FIELD PROJECT REPORTS

By

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CERTIFICATION

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

Date

DIRECTOR

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Date: the 30th December 2005 Dr. Asit Kumar Biswas

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Section 1: First Field Posting

Situation analysis of Purulia district, West Bengal, India, 2004

1. Introduction

I had been working as Deputy Chief Medical Officer of Health – II, Purulia before enrollment in the Master of Applied Epidemiology course. The job responsibility was to plan, implement, monitor and supervise all public health programmes at district level. Since the district faces multiple public health problems including malaria, filarial, leprosy and tuberculosis, the post demands hard working for successful surveillance activities. The post carries responsibility of district nodal officer for the national AIDS control programme and national blindness control programme as well as the responsibility for the district statistical cell. These includes compilation, collection, interpretation and feedback of all data generated at district level related to indicators of reproductive and child health programme, all national public health programmes and health care facilities. For the last one year I have been entrusted with additional charge of Deputy Chief Medical Officer of Health – I, Purulia with responsibility to look after the district reserve store. The job included planning, procurement and distribution of medicine and equipment at district level. I had to send the report to Chief Medical officer of Health of the district and respective state programme officers.

As field epidemiology training programme (FETP) scholar, I shall work as medical officer on training reserve under the Government of West Bengal and shall be placed under the Chief Medical Officer of Health, Purulia for doing my field epidemiology training in terms of doing projects to be assigned time to time by the National Institute of Epidemiology, Chennai. I shall meet Director of Health Services and appraise him about my assignments. I shall also meet Joint Director of Health Services (Public Health and Communicable Disease) and other officers to discuss and interview them for getting data pertaining to the

government orders and existing surveillance system at health directorate which is in the Swasthwa Bhawan, Salt Lake, Kolkata – 700 091. In Purulia district, I shall visit district health offices, meet all district level officers, interview them as per my project methodology to know about the present health scenario, secondary data, existing surveillance system including flow of data and getting data for evaluation of the surveillance system. I shall visit the health facilities (health sub center, primary health center, community health center, sub-division and district hospital) to collect information related to the present health scenario, secondary data, and existing surveillance system. I shall also share my observations time to time with the workers at all level for the betterment of health care services.

The objectives of the situational analysis of Purulia district, West Bengal are to (1) describe of geography, population and economical resources (2) know organization of the health system (3) understand major public health priorities and (4) present health status related to indicators towards the millennium development goals.

2. Methodology:

The key elements of the situational analysis were to describe geographical characteristics, demographic characteristics, socio-economic characteristics, important health related millennium development goals indicators (such as prevalence and death rate associated with tuberculosis, infant mortality rate, maternal mortality ratio per 100,000 live birth, measles immunization among children under one, under-five mortality rate per 1000 children, percent of children under age 0-3 months on exclusively breast fed, percentage of children 12-59 month of age who received one dose of vitamin A in the past six months, couple protection rate), organizational set up of the state and district, major public health priorities with flow chart in context of the Purulia district, West Bengal, India.

Data collection

We visited different offices of health and other related department at district and community block level to explain our objectives and the importance of verification of records and collection of reports. We also discussed with them to understand the organizational set up of health system. We also consulted with various reports published at state and district level by department of health and family welfare, bureau of applied economics and statistics, government of West Bengal. The reports included (1) District statistical hand book, (2) Census data, 2001 (3) SRS report, 2001 (4) West Bengal human development report, 2003 (5) National Family Health Survey 2 report (6) Health on march 2002-03, West Bengal (7) Millennium development goals, India country profile, World bank and (8) The World Health report, 2004.

