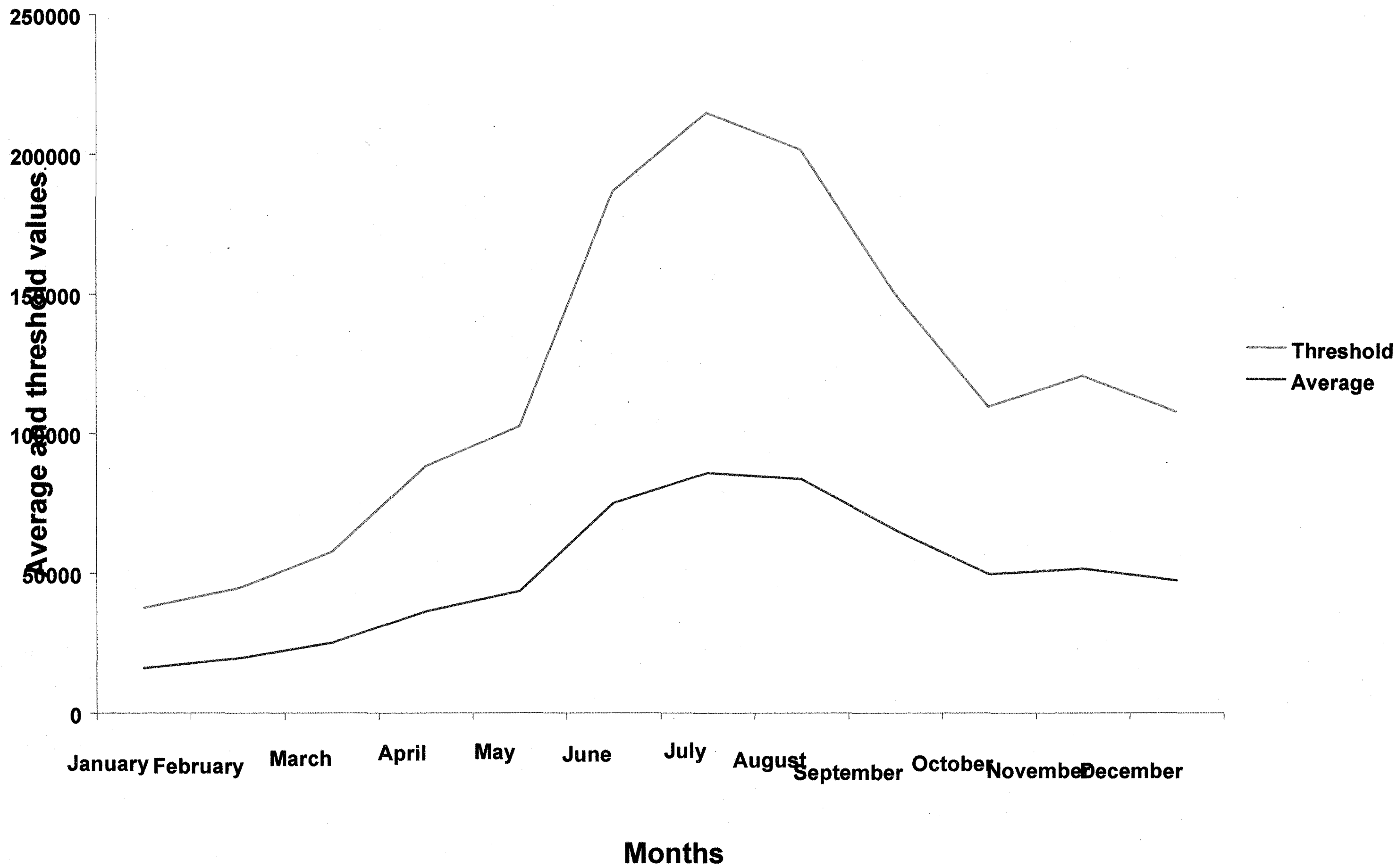
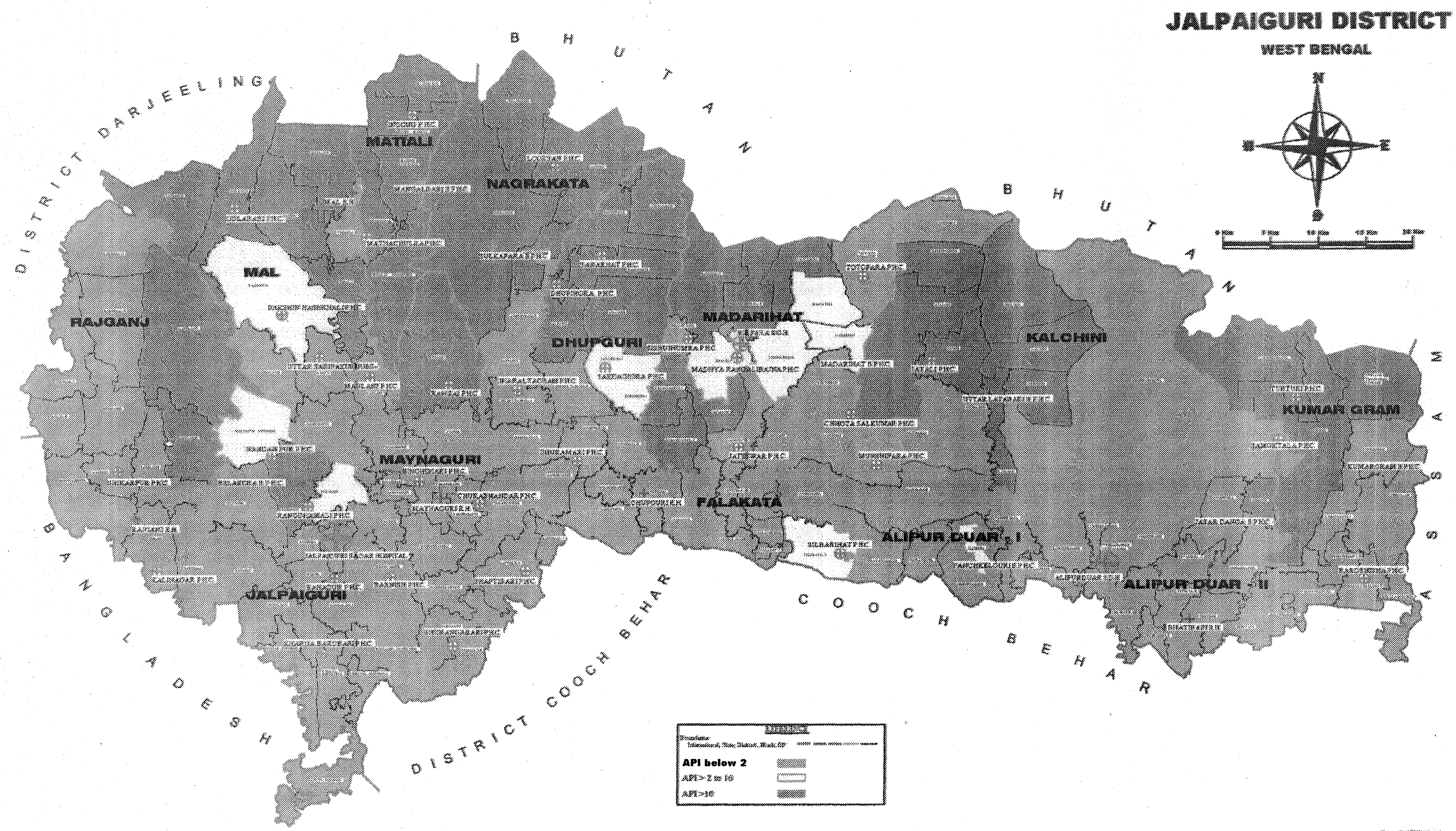
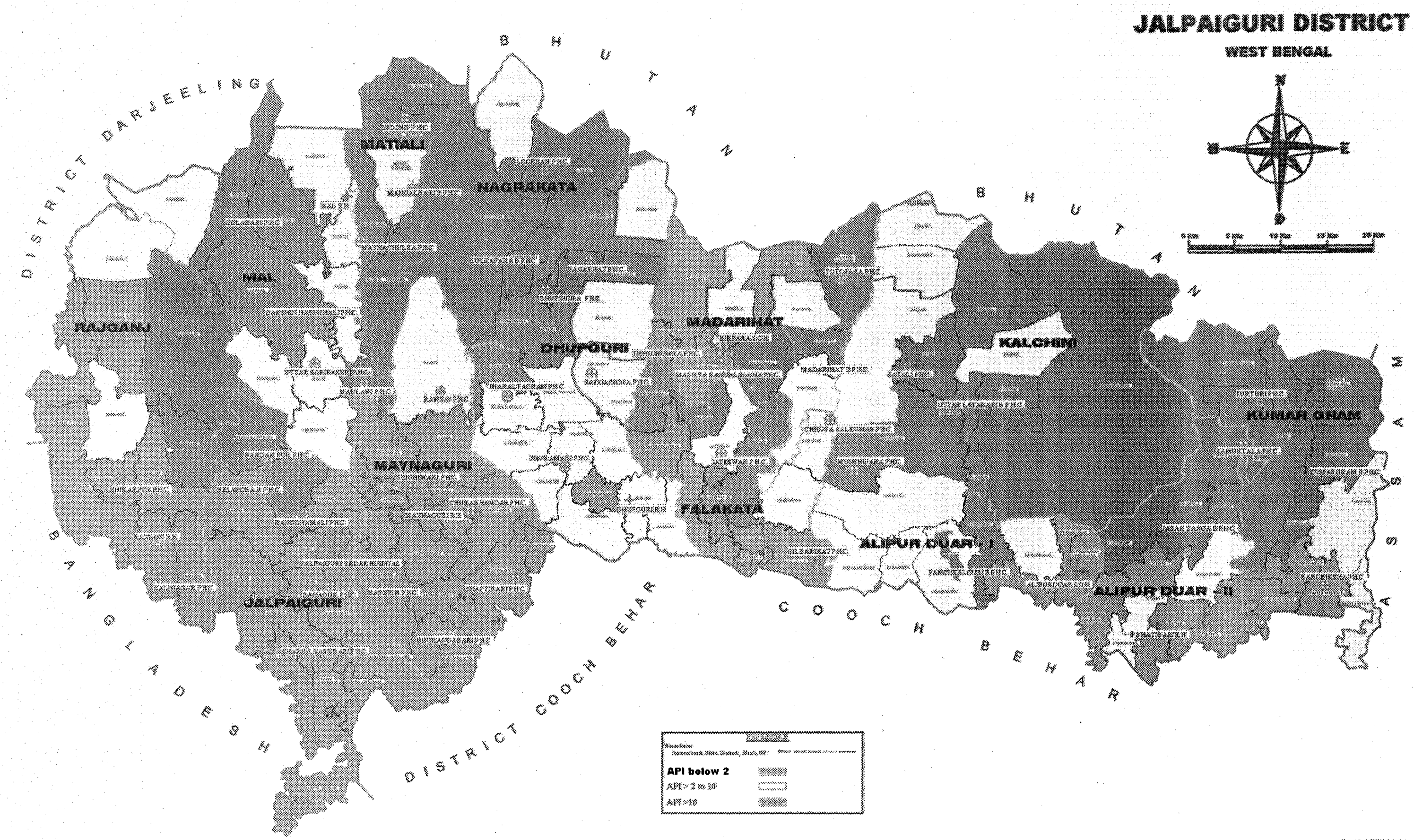


Chart- 5. Average P.F% of the District Jalpaiguri, West Bengal, India. From 1992 to 2006.

Map-1. G.P wise Annual Parasite Incidence(API) in 2005 Jaipaiguri, West Bengal, India.



Map-2. Gram Panchayet (G.P) wise Annual Parasite Incidence (API) in 2006 Jaipaiguri, West Bengal, India.



SECTION-2

SECOND FIELD POSTING

Description and evaluation of the surveillance system of malaria in Jalpaiguri, West Bengal, India. 2007.