3. Result

Location, climate, geography, population and economical resources

Purulia district lies between 22.6^0 and 23.5^0 north latitude and 85.8^0 and 86.7^0 east longitude in the Western side of the State West Bengal, India (Figure 1). The total geographical area of the district was 6259 sq. km. The district was surrounded by the Bankura, Midnapore and Burdwan districts of the state of West Bengal and the Hazaribagh, Singbhum, Dhanbad, Ranchi, Jamshedpur and Bokaro district of the state of Jharkhand. Purulia district was characterized by underlying topography with rugged hilly terrains in the western and southern parts. General elevation of the land surface ranged from 150 meters to 300 meters, with a master slope leaning towards the east and southeast. The main rivers passing through or bordering the district were Kangshabati, Kumari, Darakeshwar, Subarnarekha and Damodar. Purulia district had a sub tropical climate and is characterized by evaporation and low precipitation. Thus, Purulia was a drought prone district that falls within the semi-arid region of the state.

Average annual rainfall varied between 1100 and 1500 mm. The relative humidity was high in monsoon (75%-85%) and low in the summer (25%-35%). Annual temperature of the district varied over a range of 7^0 Celsius in winter to 46.8^0 Celsius in summer. Purulia district headquarter was located at Purulia town. The district had three administrative sub-divisions, called Sadar East, Sadar West and Raghunathpur. There were 20 police stations, 20 Community developments Blocks (figure 1), three Municipalities, 170 Gram Panchayats and 2459 inhibited villages. As per 2001 census the total Population of the district was 25,35,233. Of this 22,79,174 (89.9%) were residing in rural areas. About 12,37,194 (48.8%) of the populations were females. The proportion of Schedule caste and Schedule tribes were 21.3% and 19.0% respectively. The district had an average population density 409 per sq.km with a decennial growth rate 13.9% (Table 1). The proportion of literate population among above 7 years of the district was 56.1%. The male literacy was 74.2% as compared to 37.2% for female. About one-forth of the total population of the district were classified as main workers, one-fifth as marginal workers and rest as non-workers. Of the main workers 31.2% were cultivators, 36.1% were agricultural labours, 7.4% were engaged in household industries and rest in other activities.

Major public health priorities

The public health problems in the district related with maternal conditions, communicable diseases, non-communicable diseases and injuries. Important communicable diseases were diarrhoeal diseases, acute respiratory infection (including pneumonia), tuberculosis, malaria, filarial, leprosy, enteric fever, viral hepatitis and sexually transmitted diseases. Malaria, acute poliomyelitis and leprosy were the three public health priorities in Purulia district (Table 2).

Organization of the health system

At district level Chief Medical Officer of Health was overall in charge and responsible for the health case delivering system. The Director of Health Services of the state and District Health and Family Welfare Samity, Purulia

guided him. The District Health and Family Welfare Samity was a society with Savadhipati, Purulia Zila Parishad as Chairman, District Magistrate, Purulia as Vice-Chairman and Chief Medical Officer as member secretary and other members from respective department took decisions on policy making 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 were a good number of 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 programmes), Zonal Leprosy Officer, District Immunization Officer and District Tuberculosis Officer. One Asst. Chief Medical Officer (Medical and Administration) was looking on accounts and day-to-day administration with guidance from Chief Medical Officer of Health. The Superintendent who was accountable to Chief Medical Officer of Health administers hospitals. At the sub-divisional level Assistant Chief Medical Officer of Health (Subdivision) was responsible for discharging health cares services in the sub division. Superintendent of the sub divisional hospital was directly accountable to Chief Medical Officer of Health. Block Medical Officer of Health was overall responsible for discharging curative and preventive services in the community block. Chief Medical Officer Health, Asst. Chief Medical Officer of Health (Sub division) and Block Health and Family Welfare Samity (a society similar to the district level) guided him to take dicision. 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 assisted him for discharging preventive services. PHC Medical Officer headed each primary health center cover a population of 30000-40000. Health supervisor male and female assisted a PHC Medical Officer. A sub center was the basic unit of preventive activity and it covered a population of 6000-7000. Health assistants female and male discharged the services. Within a sub center there were some support personnel for every 1000 population namely Anganwadi Worker,

Community Health Guide and trained dhai to help in organizing health activities in respective areas.