Introduction

Malaria is a parasitic infection caused by genus plasmodium. Malaria is commonly occurred by four species of Plasmodium: P. vivax, P. falciparum, P. ovale and P. malariae. In India P. vivax and P. falciparim infection are common. P. vivax causes benign tertian and P. falciparum causes malignant malaria.[1,2] Malaria parasites are transmitted by infected anophilene female mosquito by biting to human. Malaria is endemic in countries of low socio-economic status.[1] World Health Organization (WHO) has estimated that the incidence of malaria world wide is to be 300- 500 million clinical cases each year, with about 90 percent of these occurring in Sub-Saharan Africa, and mostly caused by P. falciparum. Malaria is caused to kill between 1.1 and 2.7 million people world wide each year, of which about one million are children under the age of 5 years in these areas. Fatality rates of 10- 30 percent have been reported among children present with severe complicated malaria.[1] The commonly available laboratory test for diagnosis of malaria includes (1) the malaria parasite detection by microscopic test,(2) antibody test by rapid diagnostic kit (RDK).(3) Clinically diagnosed by symptoms and signs of malaria by clinicians. The definitive/ confirmed diagnosis of malaria depends on the detection of malaria parasite in blood smear slides.[2, 4] The World Health Organization (WHO) has provided three levels of case definitions for malaria. (1) the 'suspected' case definition refers to any fever patients without any obvious causes suspected as malaria until proved otherwise in endemic area in transmission period.(2) the probable case definition refers to suspected malaria with a positive RDK test in fever cases or clinically with symptoms and sign, diagnosed by physician.(3) the 'confirmed' case definition refers to a suspected/ probable case of malaria which are laboratory confirmed by detection of malaria parasites from blood slide smear.[4]

In West Bengal State of India, the reported annual parasites incidence of malaria (API) was 1.86 per 1000 population and Plasmodium falciparum accounted for 26.93% of malaria cases in the year 2006. Outbreaks of malaria were reported from the districts: Jalpaiguri, Cooch Bihar, Purulia and Kolkata district of West Bengal State.[5]

Jalpaiguri is one of the endemic districts of the State of West Bengal. It reported annual parasite incidence (API) of 23.5 per 1000 population and ten out of 13 blocks had an API of more than 10. More than 40% of malaria cases were due to P. falciparum.[5] The disease incidence in the district was more than eight times the incidence of the State. Further, the secondary data analysis of the district indicated a rising trend in the incidence of malaria since 1992.[5] Thirty percent of people reside in tea gardens area where malaria is more but the treatment facility is not adequate.[8] A good surveillance system is a pre-requisite for any malaria control programme.[4] We evaluated the malaria surveillance system in district Jalpaiguri. Our objectives were to (1) understand the strengths and weaknesses of the system. (2) Describe the current surveillance system for burden of malaria by time, place and persons, 3) identify the gaps in the surveillance system to propose recommendations.

Methods

Description of the surveillance system

To describe the surveillance system, we interviewed the nodal officer for public health (Deputy Chief medical officer of health- II) in the district, the medical officers of the reporting units as well as the health workers at the blocks, sub-divisions and the district. We reviewed the annual reports of malaria for the district for the years 1992 – 2007. We reviewed the monthly reports on malaria from all reporting units for the month of July' 2007. [5]

Evaluation of the surveillance system

We used the framework proposed by the Centers for Disease Control and prevention (CDC) to review the attributes of a surveillance system.[4] We reviewed the performance in relation to the attributes of a surveillance system. We reviewed the monthly reports on malaria of the 17 reporting units for the month of July 2007.[6]

Attributes of the surveillance system

Simplicity: We reviewed the reporting forms, the mode of data collection, the frequency of reporting and report transmission. We interviewed the health workers regarding the procedure followed to identify malaria cases, difficulties in filling up the existing reporting forms, compiling the data and reporting to higher authorities.

Flexibility: We assessed flexibility by reviewing whether malaria was reported separately or as a part of a comprehensive report form, which reported other diseases too.

Acceptability: To assess acceptability, we examined the monthly reports for their completeness. We reviewed the medical records for in-patients and out-patients for the month of July 2007 to determine whether there was any mention of a diagnosis of malaria or not.

Sensitivity: We assessed the sensitivity of then surveillance system in two ways: (1) Annual blood examination rate: Total blood slides examined for malaria is divided by total population under surveillance multiply by hundred.(2) Proportion of malaria cases reported to the district among the malaria cases diagnosed and treated at the health facilities: We reviewed health care facility records to find the total number of fever cases diagnosed and treated as malaria in the 17 reporting units in July 2007. We found out the total number of malaria cases reported to the district. We calculated the sensitivity by dividing the total number of malaria cases reported to the district by the total number of cases that were diagnosed and treated in these health facilities and multiplying by hundred.

Positive predictive value: First, we found out the proportion of reporting health units that followed the WHO case definitions for malaria. Second, we reviewed health care facility data to estimate the predictive value positive by calculating the proportion of malaria cases reported by the system that met the WHO probable case definition and confirmed by laboratory test. Proportion of suspected cases positive for RDK (probable cases), and proportion of RDK positive (probable) cases positive for laboratory confirmed cases. Then we calculated positive predictive value, as total test positive confirmed cases dividing by probable cases multiplied by hundred.[2]

Representativeness: We assessed representativeness on the basis of receipt of reports on malaria from the public and private sector (tea gardens, medical laboratories) as well as from the different public health units in the rural and urban areas of the district.

Timeliness: Monthly reports from the peripheral health units and from the district were supposed to reach the district malaria office (Office of the Deputy.CMOH- II) and from the district to the state by the seventh and the tenth day of the subsequent month, respectively. We estimated the proportion of reporting units reporting on time and the average time taken for the reports to reach the district from the periphery.

Usefulness

We assessed the usefulness of the system in terms of its capacity to analyze data, prepare tables and graphs representing the distribution of the disease with respect to data format, structure indicators, detect outbreaks threshold to make decisions for prevention and control.

Results

Description of the surveillance system

Malaria surveillance system is conducted by public health care facilities while the private sectors (including tea gardens hospitals) do not participate in the malaria surveillance. Malaria surveillance was passive and active in the district. Health workers did active fever surveillance during their fortnightly house visits. Active surveillance is also conducted following death or clustering of malaria cases in any area of the district.[3] There were 17 public health units in the district that reported malaria cases. These were eight block primary health centers (BPHC), five rural hospitals (RH), three sub-divisional hospitals (SDH) one district hospital (DH). The block primary health centers received malaria reports from the primary health centers (PHC) and sub centers (SC) of the block by last day of the month. The block primary health centers reported malaria using three different forms: the primary health centre (PHC) reporting form, the communicable disease reporting form and the health management information system (HMIS) form. Similarly, the secondary and tertiary hospitals reported using two different forms: the communicable and non-communicable diseases reporting form and the HMIS form. The block primary health centers provided aggregated data on different national and public health programmes including malaria in the PHC form to the district family welfare office. The 17 reporting units sent aggregated data on eight health events and 17 communicable diseases, including malaria in the communicable disease reporting form to the district public health office. Further, 17 health units sent aggregated data on both (1) non-communicable and (2) communicable diseases including malaria and (3) the HMIS form to the district public health office. All the three reporting forms were official.

The reports from peripheral units sent by post and occasionally through messenger. Daily reporting over telephone was also done from all 13 block/rural hospitals of the district. All health facilities had availability of microscopic test for malaria. The medical officers of the different reporting units made diagnosis and registered them on the medical records, the out patient department records. All the fever cases are tested with RDK tests and their blood smears are microscopically examined for malarial parasites.[3]

System of data collection and transmission:

At the block primary health centers, the health workers responsible for record keeping of collected reports on malaria during a given month from the in-patient and out-patient registers on the first week of the subsequent month. They used the standard monthly reporting forms prescribed by the Government of West Bengal. At the secondary level hospitals, the social welfare organizer (SWO) collected reports on malaria from the out-patient and in-patient registers used in the block primary health centers. They reported only cases diagnosed by the medical officers in outdoor patient department (OPD) or in indoor patient department (IPD). Fever cases that met the case definition for malaria and received treatment for it but for which the medical officers did not mention the diagnosis were not reported as malaria. All reporting units sent the consolidated monthly reports consisting of aggregated number of malaria cases and deaths due to malaria to the public health office of the district. The public health office then sent the consolidated report of all health facilities of the district to the public health office of the State.

Data analysis, feedback and action taken:

In the district epidemiological cell, the district malaria inspector (DMI) calculated the total numbers of malaria cases from the data extracted from the monthly reports of the peripheral health units. The peripheral health units as well as the district epidemiological cell calculated rates and described the data as per format of prescribed malaria form (MF- I/II/IV). They calculated ABER, API, PF%, SPR, SFR, CFR, death rate. The district has human resources and computer to analyze the data. System existed to provide regular feedbacks to the reporting units on district monthly meeting of malaria inspectors of blocks (BMI). District level monthly meetings focused on administrative issues and provide the opportunity to discuss the data. There were records indicating that malaria surveillance data was used to detect and action taken for control and prevention of outbreak.

Evaluation of the surveillance system:

Simplicity

Malaria surveillance data is collected and transmitted in three forms: (1) communicable and non-communicable disease reporting form, (2) HMIS form and (3) Malaria reporting forms (MF2, MF3 and MF4). In case of malarial deaths, they also have to send a death investigation report form. Health workers of all the 17 (100%) reporting units informed that the reporting forms are simple and easy to use.

Flexibility

Malaria reports were reported independently on prescribed malaria form as well as in other forms also. It was reported along with other diseases and health-related events in a common form and also in MF-2 form alone. Since 2006, Vector-borne disease control programme (NVBDCP) was launched in the district. Besides malaria, information about other vector-borne diseases is also collected under the programme.

Acceptability

All the 17 reporting units sent their monthly reports in July 2007. Of these, 15 (89%) reporting units filled the forms completely. Ten (59%) did not report malaria cases attending the out-patient department as the diagnosis of malaria was not mentioned in the out-patient records. 25 of 30 (82 %)

medical officers interviewed observed that the monthly reports on malaria were informative and useful, while 4 (15%) reported that in the absence of confirmatory tests (e.g. positive malaria parasite test from slide of blood smear), the reports were not of much value. One (3%) medical officer thought that it was a waste as no public health action was taken based on the reports and that action only took place following press reports or political pressure.

Sensitivity

The health care facility records indicated that 9807 (86.6%) out of 11327 fever cases were diagnosed and treated as malaria in the month of July 2007. Of these, 8807 (89%) were reported to the district. The remaining 1000 (11%) cases were not reported to the district because the diagnosis of malaria was not written on the treatment/ record sheets.

Positive value predictive

In July 2007, of the suspected 8807 cases of malaria, 3805 (45%) were probable cases of malaria (RDK positive) while 1142 (30%) were confirmed cases (slides positive for malaria parasites).

Representativeness

Malaria reports originated by the passive monthly surveillance system that captured cases in the public health care facilities of the rural (n=13) and urban (n=4) health facilities areas. There was no data on malaria from the private sector e.g. tea gardens, private hospitals, private laboratories and medical shops.

Timeliness

Of the 17 reporting units in the district, 17(100%) reported in July 2007. Of these, 12 (86%) reported on time (i.e., by the seventh of the subsequent month) while five (29.4%) reported by the tenth day of the month.

Usefulness

Block and district level health workers analyzed surveillance data and calculated various indicators of malaria transmission. Clustering of cases in an area or occurrence of deaths is considered as triggers for investigation and case management of the malarial outbreaks. Based on these triggers, district health authorities institute control measures also.

Discussion:

The district Jalpaiguri has existence of a good surveillance system for malaria. The district health department has given special emphasis on blood slide collection from fever cases present in health centers and also from the houses of the community through routine house visit by health workers. There was possibility to capture all malaria cases in the area under public surveillance. Only the area has service facility of the private health providers may be excluded of capturing malaria cases. Raised ABER suggests that the surveillance system is going well in the district. The system has a good sensitivity indicated by high ABER in the district. More over 89% cases diagnosed and treated at health facilities are reported to the district. The malaria surveillance system in the district is simple for the field workers, flexible for other diseases, well acceptable to the concern persons; there is scope to improve timely reporting and making representativeness of the whole area of the district.

Though the district malaria surveillance system is well implemented, still the system has not covered private health facilities areas in the district. No private sectors for health service providers were involved in the malaria surveillance system. Malaria reports may be under reporting in the district. In spite of that ABER is good and 89% cases are reported.

The system acquired information from the areas served by public sector. No involvement of area covered by the private sector. Again not all medical officers are used to put malaria diagnosis on treatment records. To acquire correct information of malaria in the district, whole area including tea gardens areas to be included under the surveillance system. Medical officers should write diagnosis on report sheets on OPD/IPD cases. The district health department used to take action based on clustering of malaria cases in area of the district and or occurrence of deaths due to malaria. Outbreak triggers based on the threshold levels will help identifying outbreaks early and management could be provided promptly.

Recommendations:

Based on the finding of the evaluation of the malaria surveillance system of Jalpaiguri district, we recommended for the improvement of the system as to (1) include areas of private sectors (tea gardens) under the surveillance system, (2) initiate training for the medical officers to write diagnosis for all case patients those who had received treatment for malaria in health facilities and (3) sensitized health staffs to report on time.

Constraints of the surveillance system:

One of the major constraints is the over burden by many health programmes for health workers. The numbers of case patients are high in the district Jalpaiguri. 30% of the total population of the district resides in tea gardens; forest and hilly area were difficult access not easy to supervise [6].

Strengths of the surveillance system:

The main strength of the system is the existing structure of the health system on 2006. Simple and easily understandable case definitions for grass root level workers. Simple reporting formats and forms to use. Despite of constrains health workers were doing work for malaria control in the district giving top priority and good efforts.