Indicators towards the millennium development goals

Malaria death rate was high in the district in relation to state and national level. High endemic to malaria of the district was the possible explanation. However other health related millennium goals indicators were not available in the district like under five mortality rate per 1000 children, HIV prevalence among 15 – 24 years of all women, condom use rate of the contraceptive prevalence rate, number of children orphaned by HIV / AIDS to comments. Target of Goal 4 was to reduce the under-five mortality rate by two-thirds, which was two third of 123 per 1000 between 1990 and 2015 but 1999 no data were available pertaining to this indicator. However west Bengal had under-five mortality rate in district and state was much less than national level in the year 2003. Goal 5 target was to reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio. The district level figure was 288 per 100000 live births that are higher than the state level figure but better than the national level figure. Death rate and prevalence of Tuberculosis both were less in the district and in the state in comparison to the national level. Proportion of tuberculosis cases detected and cured under DOTS was also higher in the district as well as in the in comparison to the national level (Table 4).

4. Discussion

Situated in the western part of the state West Bengal, Purulia district had extreme climate and poor rainfall. This affected the agriculture of the non-industry based district and in tern the economy of the people. Poor economy, little literacy (particularly female literacy) and inadequate infrastructure support reflected to high prevalence of public health problems related to almost all public health diseases. Indicators of millennium development goals were far away from target demanded special attention and specific micro plan.

The sub tropical climate with low precipitation made the district drought prone. This resulted in dominancy of waterborne and vector borne diseases in the district particularly in post monsoon. Poor economic reflected in results of high prevalence of tuberculosis and leprosy in the district.

Poliomyelitis was the public health priorities in the district as a part of international eradication. Existence of cases in adjacent districts demanded high quality acute flaccid paralysis surveillance as well as other eradication activities including routine immunization. Malaria was the second public health priorities for high incidence rate and case fatality rate particularly in western and southern part of the district. Development of resistance, inaccessibility to tribal people from remote area challenges the control programme. Leprosy, disease under elimination target in the country was the next public health priority since the disease prevails for very long. Though improvement in reduction of prevalence rate occurred in last decade it is far away from elimination target.

Organizational set up though in existence at different level, there were vacancies of manpower that in terns affect the activities. More over each level (community health center, primary health center and health sub center) at present served a larger population to their norms. This increased the workload at the cost of quality of services.

In the district level some data were regularly generated but some data pertaining to the indicators of millennium development goals were not being generated and for this, some modifications were required in the forms (data collection instruments). In addition to this, analysis of the raw data were to be done at the level of block and district also so that the officer concerned can take appropriate measures at their own level as per the result of analysis.

We proposed potential areas of work for my various assignments which included (1) acute flaccid paralysis for poliomyelitis (surveillance system description and evaluation) and (2) national anti malaria programme (secondary data analysis and programme evaluation).

Figure 1: Purulia district: Location in the state of West Bengal and administrative divisions, India, 2004

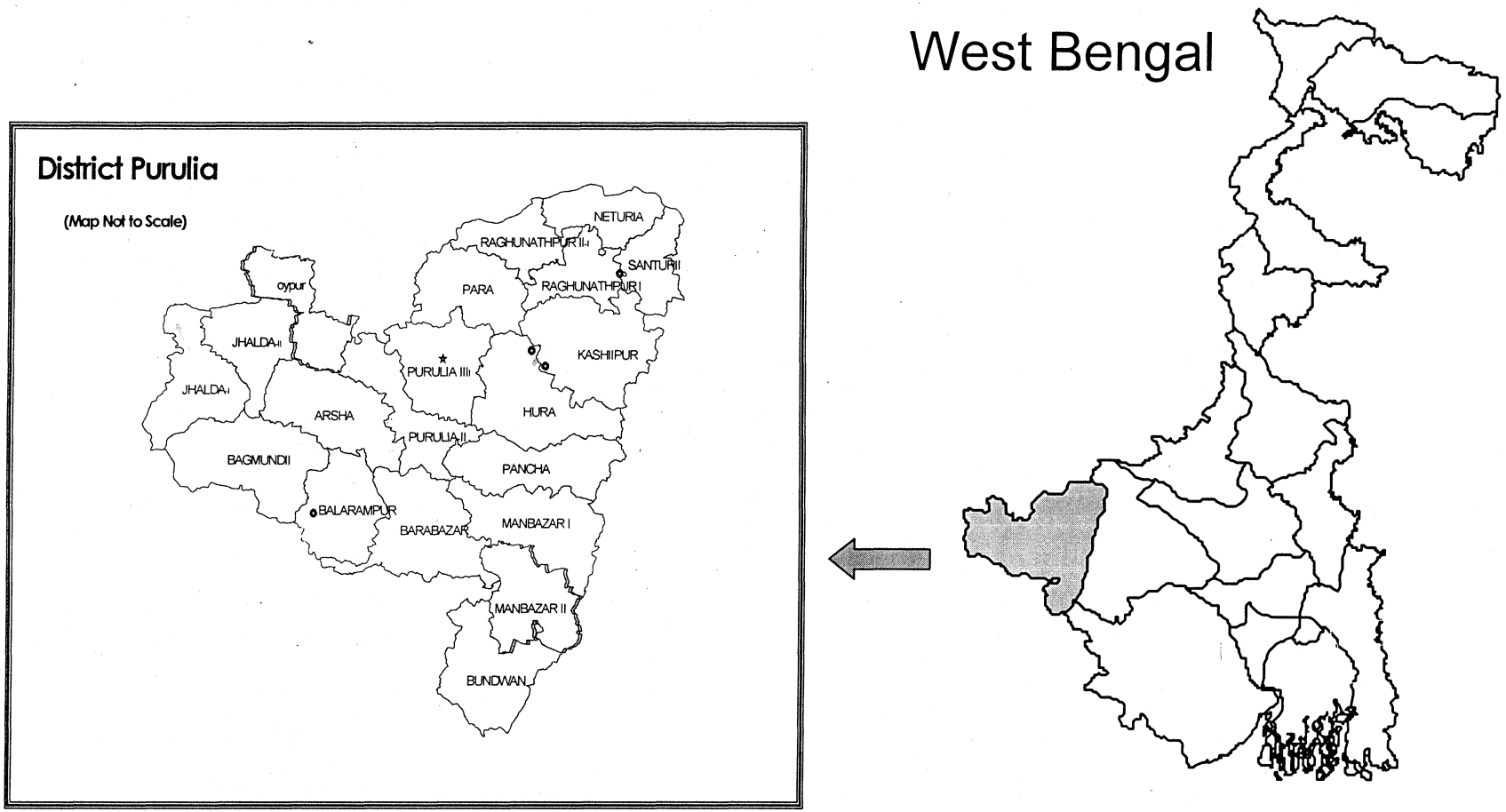


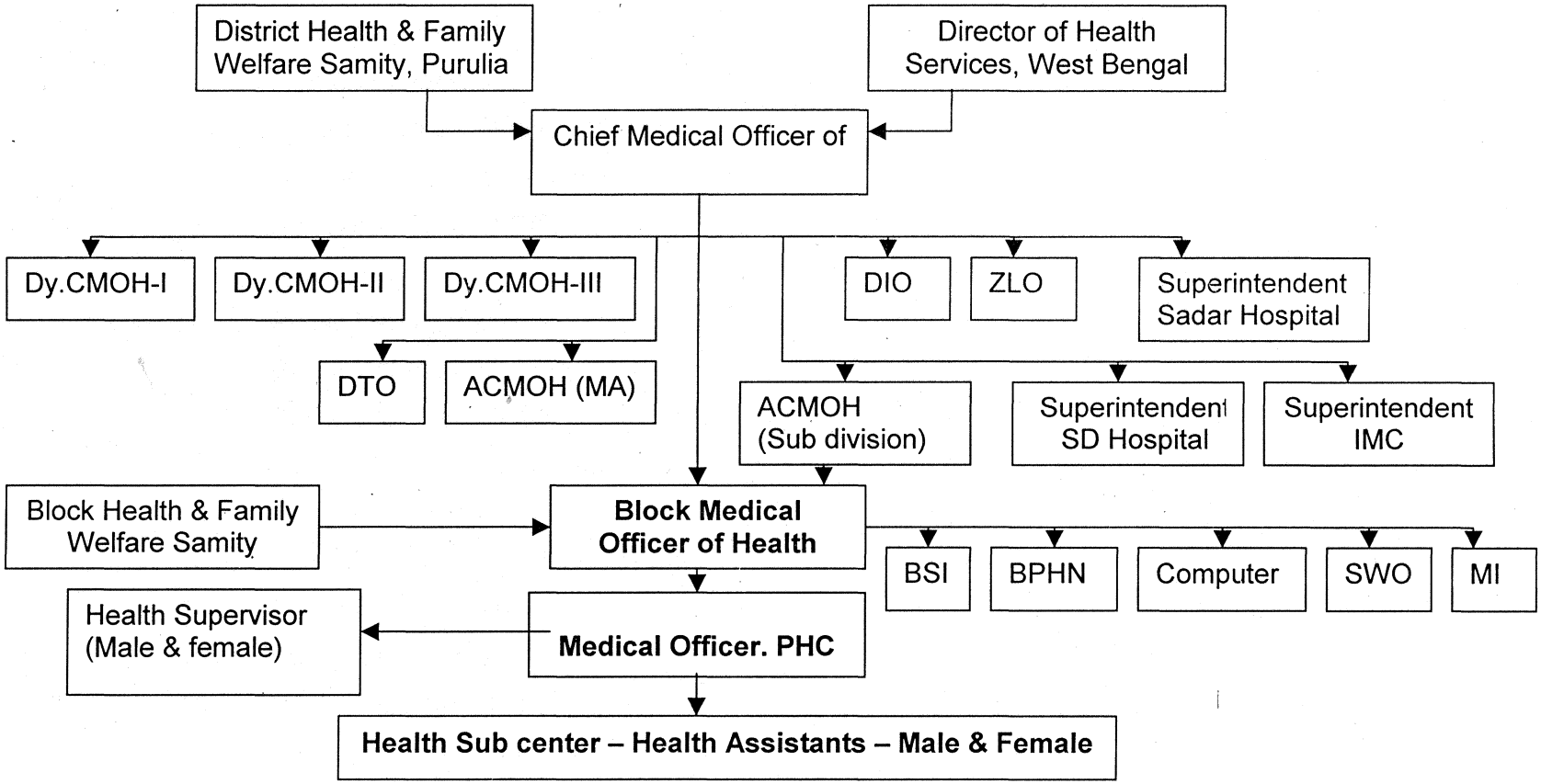
Table 1: Characteristics of the population of Purulia district, West Bengal, India, 2001

Population group	Population size (in thousand)	Proportion of the total (%)
0-4 years of age	321	13
5 - 9 years of age	321	13
10 -14 years of age	324	13
15-44 years of age	1,101	43
44-59 years of age	407	16
60 + years of age	60	3
Male	1,309	52
Female	1,228	48
Above poverty level	1,216	48
Below poverty level	1,321	52
General caste	659	26
Schedule caste	532	21
Schedule tribe	482	19
Other backward caste	862	34
Literacy	1,421	56
Total population size (Estimated)	2,537	100