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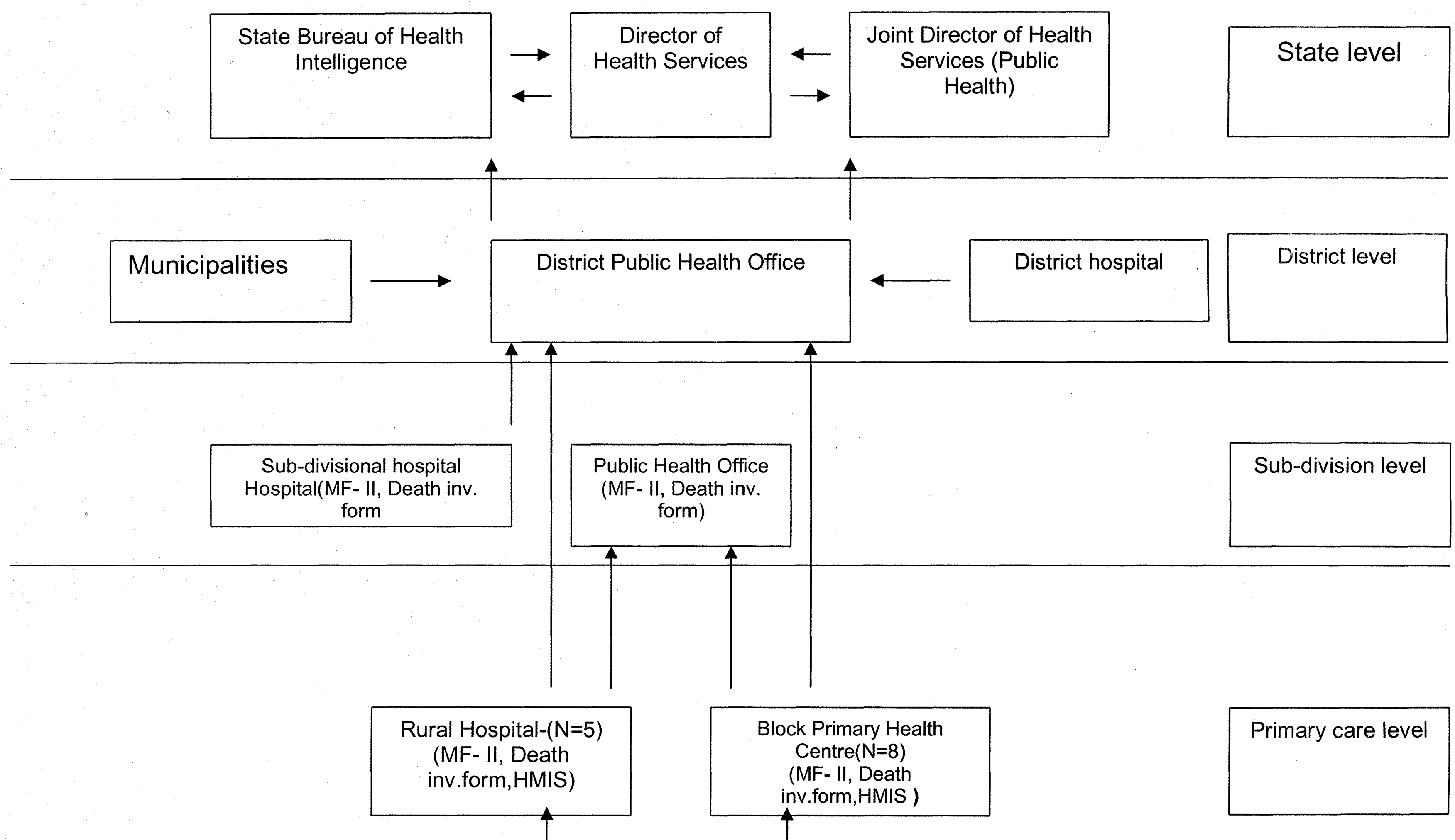
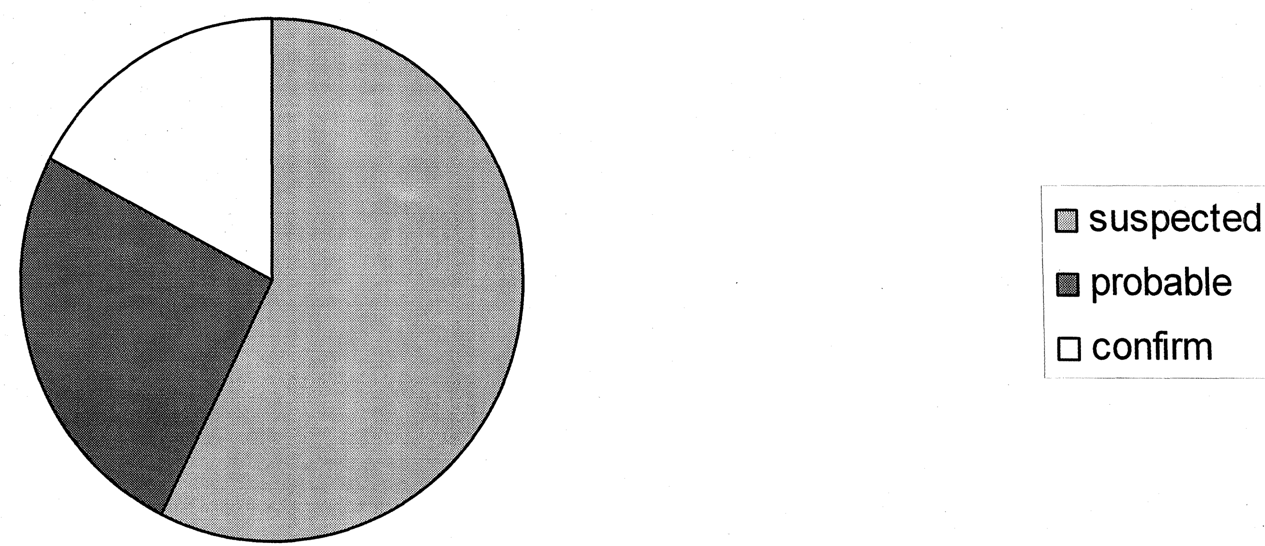
Figure 1: Flow of surveillance data on malaria in Jalpaiguri district, West Bengal, India, 2006



	Activities	Structure	Personnel	Frequency of Reporting	Frequency of feedback
Central	1. Policy making 2. Action planning 3. Monitoring	Government of India, Ministry of health & FW	Director, task force and expert committee	Monthly Collation the data	Quarterly/Half yearly
State	1. Policy making 2. Action planning 3. Monitoring.	Government of West Bengal, Department of Health & FW	DHS, Joint Director (Malaria) State malaria Officer,	Monthly	Quarterly, Half yearly and yearly
District	1. Data collection 2. Compilation 3. Analysis 4. Cross checking 5. Report writing 6. Supervision	Office of the CMOH and Dy. CMOH-II	CMOH, Dy.CMOH-II, DMI Field worker Statistical officer	Weekly/Quarterly /Monthly	Weekly/monthly
Block	1. Diagnosis & treatment 2. Collection & Compilation of data 3. Reporting 4. Supervision	Office of the BMOH	BMOH, MI, BPHN, PHN, Supervisors Medical officers Lab. technicians Block statistical officer, ANM	Weekly/Monthly	Weekly/monthly
PHC	1. Diagnosis & treatment, 2. Collection & Compilation of data 3. Reporting 4. Supervision	Office of the MO- incharge, BMOH	MO- incharge Supervisor HA(M)/HA(F) Lab. Technicians, ANM	Daily/ weekly/monthly	weekly/ Monthly
SC	1. Case finding, 2. Treatment 3. Data generation 3. Reporting	GP- HQ	MPWs (HA- M, HA- F) Link persons, DDC, FTD.	Daily/weekly/ monthly	weekly/Monthly

Chart-I.Diagnosed malria cases of Jalpaiguri, West Bengal, India.2007.



Evaluation of the National anti-malaria programme (NAMP) in Jalpaiguri district, West Bengal, India, 2007.

Introduction:

A WHO (World Health Organization), World malaria report-2008, stated that the global burden of malaria remains enormous, though progress in malaria control has accelerated dramatically since 2006. The report states that half of the world's population is at risk of malaria. An estimated 247 million malaria cases out of the 3.3 billion people at risk in 2006 caused nearly a million deaths, mostly of children under 5 years of age. Malaria was endemic in 109 countries in 2008 and 45 of them were within the WHO African region. 86 per cent or 212 million (152–287 million) cases were from the African Region. Among the cases that occurred outside the African region, 80 per cent were from

India. During 2006, in India, 1.67 million cases of malaria were reported with 1487 deaths. Plasmodium falciparum, the main cause of severe malaria, now accounts for more than 46% of malaria cases and 95% of malaria deaths in the country. Malaria is highly endemic in the states of Assam, Orissa, Jharkhand, Bihar, Chhattisgarh, Madhya Pradesh and Gujarat.

West Bengal, one of the eastern states of the country is not highly endemic for malaria. However, the districts Jalpaiguri, Coochbehar, Purulia and the Kolkata are endemic and account for more than 90% of the burden of malaria of the State. The district Jalpaiguri located in the northern part of West Bengal State, is highly endemic for malaria. Surveillance data analysis indicates perennial transmission. There was an outbreak of malaria in 2003 in the district during which 842,409 cases were reported with 149 deaths. Fifty percent of the cases were due to P. falciparum. Drug resistance studies conducted during 2004, revealed chloroquine resistance among falciparum malaria. Entomological investigations revealed that Anopheles dirus was the primary vector for malaria in the areas nearby forests and tea gardens.

During 2006, there was another malaria outbreak in the district. A total of 940,338 fever cases were reported during the year of which 65% were positive for malaria. Forty percent of malaria cases were due P. falciparum. Ninety-seven malarial deaths were reported during the year with a case fatality rate of 1.6%. Review of NAMP in Alipurduar sub-division which contributed for majority of malarial cases and deaths in the district, revealed shortage in the positions of health workers and laboratory technicians leading to delay in case detection and prompt treatment, late referral of complicated cases and deaths. Poor capacity of the highly available private providers in malaria management aggravated the situation.[5] Department of Health;took corrective measures to address the deficiencies in the district in anti-malaria programme by increasing the inputs for the programme. Laboratory technicians (MT.Lab) were deputed in health facilities for malaria slide examinations. Rapid diagnostic kits (RDK) were provided for early diagnosis and Artemisinine based combination therapy (ACT) was made available for treatment of malaria positive case patients in place of chloroquine and primaquine (CQ+PQ). Insecticide treated bed nets (ITBN) were provided to below poverty level (BPL) families living in high-risk areas (API> 2) of the district. The funds for NAMP were also increased.

We evaluated the activities of National Anti Malaria Programme (NAMP) in Jalpaiguri district, West Bengal, India during 2007 with the objectives of (1) describing the performances of different components of the NAMP in terms of input, process, output and impact (2) explore the community knowledge, attitude and participation in malaria prevention and control, including health seeking behaviors and (3) formulate recommendations on leading issues that the programme was lacking in the district. We also compared the input, process, output and impact indicators of the programme with the indicators in 2006.

Method

Description of the programme:

We reviewed in detail the operational manual for Malaria Action Programme (MAP) 1995 of the National Anti Malaria Programme (Government of India). We also discussed different operational issues of the programme in the district with programme managers at district, health facilities, microscopic centers and sub centers.

Evaluation of the programme:

We considered the whole population of Jalpaiguri district to evaluate the national anti malaria programme. We evaluated the three main arms of the programme (i.e. early diagnosis and prompt treatment, vector control and personal protection) in terms of input, process, output and impact of indicators. We compared different indicators for the year 2006 and 2007. We used the following indicators to evaluate the programme:

Early diagnosis and prompt treatment (EDPT):

Input: Early diagnosis and prompt treatment: Our input indicators included the (1) position of medical officers, laboratory technicians and health assistants in and trained, (2) allocation of funds to the health facilities of the district according to their requirement in 2006-07, (3) health facilities having adequate stock of anti-malarial drugs and health facilities having adequate stock of second-line antimalarials (4) health facilities supplied with rapid diagnostic kits (RDK) for malaria cases detection as supplement of laboratory blood slide examination (5)Number of villages of population 1000 having Drug Distribution Centers (DDC)/ Fever Treatment Depots (FTD)

Process*:* Early diagnosis and prompt treatment: Our process indicators included (1) proportion of health facilities utilizing 95% of funds allocated, (2) median time taken to examine the blood smear and start of radical treatment for positive cases from the day of blood smear collection (3) discrepancy rate of test reports in laboratories (4) the proportion of severe malaria patients treated with correct anti-malarial drugs at health facilities (5) proportion of villages covered by drug distribution centers (DDC) (6) the proportion of health institutions/ subcentres monitored and supervised regularly by supervisors and medical officers .

Output: Our output indicators included the proportion of microscopic centers functioning to its requirement (As per the programme guidelines, targeted of every laboratory technician is to examine at least 50 malaria blood slides per day), the proportion of health facilities meeting the target of annual blood examination rate of 10% and 20 blood slides per health worker per month, the proportion of complicated malaria cases cured, proportion of health facilities had not run out of stock of anti-malarial drugs for a week or more.

Indicators of vector control:

Input: Our input indicators included engagement of spray workers gang (six persons per gang) and proportion of health facilities having adequate supply of DDT for spray in the area as per requisition.

Process: Our process indicators included percentage of households sprayed with two rounds of DDT in areas with API>2 in the year.

Output: Percentage of households sprayed with maintaining the quality.

Indicators of personal protection:

Input: Proportion of health facilities having information, education and communication (IEC) materials. Supply of Insecticide treated bed nets to the below poverty level households in high risk area (API>2)

Process: Proportion of BPL families supplied with ITBN in high-risk areas of the district and number of health awareness camps held to increase knowledge, attitude and participation of community in malaria control.

Output: Percentage of population using ITBN during sleep and percentage of population knowing malaria is a curable and preventable disease and malaria can be prevented by using ITBN during sleep.

Impact of NAMP: Our impact indicators were annual blood slide examination rates (ABER), Annual Parasite Incidence (API) and case fatality rate (CFR) due to malaria.

Data collection:

We interviewed the programme managers at the district and block level, visited different health facilities and collected the data required for various indicators. We used a pre-tested questionnaire to collect information from the health care facilities, microscopic centers and sub centers. We also reviewed the records of the health care facilities.

Community survey: We conducted a survey in all the 13 blocks of Jalpaiguri district. We calculated the sample size of 520 by using Right size software, assuming the highest possible utilization rate of health services at the community level at 80%, an alpha error set at 5%, a precision at 5% and an anticipated proportion of non-response of 10%. We selected 52 clusters in the district (four from each block) with population proportional to size. In each cluster, we selected 10 households by three stages method. In each household we interviewed one adult. We used pre-tested questionnaire to collect information about socio-economic status, availability and use of bed nets and knowledge of malaria control and prevention. We also examined these houses for quality of the DDT sprayed.

The principal investigator (FETP scholar) and the trained block malaria inspectors (BMI), block sanitary inspectors (BSI), block public health nurses (BPHN) and gram panchayet level health supervisors (HS) conducted the interview with the help of health assistances (HA-M/F). We analyzed data collected from abstract of report available in the department and through interview, by using excel and EPI info version-6.

Results

Description of the programme

The basic strategy of national anti malaria programme was to (1) ensure community access to early diagnosis and prompt treatment, (2) conduct vector control (DDT- spray, lervivorus fish cultivation), (3) personal protection-promote community use of bed nets (especially insecticide treated), and (4) capacity building for community participation in prevention and control of malaria with a network of community health services. [4]

Early diagnosis and prompt treatment: Early diagnosis and prompt treatment is the most important activity to prevent malaria-associated morbidity and mortality in the community. [9] The malaria action programme described three types of facilities: (1) Malaria clinic with facility for presumptive treatment, smear collection and microscopy for blood testing facility (2) Fever treatment depot (FTD) with facility for presumptive treatment and smear collection had been available for every village of one thousand populations (3) Anganwadi worker or any other volunteer (e.g. community health guide-CHG, Non Government organizations- NGO's) engaged by establishing drug distribution center (DDC) with facility for presumptive treatment and smear collection for very villages of 1,000 population.Majority of villages (94%) of the district are covered by FTD or DDC. The case detection was strengthened by routine fortnightly domiciliary house-to-house visit by Health Assistant male/ female (HA-M/F) to detect episodes of fever and collect blood smears. Microscopic facility is available at the ratio of one for every 30,000 population in plain area and one for every 20,000 population in tribal/hilly/difficult to access areas. There were 56 microscopic centers in the district in 2005. During 2006, 38 extra laboratory technicians were appointed on contractual basis for strengthening the malaria smear examination in the district. Laboratory technicians send the reports of blood smears within 48 hours of examination to the peripheral staff for radical treatment (gametocidal action for plasmodium falciparum and anti-relapse action for plasmodium vivax). Quality control of the laboratory tests done through a cross checking system at district laboratory.

Vector control: *(1) Insecticide residual spray (IRS):* While early detection and prompt treatment prevented malarial mortality, the residential inside residual spray aimed at preventing malaria transmission to reduce morbidity in the community.[9]The recommended short-term intervention measure in the malaria action programme was two round of residual spray with DDT (50% concentration) in all areas with annual parasite incidence of two or more and a selective additional round in a few villages with perennial transmission. To obtain the best result, the national programme coverage of households had to exceed 80% and insecticide had to be used in recommended quantity and quality as per programme guideline.[1]Bed nets as personal protection: Bed nets especially insecticide treated are amongst the most effective measure to reduce malaria transmission and mortality.[1] Use of bed net during sleep prevent the contact between the host (human) and the vector (mosquito) by making mechanical barrier. To encourage mosquito nets use 90,000 insecticides treated nets supplied to the below poverty level (BPL) family free of cost in high-risk areas of the district. Frequent meetings were organized in every Gram Panchayet for generating awareness regarding malaria control and prevention. Information, education and communication (IEC): Community participation in the prevention and control of malaria is a key for success of the programme. Information, education and communication (IEC) played an important role in protective and preventive habit among individuals and in the community. Population's knowledge and education created demand for appropriate services from the health service delivery system. Capacity building of health care service provider is another issue for improvement towards malaria control. The strategy for achieving this goal includes in-service, re-orientation training for the medical Officers, laboratory technicians, supervisory staffs and multipurpose health workers.

Evaluation of the programme (NAMP)

We evaluated NAMP in 56-health facilities, 94 microscopic centers and 537 sub-centers of the district. Of the 520 community members sampled in 52 villages, 500 (96%) were available for interview.

Input indicators: In 2007, 184 (94%) of 196 medical officers, 94 (168%) of 56 laboratory technicians and 619 (58%) of 1074 health assistants (M/F) were in position compared to sanctioned post in the district. Of the staff in position, all medical officers, laboratory technicians and health assistants were trained in malaria. 1284 (94%) of 1361 villages had drug distribution centers. All the health facilities were allocated the funds as per their requirement. All the 56 health facilities in the district had adequate supply of first line anti-malarial drugs while 38 (68%) had supply of second line anti-malarial drugs.

Out of 104 gangs enlisted for spray operation 61 (59%) spray gangs were engaged to spray work in the district. All of 56 health facilities (100%) had the required stock of DDT through out the year.

Process indicators: All the 56 health facilities in the district utilized 95% of the received malaria funds during the financial year 2006-07. The median interval between blood smear collection and examination was one day (range: 1 to 3 days) for passive case detection in outdoor and indoor health care facilities and 5 days (range: 3 to 7 days) for active case detection by house to house visit and mass medical camps held during clustering of malaria cases and death due to malaria. The median interval between blood smear collection and radical treatment was 9 days (range: 6 to 12 days). All positive and 10% negative blood smears were sent for cross checking to district laboratory, time to time by order to estimate discrepancy rate. The overall discrepancy rate in district was 3%. Fifteen (16%) of the 94 microscopic centers had discrepancy of test results. Out of 24,739 plasmodium falciparum positive cases, 2252 cases (9%) were admitted with diagnosis of severe malaria. Out of 2252 Pf severe malaria cases, 2101 (94%) were treated with artemesiniene based combination therapy (ACT) while 151 (6%) were treated with artemether.

District health officials supervised 12% sub centers once in a year. Medical officers supervised 21.5% sub centers once in every quarter while malaria inspector supervised 15% sub centers once in a month. Health supervisors, PHN and BPHN supervised 56% sub-centers monthly. Of the 500 houses interviewed, 135 (27%) of the houses were visited by Health Assistants every fortnightly.

Eighty six percent of the health facility area in the district was sprayed with insecticide DDT (50%) in 2007. seventy three percent of the target population of area (API of two or more) was sprayed with DDT (two rounds). Seventy six percent of the targeted households were covered by two round of DDT spray in 2007. Of the 500 individuals interviewed, 300(60%) owned at least one bed net.

Of the 4,26000 BPL families in high risk area of the district, 90,000 (21%) were supplied with one ITBN during 2006, BPL household of high risk area covered by bed net were 21%.

Output indicators

All the 537 (100%) sub-centers were functioning for malaria action programme in the district. The laboratory technician in 92 the 94 microscopic centers (56 attached to health facilities and 38 attached to sub-centers) examined at least 50 malaria slides every day during 2006. The ABER in all the 13 blocks was higher than 10% during 2007. Of the 2252 severe cases of malaria treated in the district, 1255 (56%) were cured while 47 (2%) died. The remaining 950 (42%) cases were referred to North Bengal Medical College, Darjeeling for treatment. No health facilities or sub centers reported a stock-out of anti malarial drugs.

Of the 500 individuals interviewed, 475 (95%) knew that malaria was transmitted through mosquito bite and 235 (47%) knew the symptoms of malaria. 480 (96%) knew the location of the drug distribution center (DDC). 300 (60%) households owned at least one bed net while 90 (18%) reported that they regularly used bed net during sleep.

Impact indicator

The API in the district decreased from 23.5 in 2006 to 7.2 in 2007. The case fatality rate reduced from 4.3 in 2006 to 1.8 in 2007.

Discussion

The national anti malaria programme in Jalpaiguri had increased infrastructure support, logistic supply and sanction sufficient funds for the anti malaria programme in the year 2006. Regarding human resources (i.e.

medical officers, laboratory technicians) were in positions in all of the centers. The grass root level workers e.g. health assistant male/females (HA-M/F) were increased in the district though all vacancies were not filled up. Established drug distribution centers (DDC) in 94% of villages of the district. More than sanctioned posts of laboratory technician were posted for blood slide examination. RDK were supply to use for early diagnosis of malaria in fever cases to treat with second line of antimalaria drugs. Second line of treatment with artemisinine based combination therapy (ACT) started in the district. That was according to the State Government order after the report of drug resistant evaluation team in 2004. The revealed that ~ 10% of falciparum malaria cases are resistant to chloroquine + primaquine. Fortnightly domiciliary visit by health workers, monitoring and supervision increased. Laboratory support was increased and there was initiation of cross checking mechanism for laboratory test of positive and negative blood slides in the district for laboratory standard examination.

Insecticide residual spray (IRS) operations were poor regarding quality and quantity. 60 % house hold were sprayed maintaining 15% of quality as per national guide line. Quality of spray was determined by inspection of district health officials through visiting the sprayed area. Quantity was poor due to less number of gangs engaged and lack of supervision was the cause of poor quality.

Insecticide treated bed nets (ITBN) were supplied only for 21% of below poverty level (BPL) house holds. That was due to short supply of the bed nets. Only 60% of households used bet nets during sleep.

Supervisory part: though increased in compare to 2006 still weak in 2007 by district officials and also by peripheral workers of the blocks of the district.

Additional microscopy centers were established with laboratory technicians in excess of the sanction posts. Daily 50 slides examination per lab technician was targeted to complete collected blood slides examination within reasonable time (within 24 hours) without keeping backlog.

The process of decentralization of microscopic centers at primary health center level (one in 30,000 populations). The overload of laboratory works increased the median time between blood smear collection and examination and delayed the radical treatment. This, allowed community transmission of falciparum malaria and increased in morbidity. Increased microscopic centre reduces the problem in 2007. Cross checking of examined blood smear slides indicated an overall low discrepancy rate in district. The proportion of severe plasmodium falciparum malaria cases was higher than national average. Possible reasons include delay in case detection, delay in start of anti malarial treatment and misclassification between uncomplicated and severe malaria, thus scope of transmission of PF malaria. However correct use of anti-malarial drugs and use of artemesinin based combination (ACT) therapy at peripheral health facilities explained for low case fatality rate in district in 2007.

The district had logistics support for information, education and communication (IEC) activities. The entire health facility and sub center provided with IEC materials. Most of the community sought health care from Government sector and most community members knew how to recognize symptoms of malaria.

Use of bed nets for personal protection not common in the district. Two factors may explain this situation. First, only 21% of the households had one bed net in their residence. Several studies in country and aboard indicates demographic characteristics, socio-economic conditions and knowledge, attitude and practices of community people played important role towards ownership and non-ownership of bed net. Second, those who had a bed net did not regularly use it (60%). Poor ventilated house, outdoor sleeping habit and under alcohol intake of tea gardens population (30% of district populations) of the district not bother about personal protection and transmission of malaria by mosquito bite may be the possible another reasons in the district.

One of the potential biases of our study was interviewer bias. To minimize the possible interviewer biases, team members were carefully selected to avoid exchange of experience of members between sub centers and community. Further, team member reviewed records and interviewed jointly rather than individually. Some information provided by health workers and community members could have been inaccurate due to recall bias.

Some weakness of the programme:

Sub centers established fewer than requirement (G.O) in the district. Health workers were less than sanctioned post. Total spray gangs were not utilized for spraying. All level supervisory works was poor in the district. Only selective distribution of insecticide treated bed nets (ITBN) in the district. Insecticide residual spray was poor in quality and quantity.

Some positive aspects of the programme:

Laboratory technicians were more than sanctioned post. Malaria control programme tagged with National vector born disease control programme (NVBDCP). Drug distribution centers established in the villages. Increased funding for malaria programme in the district.