Table 2: Key public health priorities in Purulia, West Bengal, India, 2003

Public health priority	Key elements	Ongoing prevention and control programmes
Malaria	• 2.6 million (100%) of population at risk • Ten to twelve thousand annual episodes • Plasmodium falciparum infection is as high as 60 % of total malaria cases • Deaths reported from endemic areas	1. Preventive strategy (a) Early detection and prompt treatment (b) Selective vector control (c) Personal protection (d) Information, education and communication 2. Control strategy (a) Treatment of uncomplicated malaria at community level (b) Treatment of complicated malaria at health facility 3. Early detection and management of epidemic
Acute Poliomyelitis	• Disease under international eradication programme • Cases detected in 2003 in adjacent Burdwan district and Jharkhand state	1. Pulse polio immunization 2. Routine immunization 3. Mopping up if wild virus is identified 4. Acute flaccid paralysis surveillance – investigation and follow up of cases
Leprosy	• Disease under national elimination programme • High prevalence rate (5 per 10000 population) compared to state West Bengal • Elimination goal has fixed at prevalence rate at one per ten thousand by 2005.	1. Preventive strategy (a) Detection and treatment at health facility (b) Information, education and communication (c) Community programmes like Mass Leprosy Elimination Campaign, Block Leprosy Awareness Campaign 4. Other strategy (a) Cleaning of register (b) Disability management including reconstructive surgery.

Figure – 2: Flow chart illustrating the administrative structure of the health system, Purulia, West Bengal, India 2003



Dy. CMOH – Deputy Chief Medical officer of Health
DIO – District Immunization Officer
DTO – District Tuberculosis Officer
ZLO – Zonal Leprosy Officer
ACMOH - Assistant Chief Medical Officer of Health
SD – Sub division
IMC – Institute of mental Care
BSI – Block Sanitary Inspector
BPHN – Block Public Health Nurse
SWO – Social Welfare Officer
MI – Malaria Inspector
MA – Medical & Administration

Table – 3: Health manpower in district Purulia, West Bengal, 2003

Sl. No.	Category of staff	Sanction	In-position	Vacancy
1	Medical Officer	176	91	85
2	Dental Surgeon	15	11	4
3	Senior Ayurvedic Medical Officer	23	23	-
4	Homeopathic Medical Officer	36	36	-
5	Additional Medical Officer	22	22	-
6	Pharmacist	75	64	11
7	Public Health Nurse	40	25	15
8	General Nurse Midwifary	191	111	80
9	Social Welfare Officer	20	6	14
10	Medical Technologist (Laboratory)	22	19	3
11	Assistant Computer	20	20	-
12	Para Medical Opthalmic Assistant	20	20	-
13	Block Sanitary Inspector	20	1	19
14	Health Supervisor	128	58	70
15	Health Assistant (Male)	385	304	81
16	Health Assistant (Female)	385	338	47
17	General Duty Attendant	338	324	14
18	Sweeper	173	138	35

Table 4: Indicators of progress for the health related millennium development goals, Purulia, West Bengal, India, 2003

Goal	Indicator	Value of the indicator		
		In Purulia (Year)	In West Bengal (Year)	In India (Year)
Goal 1	Percent of children under three years underweight	NA	48.7 (1998)	47.0 (1998)
	Proportion of population below minimum level of dietary energy consumption	NA	NA	NA
	Percentage of children 12-59 month of age who received one dose of vitamin A in the past six months	NA	43.4 (1999)	29.7 (1999)
	Percent of children under age 0-3 months on exclusively breast fed	NA	48.8 (1999)	55.2 (1999)
Goal 4	Under-five mortality rate per 1000 children	NA	67.6 (1999)	87.0 (2003)
	Infant mortality rate per 1000 live birth	57 (2002)	49(2002)	63 (2002)
	Measles immunization among children under one	72 (2003)	75.49 (2003)	67.0[1](2002)
Goal 5	Maternal mortality ratio per 1,00,000 live birth	288 (2003)	266 (1998)	540 (2001)
	Proportion of births attended by skilled health personnel	65 (2003)	44.2 (98-99)	42.5 (2001)
	Eligible Couple protection rate	47 (98-99)	47.00 (98-99)	47 (2000)
	Percentage of women receiving antenatal care (three ANC)	58 (03 – 04)	58.6 (03 – 04)	41.3 (98 – 99)
Goal 6 (HIV)	HIV prevalence among 15-24 yrs old pregnant women **(15 – 24 yrs women)**	NA	NA	0.7 (2001)
	Condom use rate of the contraceptive prevalence rate	NA	7.1 (98 – 99)	7.2 (98 – 99)
	Number of children orphaned by HIV/AIDS	NA	NA	NA
	Percentage of people using a condom during most recent higher risk sexual encounter	NA	NA	49.3
	Percentage of STI clients who are diagnosed and treated according to guidelines (in Family Health Awareness Campaign 2003)	61 % (2003)	86 % (2003)	89 % (2003)
	Percentage of HIV-positive women receiving anti-retroviral treatment during pregnancy to prevent mother to child transmission of HIV- January 2003 to June 2004	NA	NA	84.5 % (2003)