In conclusion we could say that due to increase inputs for the programme in the areas of (1) early diagnosis and prompt treatment, (2) vector control and (3) personal protection, against malaria in the district, impact of the programme has been raised. That was found in four aspects (1) Death decreased from 97 (case fatality 4.3) in 2006 to 47 (case fatality 1.8) in 2007. (2) API reduced from 26.75 in 2006 to 16.8 in 2007 (3) ABER raised 21.3 in 2006 to 21.9 in 2007 (4) P.F % raised 28.6 to 40.3 between 2006 and 2007. Despite of the gains, case fatality and API were remaining high and that might be due to increase inputs was limited. Less community participation in the programme was another cause. To reduce the morbidity and mortality due to malaria, this study allowed recommending measures to improve and overcome lackness of the national anti malaria programme in Jalpaiguri district.

Recommendation

We recommend for (1) feeling up of vacancies of health assistances (HA-M/F) up to 100%. (2) Conducting increase insecticidal residual spray (IRS) maintaining quality and quantity. (3) Continue supply of RDK and second line medicine (SPACT) for malaria treatment (4) Increase spray gangs to work. (4) Manage to distribute insecticide treated bed nets (ITBN) to cover BPL house holds in the high risk areas of the district and encourage community to use it during sleep (5) Increase supervisory works by all level supervisors of the district. (6) Initiate training for private health service providers for malaria case managements. (7) Mass campaigning to increase knowledge, attitude and practices regarding vector control and personal protection for the community during fever episode (9) Conduct study to establish association of the risk factors for malaria deaths in the district.

Figure-II: Logical frame indicating input, process, output and impact indicators to different strategies of national Anti malarial programme(NAMP), Jalpaiguri district, West Bengal, India, 2007.

	National anti malaria programme strategies			
	Early detection and prompt treatment	Insecticidal residual spray	Personal protection	Information, education and communication(IEC)
Input	Percentage of Medical officer in position Percentage of Lab. technician officer in position Percentage of Health assistant- in position Percentage of health facility able to utilize 95% of fund Number of sub centre functioning in respect to requirement Established DDC in village of district	% of spray gang engaged to work % of health facility having adequate stock of insecticide	% of house-hold having at least one bed net % population ITBN supply to BPL family	Percentage of health facility have IEC materials for malaria
Process	% patient treated in public sector % patient treated with 2nd line of drugs % technician examine slide as per target % house visited by health workers % house visited by medical officer	% house hold covered % House hold sprayed among targeted	% population use bed nets % house hold supplied one bed nets among targeted population	# awareness camp held in the year
Outcome	% health facilities able to confirm malaria diagnosis % health facility able to collect blood smear as per target of national policy % of patient cured after treatment % of patient treated with 2nd line drug % of health facilities reporting no disruption of stock of anti-malarial drugs for 1 week	% spray done in quality(G.O) % house hold covered by DDT spray	Proportion of API decreased	% of community member able to recognize symptoms of malaria % population knows bed nets use prevent malaria
Impact	Case fatality rate Slide positivity rate Plasmodium falciparum percentage Number of deaths	Reduction of (1) Annual Parasite incidence (API) (2) Percentage of complicated malaria (3) Percentage of high risk sub-center (4) deaths with case fatality.		

Table-I. Some selected indicators of anti malaria programme in Jalpaiguri district, West Bengal, India, in comparison of the year 2006 and 2007.

Component	Indicators	2006 n/N	2007 n/N	2006 %	2007 %	increased/decreased in comparison
	Health assistant in position	537/1074	619/1074	50	58	+8
	Health assistant trained in malaria	537/537	619 /619	100	100	nil
	laboratory technician in position and trained	56/56	94/56	100	168	+68
	medical officer in position and trained	166/196	184/196	0.8	0.9	+0.1
	spray gang engaged to spray in district	93/104	61/104	90	60	-30
Input	Sanctioned malaria fund to blocks as per demand	5/13	13/13	38	100.0	+62
	Health facilities utilized 95% of received funds	28/56	56/56	50	100	+50
	Distribution of ITBN to BPL households	nil	21%	nil	21%	+21
	supply of 2nd line of anti malaria drug to health facilities	nil	38/56	nil	67.8	+67.8
	SC functioning in the district out of requirement	537/686	537/686	78%	78%	nil
	Supply of material on IEC in blocks	13/13	13 /13	100	100	nil
Process	Sub center visited by district official once in a year	7/537	27 /537	1.3	5	+3.7
	Sub center visited by medical officer once in a quarter	45/537	120 /537	8.4	22.3	+13.9

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SECTION-3:

OUTBREAK INVESTIGATIONS

Measles outbreak in Rajganj block, Jalpaiguri, West Bengal, India. 2007

Introduction:

Measles is the leading cause of childhood morbidity and mortality. World Health Organization (WHO) estimates that 30 millions measles cases and one million measles deaths occur every year.[1] The measles immunization coverage has a major impact on the incidence of measles in a community.[1,2] Measles outbreaks are common in communities with low vaccine coverage, mostly affecting children below 5 years of age.[3] As vaccine coverage increases, the time between outbreaks increases and a shift in incidence among older age group occurs as observed in several countries.[1-7]. The case fatality rate ranges from 0.06 to 2.2 per 1000 cases in population with good nutrition and medical cares compared to as high as 20 to 150 per 1000 in developing countries, where nutrition is poor and medical care is lacking.[1-7] Three main interventions can reduce death from measles complications. These are (1) administering two doses of vitamin A to all children with measles, (2) promptly treating complications (e.g. diarrhea, pneumonia, otitis media) and (3) ensuring that all children 9 months or older are vaccinated against measles.[1-8] Based on implementation of a combination of measles immunization and surveillance strategies worldwide, countries are considered to be in one of

Measles outbreak in Rajganj block, Jalpaiguri, West Bengal, India. 2007

Introduction:

Measles is the leading cause of childhood morbidity and mortality. World Health Organization (WHO) estimates that 30 millions measles cases and one million measles deaths occur every year.[1] The measles immunization coverage has a major impact on the incidence of measles in a community.[1,2] Measles outbreaks are common in communities with low vaccine coverage, mostly affecting children below 5 years of age.[3] As vaccine coverage increases, the time between outbreaks increases and a shift in incidence among older age group occurs as observed in several countries.[1-7]. The case fatality rate ranges from 0.06 to 2.2 per 1000 cases in population with good nutrition and medical cares compared to as high as 20 to 150 per 1000 in developing countries, where nutrition is poor and medical care is lacking.[1-7] Three main interventions can reduce death from measles complications. These are (1) administering two doses of vitamin A to all children with measles, (2) promptly treating complications (e.g. diarrhea, pneumonia, otitis media) and (3) ensuring that all children 9 months or older are vaccinated against measles.[1-8] Based on implementation of a combination of measles immunization and surveillance strategies worldwide, countries are considered to be in one of the three stages (a) control (b) Outbreak prevention and (c) elimination [3]. WHO/UNICEF formulated a strategic plan for measles mortality reduction and regional elimination between 2001 and 2005. This plan aims at a 50% mortality reduction and interruption of measles transmission in large geographical areas. The elimination strategy has includes three objectives (1) a routine immunization coverage of exceeding 90% in 80% of districts of the country (2) a second opportunity for measles vaccination through the routine system or through supplementary immunization activities and (3) enhanced surveillance and case management [1-8].

Accumulation of children who are either not immunized or do not develop immunity from one dose of vaccine given at nine months of age in successive birth cohorts can result in measles outbreaks.1 Investigation of these outbreaks often provides information that allows preventing future ones. This includes identification of high-risk groups, description of changes in measles epidemiology and detection of weaknesses in routine immunization.

On 9th August 2007, local health staffs reported seven suspected measles cases from Brahmatal para, Mogha para, Foutia para and Sarium villages of Rajganj block. The block medical officer of health (BMOH) confirmed this report. We investigated the cluster of measles with the objectives to (1) describe the magnitude (2) estimate the vaccine coverage and vaccine efficacy (3) know the reasons for occurrence of the outbreak and (4) propose recommendations for prevention and control of the outbreak.

Methods-

Descriptive study

Case definition: We defined a suspected cases of measles as occurrence of fever and maculo-papular rash with one any of the symptoms: (1) cough (2) coryza (3) conjunctivitis since June 2007, among children aged 14 years or less residing in the said villages of Rajganj block.

Case search: We conducted house-to-house search to identify the case patients on15th September 2007. We collected information about age, sex, residence, date of rash onset, measles immunization status and clinical details of the case patients from mother/parent of the case patients.

Laboratory investigation: We collected 4 blood samples from the measles case patients and transported them under cold chain to the National Serum Institution, Kolkata for serological investigations.

Data analysis: We constructed an epidemic curve to describe the time distribution. We calculated the attack rates by age and sex. We studied the place distribution of case-patients by plotting a spot-map.

Analytical study:

We hypothesized that the measles outbreaks in the area might have occurred due to low measles vaccine coverage and or low measles vaccine efficacy. Our null hypothesis was that the measles vaccine was not associated with the disease protection. To test this hypothesis, we conducted retrospective cohort study among children aged 9 months to 14 years residing in this area. We ascertained the immunization status of children based on the immunization card or mother's/ parent's history when the card was not available. Children who have had measles in the past, as reported by mother were excluded from the study. We calculated attack rates of measles by vaccination status. We also calculated the vaccine efficacy after excluding the children under 9 months of age, which was the lowest cut off month for measles vaccination in India. We calculated Relative Risk (RR) and their confidence interval (CI) using epi-info software. then we calculated vaccine efficacy using formula of (1-RR) [5].

Results:

Descriptive epidemiology

We identified 92 case patients meeting our case definition from a total population of 1,245 aged 14 years or less. The overall attack rate of measles was 7.4%. No death was reported. All the four samples were positive for IgM antibodies against measles.

The attack rates were higher among children aged 5-9 years (10.6%) and males (7.9%) (Table-1). Cases started occurring from 3rd week of June 2007. The dynamic of the outbreak suggested that there had been a number of generations of cases with a peak during the third week of August 2007. The last case was reported during the second week of September 2007. The epidemic curve suggested person-to-person transmission (Fig-1). The cases were reported from brahmatal para, mogha para, foutia para and sariam villages that were adjacent to each other (Fig.2)

Analytical Study:

We included 1245 children aged 9 months to 14 years in the cohort study. Of these, 843 (68%) were vaccinated against measles. The attack rates among vaccinated and un-vaccinated children were 3.6% (30/843) and 15.4% (62/402) respectively. The relative risk associated with measles vaccine was 0.23 (95% CI=0.15-0.35). The efficacy of measles vaccine was 77% (95% CI=65-85%).

Discussion

A measles outbreak affected four villages of Rajganj block of Jalpaiguri district India between June 2007 and August 2007. The outbreak probably occurred due to low immunization coverage in the area. The efficacy of measles vaccine on the other hand was satisfactory.

The results of the investigation indicated that the outbreak occurred in the population with low vaccine coverage. The vaccine coverage in these villages was lower than the coverage reported from block (84%) and district (88%) in 2007. Low vaccine coverage might have led to accumulation of children susceptible for measles thereby leading to the outbreak. On the other hand, efficacy of the vaccine was found to be satisfactory. The possible reasons for low vaccination coverage in these villages could be poor delivery of immunization services and /or low demand of community. The possible reasons for poor community participation in immunization activities as well as programmatic issues associated with lower coverage however need to be explored.

In conclusion, the measles outbreak in Rajganj block occurred due to low vaccine coverage. Based on our findings, we recommended (1) strengthen the routine immunization service delivery and (2) understand reasons for low coverage in the area.

Reference

1. WHO (1999), The World Health Report 1999, making a difference.
2. WHO (1999), Health situation in South-East Asia Region 11994-1999, Regional office, New Delhi.
3. WHO (1998), The World Health Report 1998, Life in the 21st century A Vision for all.
4. Government of India (2000), Annual Report 1999-2000, Ministry of Health and Family Welfare, New Delhi.
5. Text book of preventive and social medicine Park and park- 19th edition.
6. National Polio Surveillance Project – India, Measles Outbreak Investigation, A Practical Guide (May, 2003).
7. Harrison's text book of internal medicine

Table 1. Attack rates of a measles by age and sex invillages of Rajganj block, Jalpaiguri, India- 2007

Age and Sex	Population surveyed	Identified measles cases		Attack rate%
		Number	%	
<1 year	168	10	10.9	6
1 to 4 years	187	15	16.3	8
5 to 9 years	443	47	51.1	10.6
10 to 14 years	447	20	21.7	4.5
Male	660	52	56.5	7.9
Female	585	40	43.5	6.8
Total	1245	92	100	7.4

Table-2, Attack rate among immunized and unimmunized against measles by age group, Rajganj block, Jalpaiguri, India, 2007.

Age Groups	Population immunized against measles			Population unimmunized against measles		
	Cases	Total	Attack rate (%)	Cases	Total	Attack rate (%)
< 1 year	3	92	3.3	7	76	9.2
1 - 4 years	7	144	4.9	8	43	18.6
5 - 9 years	17	309	5.5	30	134	22.4
10-14 years	3	298	1.0	17	149	11.4
Total	30	843	3.6	62	402	15.4

Table 3. Attack rate, Relative risks among immunized and unimmunized, vaccine coverage and vaccine efficacy by age group of population of villages of Rajganj, Jalpaiguri, West Bengal, India 2007.

Age Groups	Population Immunized against measles			Population unimmunized against measles						
	Cases	Total	Attack Rate (%)	Cases	Total	Attack rate (%)	Relative Risk(RR)	95% C.I	Vaccine Coverage (%)	Vaccine Efficacy (%)
< 1 year	3	92	3.3	7	76	9.2	0.36	0.10-1.34	54.8	64
1 - 4 years	7	144	4.9	8	43	18.6	0.26	0.10-0.68	77	89.00
5 - 9 years	17	309	5.5	30	134	22.4	0.25	0.14-0.43	69.8	96.00
10-14 years	3	298	1	17	149	11.4	0.09	0.03-0.30	66.7	91.00
Total	30	843	3.6	62	402	15.4	0.23	0.15-0.35	67.7	77.00

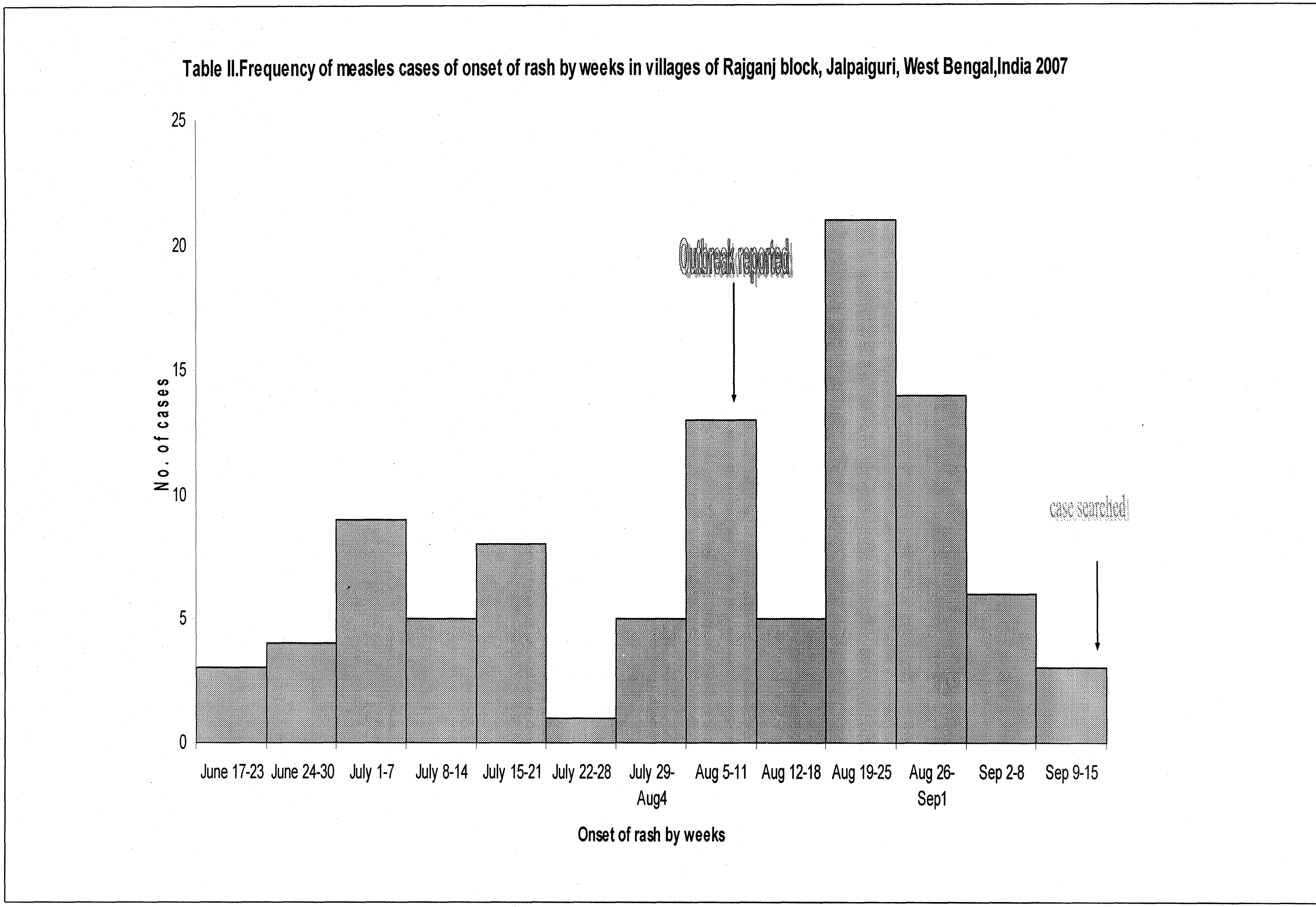
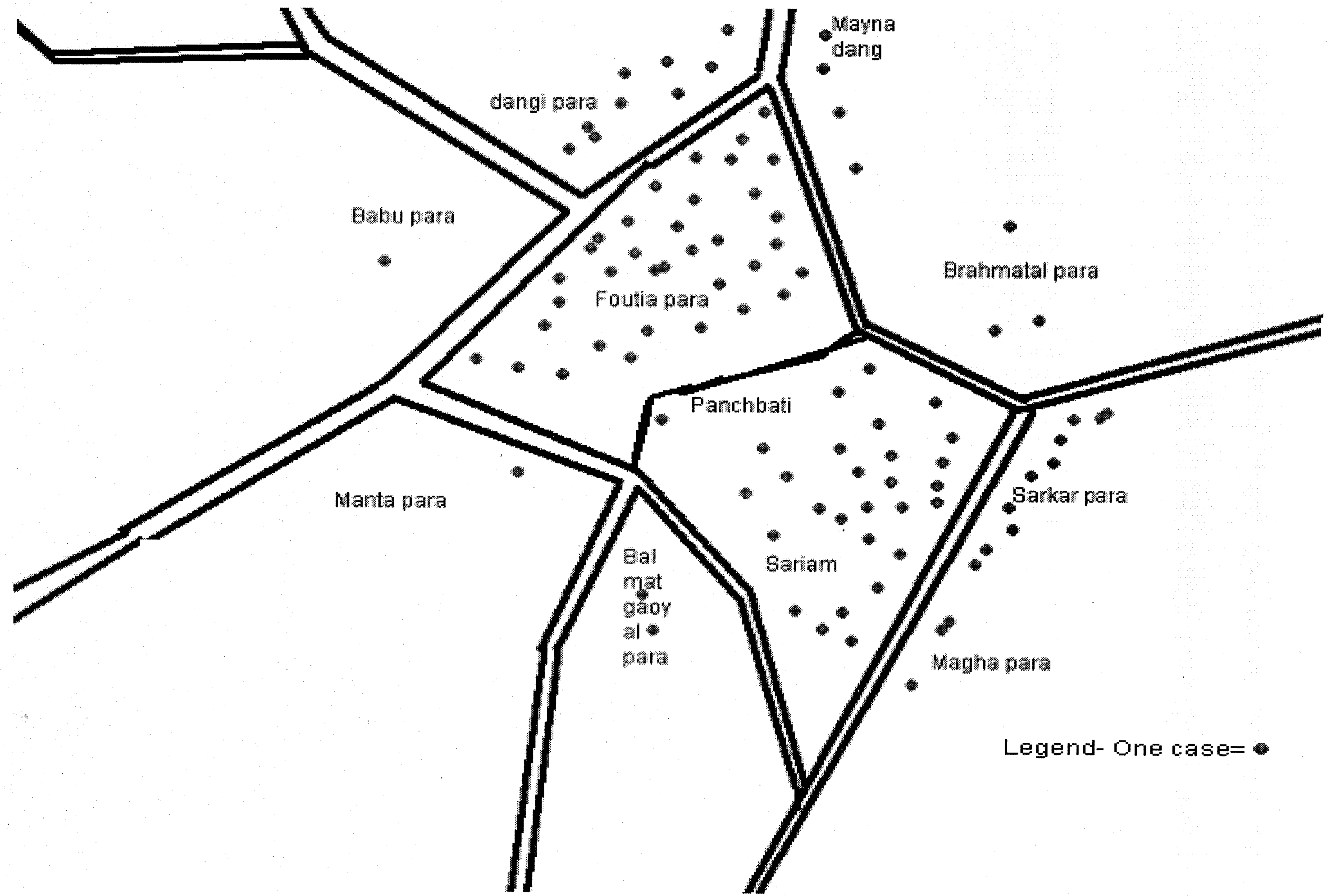


Table II.Frequency of measles cases of onset of rash by weeks in villages of Rajganj block, Jalpaiguri, West Bengal,India 2007
No. of cases
25
20
15
10
5
0
Outbreak reported
case searched
June 17-23
June 24-30
July 1-7
July 8-14
July 15-21
July 22-28
July 29-Aug4
Aug 5-11
Aug 12-18
Aug 19-25
Aug 26-Sep1
Sep 2-8
Sep 9-15
Onset of rash by weeks


Mayna
dang
dangi para
Babu para
Brahmatal para
Foutia para
Panchbati
Manta para
Sarkar para
Bal
mat
gaoy
al
para
Sariam
Magha para
Legend- One case=

Gastro-enteritis outbreak in a village, Cooch Behar district, West Bengal, India 2007.

Introduction*:*

On 16th May 2007, "Uttar Banga" local newspaper reported the occurrence of clustering of gastrointestinal illness in Dal lakshipur village of mathabhanga-II block of Cooch Behar District, West Bengal. As per the report, 80 persons were hospitalized. The Block Medical Officer of Health of Dhupguri rural hospital, Jalpaiguri, who confirmed the news, also reported that the outbreak occurred among people who attended the *puja* in the house of a resident of the village. A team consisting of FETP scholar, block sanitary inspector and block public health nurse of Dhupguri block investigated the outbreak on 16 May 2000 with the objectives of (1) estimating its magnitude (2) find out the causative organism, (3) identify the source of infection and vehicle of transmission and (4) recommend ways of controlling outbreak.

Method

We conducted a retrospective cohort study among people who attended the *puja* on 14th May 2007. Using standardized questioners, we interviewed the attendees in the hospital or in their houses and collected information regarding age, sex, various food items consumed as *puja prasad*, time of consumption of *puja prasad*, presence of symptoms of gastroenteritis and time of onset of the symptoms. We defined a case of gastroenteritis as the occurrence of loose motions with any of the symptoms of pain abdomen, fever, vomiting, among the *puja* attendees.

We drew the epidemic curve to know the distribution of cases over time. We calculated the attack rates of acute gastroenteritis according to age and sex. We calculated the relative risk and its 95% confidence interval (CI) associated with consumption of different food items. We also calculated the population attributable risk (PAR), using the formula (proportion of population exposed x (1-RR)/RR). We calculated incubation period to find out the organism of infection.

Results

Descriptive epidemiology:

A total of 178 individuals attended the puja, of which 160 (90%) were from the same village while 18 (10%) who were near relatives of the host of puja function, were from other villages. We interviewed 170 (95%) persons while eight individuals could not be contacted in their houses. Demographic, clinical details as well as history of food consumption were collected from other members of the households, hospital records and the host of the puja function.

We identified a total of 150 persons meeting the case definition of gastroenteritis with an attack rate of 84%. A total of 108 case patients were admitted in hospitals while 42 received treatment from the local health staffs. Apart from loose motions, abdominal cramps and pain abdomen (83%), fever (20%) and vomiting (19%) were the common symptoms among the 150 case patients, The attack rates were higher among individuals aged 30 years or more and males. All age groups however were affected (Table-1).

Cases of gastroenteritis started occurring at 6 AM on 15 May 2007 hours, peaked at 10 AM hours and then declined by 1.00 PM. A sharp rise in number of cases and then sudden decline indicates a common source outbreak with single exposure (Fig-1). The median incubation period was 10 hours (range: 6 - 12 hours)

The puja function was organized in the house of a villager. Three food items i.e. rice, sinni and fruits were served as puja prasad. Sinni was prepared by mixing wheat flour, banana, jaggery and raw milk and was served 7-8 hours after the preparation. The host served the puja prasad between 7 pm. to 12 midnight on 14th May 2007. There was no refrigerator in the house.

Analytical epidemiology:

The relative risk associated with consumption of Sinni was 4.84 (95% C.I: 1.74- 13.44). The relative risks of illness associated with consumption of rice and fruits were 1.28 (95% C.I: 1.07- 1.54) and 1.34 (95% C.I: 1.34- 1.64) respectively. Consumption of The population attributable fraction (PAF) associated with consumption of sinni was 78% (95% C.I, 55- 100). The corresponding figures associated with consumption of rice and fruits were 16% (95% CI=5- 28) and 20% (95% CI=7- 33) respectively.

Discussion

An outbreak of gastroenteritis occurred in Mathabhanga block of Cooch Behar district affecting a large proportion of puja attendees. More than three fourth of the cases could be explained by consumption of Sinni. The median incubation of disease was 10 hrs.

Use of Sinni during religious festival is a common custom in India. During the present outbreak, Sinni was prepared by mixing wheat flour, banana, jaggery and raw milk and was served 7-8 hours after the preparation. The findings of our investigation suggest that contamination of Sinni might have led to this outbreak. A similar outbreak was also reported in the same district in 2005.[1]

We could not conduct any laboratory investigation to identify the causative organism in stool, vomitus or food items. However, considering the median incubation period of 10 hrs and clinical presentation of case-patients, the possible organism that might have caused the outbreak was Clostridium perfringens. Clostridium perfringens is an anaerobic, Gram-positive, spore-forming rod (anaerobic means unable to grow in the presence of free oxygen). It is widely distributed in the environment and frequently occurs in the intestines of humans and many domestic and feral animals. The common form of perfringens poisoning is characterized by intense abdominal cramps and diarrhea which begin 8-22 hours after consumption of foods containing large numbers of those C. perfringens bacteria capable of producing the food poisoning toxin. The illness is usually over within 24 hours. In most instances, the actual cause of poisoning by C. perfringens is temperature abuse of prepared foods. Small numbers of the organisms are often present after cooking and multiply to food poisoning levels during cool down and storage of prepared foods.[2]

In conclusion, an outbreak of gastroenteritis occurred during a religious festival in Cooch Behar district. Consumption of contaminated Sinni was probably associated with the outbreak. Based on our findings, we propose the following recommendations. It is necessary to educate people about not using raw milk for preparing puja prasad and shortening of time interval between food preparations and serving to attendees. Health authorities also need to be educated about the importance of confirming the diagnosis by sending the appropriate specimen including food samples to appropriate laboratories.

References:

1. Pramanik T. Outbreak of gastroenteritis associated with consumption of Sinni during a religious festival, Cooch Behar district, West Bengal 2005 (unpublished)
2. Harrison's principal of internal medicines, chapter on communicable diseases.

Table-I. Attack rate of gastroenteritis by age and sex, Dal lakshipur village, Cooch Behar, West Bengal, 2007

Demographic characteristics		Ill	Total	Attack rate%
Age	< 5 year	21	28	75
	5-14 year	24	31	77.4
	15-29 year	40	49	81.6
	30-49 year	43	46	93.5
	50 year +	22	24	91.7
Sex	Male	74	85	87.1
	Female	76	93	81.7
Total		150	178	84.3

Table 2. Relative risk of gastroenteritis associated with consumption of different food items, Dal Lakshipur village, Cooch behar, West Bengal, 2007

Food items served	No. of persons who ate specified food items.				No. of persons who did not ate specified food items				Risk Ratio. (RR)	95% C.I
	Ill	Not ill	Total	Attack Rate%	Ill	Not ill	Total	Attack rate %		
Sinni	147	15	162	90.74	3	13	16	18.75	4.84	1.74-13.44
Rice	112	12	124	90.32	38	16	54	70.37	1.28	1.07- 1.54
Fruits	119	13	132	90.15	31	15	46	67.39	1.34	1.09- 1.64

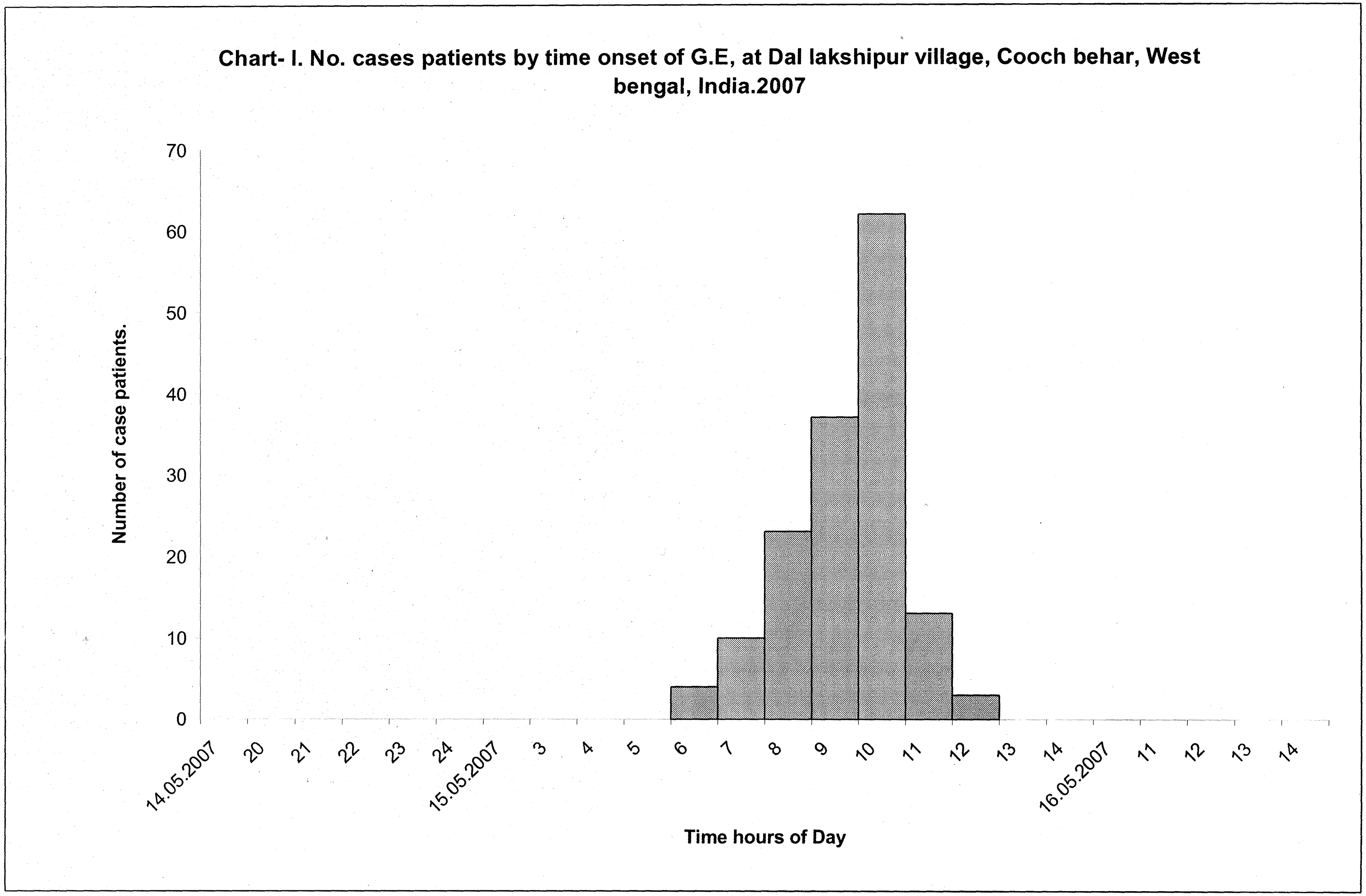
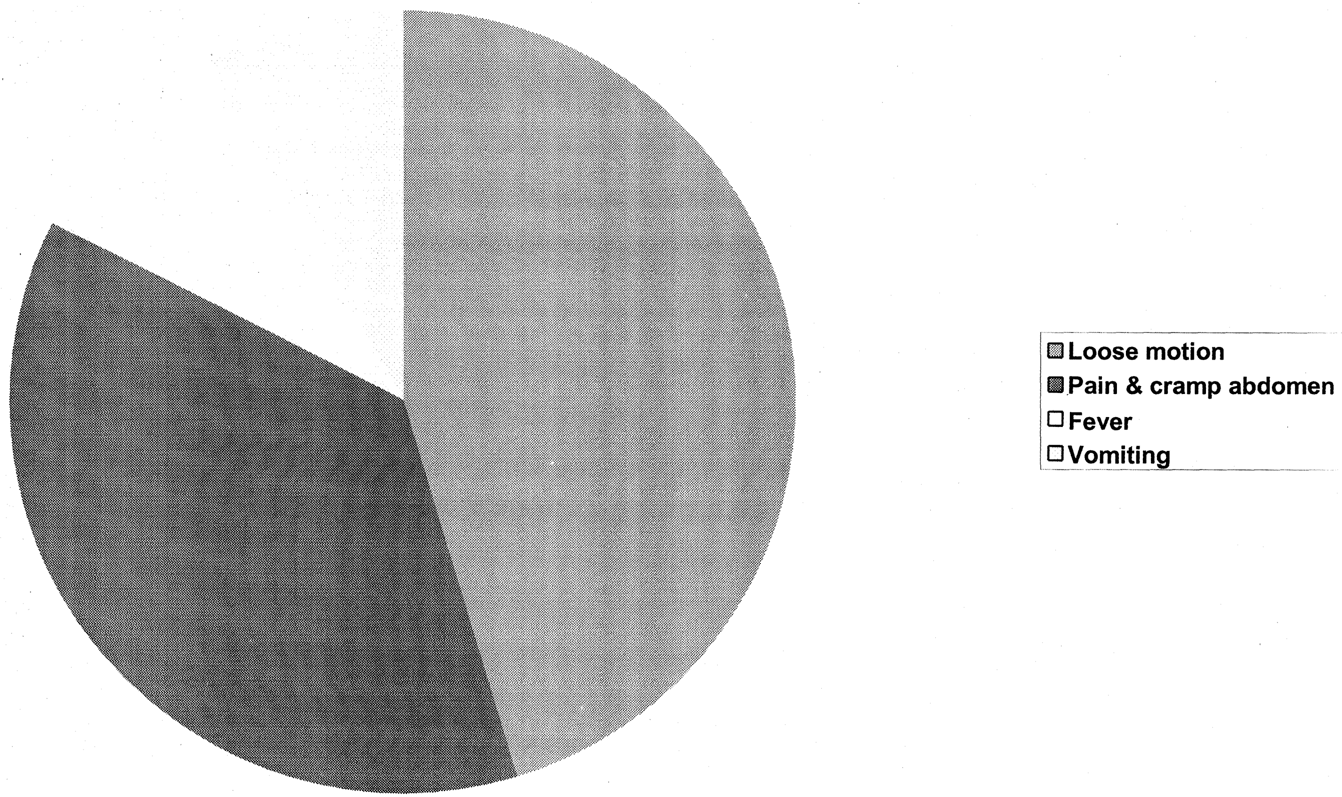


Chart- I. No. cases patients by time onset of G.E, at Dal lakshipur village, Cooch behar, West bengal, India.2007
Number of case patients.
70
60
50
40
30
20
10
0
14.05.2007
20
21
22
23
24
15.05.2007
3
4
5
6
7
8
9
10
11
12
13
14
16.05.2007
11
12
13
14
Time hours of Day

Chart-II. Symptoms of gastroenteritis by percentage of symptoms, Dal lakshipur village, Cooch Behar, West Bengal, India 2007.



Measles outbreak of Dhupguri block, Jalpaiguri, West Bengal, 2007.

Introduction:

Measles is the leading cause of childhood morbidity and mortality. World Health Organization (WHO) estimates that 30 millions measles cases and one million measles deaths occur every year[1].The measles immunization coverage has a major impact on the incidence of measles in a community. Measles outbreaks are common in communities with low vaccine coverage, mostly affecting children below 5 years of age.[2]When vaccine coverage increases, the time between outbreaks increases and a shift in incidence among older age group occurs, that has been observed in several countries.[1]The case fatality rate ranges from 0.06 to 2.2 per 1,000 cases in population with good nutrition and medical cares compared to as high as 20 to 150 per 1,000 in developing countries, where nutrition is poor and medical care is lacking.[3] Three main interventions can reduce death from measles complications. These are (1) administering two doses of vitamin A to all children with measles, (2) promptly treating complications (e.g. diarrhea, pneumonia, otitis media) and (3) ensuring that all children of aged 9 months or older are vaccinated against measles[1]. Based on implementation of a combination of measles immunization and surveillance strategies worldwide, countries are considered to be in one of the three stages (a) control (b) Outbreak prevention and (c) elimination.[1] WHO/UNICEF formulated a strategic plan for measles mortality reduction and regional elimination between 2001 and 2005. This plan aims at a 50% mortality reduction and interruption of measles transmission in large geographical areas. The elimination strategy has includes three objectives

(1) a routine immunization coverage of exceeding 90% in 80% of districts of the country (2) a second opportunity for measles vaccination through the routine system or through supplementary immunization activities and (3) enhanced surveillance and case management [1].

Accumulation of children who are either not immunized or do not develop immunity from one dose of vaccine given at nine months of age. Among successive birth cohorts can result in measles outbreaks. Investigation of these outbreaks often provides information that allows preventing future ones. This includes identification of high-risk groups, description of changes in measles epidemiology and detection of weaknesses in routine immunization.

On 9th July 2007, local health staffs reported two and on 13th four suspected measles cases from Ambari and Kanthalguri tea estates of Dhupguri block. The block medical officer of health (BMOH) confirmed this report. We investigated the cluster of measles with the objectives to (1) describe the magnitude (2) estimate the vaccine coverage and vaccine efficacy (3) know the reasons for occurrence of the outbreak and (4) propose recommendations for prevention and control of the outbreak.

Methods-

Descriptive study

Case definition: We defined a suspected cases of measles as occurrence of fever and maculo-papular rash with one any of the symptoms: (1) cough (2) coryza (3) conjunctivitis, since May 2007, among children aged 14 years or less residing in the tea estates of Dhupguri block.

Case search: We conducted house-to-house search to identify the case patients on 28th July 2007. We collected information about age, sex, residence, date of rash onset, measles immunization status and clinical details of the case patients from mother/parent of the case patients.

Laboratory investigation: We collected 10 blood samples from the measles case patients and transported them under cold chain to the National Serum Institution, Kolkata for serological investigations.

Data analysis: We constructed an epidemic curve to describe the time distribution. We calculated the attack rates by age and sex. We studied the place distribution of case-patients by plotting a spot-map.

Analytical study:

We hypothesized that the measles outbreaks in the area might have occurred due to low measles vaccine coverage and or low measles vaccine efficacy. Our null hypothesis was that the measles vaccine was not associated with the disease protection. To test this hypothesis, we conducted retrospective cohort study among children aged up to 14 years residing in this area. We ascertained the immunization status of children based on the immunization card or mother's/ parent's history when the card was not available. Children who have had measles in the past, as reported by mother/father were excluded from the study. We calculated attack rates of measles by vaccination status. We also calculated the vaccine efficacy after excluding the children under 9 months of age, which was the lowest cut off month of age for measles vaccination in India. We calculated Relative Risk (RR) and their confidence interval (CI) using epi-info software. Then we calculated vaccine efficacy using formula of (1-RR) [5].

Results:

Descriptive epidemiology

We identified 145 case patients meeting our case definition from a total population of 1976 aged 14 years or less. The overall attack rate of measles was 7 %. No death was reported. The four samples were positive for IgM antibodies against measles and other six reported as inadequate in amount.

The attack rates were higher among children aged 1- 4 years (16%) and males (7.9%) (Table-1). Cases started occurring from 17th week of year 2007. The dynamic of the outbreak suggested that there had been a number of generations of cases with two peaks during the 25th and 29th week of year 2007. The last case was identified during the 31st week of year 2007. The epidemic curve suggested person-to-person transmission (Fig-1). The cases were identified from two tea estates that were adjacent to each other and far away from block primary health centre (BPHC) and also from primary health center PHC) of the block (Fig.2)

Analytical Study:

We included 1976 children aged less than 14 years in the cohort study. Of these, 589 (29.8%) were vaccinated against measles. The attack rates among vaccinated and un-vaccinated children were 3.2% (19/589) and 9.1% (126/1387) respectively. The relative risk associated with measles vaccine was 0.36 (95% CI=0.21-0.82). The coverage of measles vaccination was 29.8% and the efficacy of measles vaccine was 64.5% (95% C.I:18- 79).

Discussion

A measles outbreak affected two tea estates of Dhupguri block of Jalpaiguri district India between May 2007 and August 2007. The outbreak probably occurred due to low immunization coverage and or low vaccine efficacy in the area.

The results of the investigation indicated that the outbreak occurred in the population with low vaccine coverage as well as low vaccine efficacy. The vaccine coverage and vaccine efficacy in these tea estates were lower than the vaccine coverage reported from block (87%) and district (87.75%) in 2007. Low vaccine coverage and vaccine efficacy might have led to accumulation of children susceptible for measles. Low vaccine coverage and vaccine efficacy thereby leading to the outbreak. The possible reasons for low vaccination coverage in these tea estates could be due to poor delivery of immunization services and/ or low demand of community. The possible reasons for low vaccination efficacy in these tea estates might be due to improper technique of immunization administration by vaccine providers and /or poor cold chain maintenance by the department. The possible reasons for poor community participation in immunization activities as well as programmatic issues associated with lower vaccine coverage and low vaccine efficacy. However these possibilities need to be explored.

In conclusion, the measles outbreak in Dhupguri block occurred due to low vaccine coverage and/ or low vaccine efficacy. Based on our findings, we recommended (1) strengthen the routine immunization service delivery and (2) understand reasons for low vaccine coverage and low vaccine efficacy in the area.

Reference

1. WHO (1999), The World Health Report 2008, making a difference.
2. WHO (2007), Health situation in South-East Asia Region 11994-2007, Regional office, New Delhi.
3. Government of India (2007), Annual Report 2006-2007, Ministry of Health and Family Welfare, New Delhi.
4. Text book of preventive and social medicine Park and park-19th edition.
5. National Polio Surveillance Project – India, Measles Outbreak Investigation, A Practical Guide (May, 2003).
6. Harrison's text book of internal medicine,12th edition, section communicable diseases.

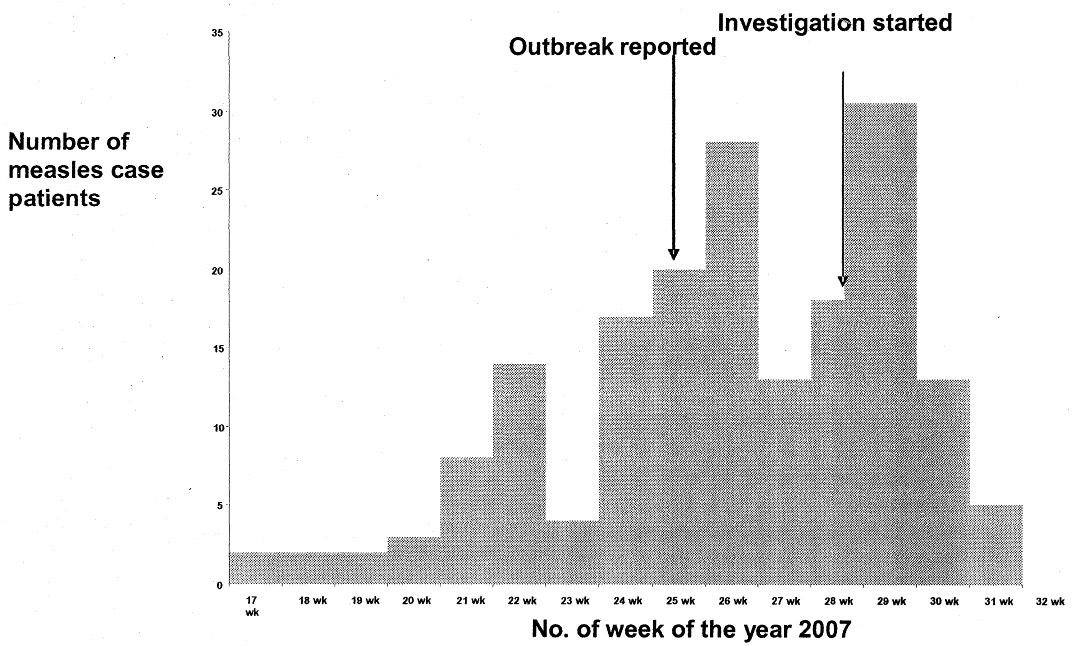
Table I. Attack rates of the measles outbreak by age and sex in tea estates of Dhupguri block, Jalpaiguri, India 2007

Age groups	No. of measles case patients identified	Population surveyed	Attack rate %
<1Year	14	165	8
1 To 4 Years	77	480	16
5 To 9 Years	49	690	7
10 to 14 Years	5	641	1
Male	83	1126	7
Female	62	850	7
Total	145	1976	7

Table- II. Attack rates, relative risks of measles among immunized and unimmunized by age, sex and total, vaccine coverage and vaccine efficacy , Dhupguri, West Bengal, India 2007.

age group	population Immunized against measles			population not immunized against measles			relative risk	95% C.I	Vaccine coverage	Vaccine efficacy
	cases	Total	Attack rate (%)	cases	Total	Attack rate (%)				
< 1 year	1	58	1.7	13	107	12.1	0.14	0.02-1.06	35.2	86.0
1 - 4 years	17	211	8.1	60	269	22.3	0.36	0.22-0.60	44.0	63.7
5 - 9 years	1	200	0.5	48	490	9.8	0.05	0.01-0.37	29.0	94.9
10-14 yrs	0	120	0	5	521	1	0	-	18.7	-
Male	10	321	3.1	70	702	10.0	0.31	0.16-0.60	31.4	68.8
Female	9	268	3.4	56	685	8.2	0.41	0.21-0.82	28.1	58.9
Total	19	589	3.2	126	1387	9.1	0.36	0.19-0.48	29.8	64.5

Graph III. Onset of measles by week of ambari and kathalguri tea estate, dhupguri, west Bengal, India 2007



Spotmap- I. Distribution of Measles cases in Kathalguri and Ambari tea garden of dhupguri Block, Jalpaiguri, West Bengal,India.2007

Legend:
Primary Health Center-
Tea garden hospital---
Measles cases----------
Block demarketed by Gram panchayet and Tea gardens area

SECTION- 4

CRITIQUING OF SCIENTIFIC LITERATURE

Title of the paper: Cassia occidentalis poisoning in children in western Uttar Pradesh

Authors: V. M. Vashishtha, Amod Kumar, T.Jacob John & N.C. Nayak.

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

Reviewer: Dr. Jagannath Sarkar, MAE- FETP scholar, cohort- VII, Chennai, India.

Date: 30. 09. 2007

General narrative comments:

Good subject for investigation and research. Study was done nicely. Write-up was also good. Only global and national problems were not highlighted. Time, place and persons distributions were not reflected properly by the help of epidemic curve, age and sex distribution table, spot map etc. The outcome of the study pointing towards future prevention method and toxicological research study for causative agent confirmation was valuable for the problem.

Area	Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
		1	2	3	4	5	
Overall assessment of the paper	The background provides a description of the public issue at the global and local levels and logically introduces the need to answer a specific research question.						1) No global and national scenario.
	The results reports sound scientific results that meet the study's objective and the research question. They are presented with sufficient details and adequate statistical information (e.g., Confidence Intervals).						2 by 2 table and chi-square test not reflected.
	The discussion summarizes and interprets the results, discusses the findings in view of what is already known, frames what the results of the study can support, defines the limitation of the work and suggests next steps in terms of (1) intervention and (2) research.				,,		1) Laboratory test results not indicating definite cause of case patient of the out break. 2) Suggestion of intervention by awareness and weeds reduction as well as research study on toxicology sufficient.

Methods	The study design is adequate to meet the objective.				,,	Case control study appropriate
	The study population is well defined and relevant to the research question				,,	Community based local population were best study population
	Definitions are specified, sound and based upon standardized criteria when available.	,,				Definitions are not specified clinically and by Laboratory tests
	Sampling methods are statistically sound and adapted.				,,	Community based neibouring and relatives are best controls
	The sample size was estimated beforehand appropriately.				,,	Only 18 cases so control- 3 times is correct
	The study is exempt from bias.			,,		Age matched-no confounding and selection bias, recent history-no recall bias, community based- no barkesonian bias but no double blinding- interviewer bias present
	The data that were collected are well described and relevant.				,,	
	The data was collected was of sufficient quality.				,,	
	The analysis is thought beforehand and appropriate.		,,			Age and sex distribution analysis lacking.

	The indicators generated are appropriate and well calculated.	,,	
	The statistical tests used are appropriate and well computed.	,,	Chi Squire and fisher exact test are appropriate but not computed.
	Appropriate attention has been given to human subject protection issues.	,,	Parents of the died children's were interviewed without written consent and without presence of psychiatrist with treatment available.
Methods	The study design is adequate to meet the objective.	,,	Case control study appropriate
	dy population is well defined and relevant to the question	,,	Community based local population were best study population
	Definitions are specified, sound and based upon standardized criteria when available.	,,	Definitions are not specified clinically and by Laboratory tests
	Sampling methods are statistically sound and adapted.	,,	Community based neibouring and relatives are best controls
	The sample size was estimated beforehand appropriately.	,,	Only 18 cases so control- 3 times is correct

The study is exempt from bias.		,,		Age matched-no confounding and selection bias, recent history-no recall bias, community based- no barkesonian bias but no double blinding- interviewer bias present
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Appropriate attention has been given to human subject protection issues.	,,			Parents of the died children's were interviewed without written consent and without presence of psychiatrist with treatment available.

		1	2	3	4	5	
Writing	The content is well distributed by chapters and sections.					,,	The content is well distributed by chapters and sections.
	The language is simple and clear. The word count is < 3000.				,,		The language is simple and clear. The word count is more than 3000.
	The writing is sequential, going from one point to the next.	,,					Introduction contains method and result section contains method and discussion.
	The active voice is used throughout.		,,				Not in interpretation and conclusion
	The vocabulary is precise, consistent and standardized.		,,				More theory based discussion
Tables and figures	There are no more than five tables and or figures. All are needed.		,,				1) 2 tables and 1 figure 2) Table- I and figure not needed.
	The choice of graph or table to display information is judicious.		,,				Only Table- II is judicious
	ıre clear, exact and the totals add up.		,,				
	The graphs are effective, appropriate and understandable.	,,					Not needed graph of plant