Table 4 (contd.): Indicators of progress for health related millennium development goals, Purulia, West Bengal, India, 2003

Goal	Indicator	Value of the indicator		
		In [location] (Year)	In the state (Year)	In India (Year)
Goal 6 (Malaria)	Malaria death rate	0.005 (2003)	0.004 (2003)	0.003 (2000)
	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	NA	NA	NA
	Percentage of pregnant women who have taken chemoprophylaxis or drug treatment for malaria	Not found	NA	NA
	The proportion of households having at least one insecticide treated bed nets	NA	NA	NA
Goal 6 (TB)	Prevalence and death rate associated with tuberculosis	Prevalence =0.05 Death rate = 0.0002 (2003)	Prevalence =0.1 Death rate =0.002 (2003)	Prevalence =0.06 Death rate =0.005 (2003)
	Proportion of tuberculosis cases detected and cured under DOTS	1.2 (2003)	1.2 (2003)	0.1 (2003)
	Percentage of estimated new smear-positive tuberculosis cases registered under the DOTS approach	38 % (2003)	58 % (2003)	47% (2003)
Goal 7	Proportion of population with sustainable access to an improved water source, urban and rural	85 (2001)	89.3 (1999)	77.9 (1999)
	Proportion of urban population with access to improved sanitation	17 (2001)	55 (1999)	64 (1999)
Goal 8	Proportion of population with access to affordable essential drugs on a sustainable basis	NA	NA	NA

Reference

1. District Statistical Hand Book: Purulia 2002
2. Census Data: Census of India 2001
3. Directorate of Agriculture, and State Forest Department, Govt. of West Bengal.
4. SRS, Department of Family Welfare, Government of India
5. West Bengal Human Development report, 2003
6. NFHS 2 Report
7. Health on the March, 2002-2003
8. Records of Office of the Deputy Chief Medical Officer of Health II, Purulia
9. Records of Office of the Deputy Chief Medical Officer of Health III, Purulia
10. Millennium development goals, India country profile, World Bank.
11. The World Health Report 2004, annexure 7

Laboratory facilities and linkage in Purulia district, West Bengal, India, 2004

1. Introduction

Laboratory support is essential to proper functioning of disease surveillance and hence comprehensive support require for surveillance related laboratory work, and improving computing and communication facilities of the participating laboratories at the block, district and state levels. Currently, the laboratory support in many areas appears weak and the available system is not integrated well with the district and state surveillance program. Areas that need special attention include technology and infrastructure for performing essential diagnostic tests at the district level, particularly microbiology cultures, bio-safety management and quality assurance. The laboratory networks are ideally at four levels of functions. These are (a) peripheral Laboratories and Microscopic centers (b) district public health Laboratory (c) disease based state laboratories and (d) reference laboratories and quality control laboratories.

Accurate and timely laboratory facilities and information has become the foundation upon which current disease treatment, prevention and control programmes are based. The usefulness of a laboratory are (a) to detect confirm clinical cases and epidemic (b) to identify the immunization status / carrier stage / vaccine (c) disease elimination/ eradication/ surveillance (d) detection of new pathogen and (e) detection, treatment and surveillance of anti-microbial/ parasite resistance.

The objectives of the study are to (1) identify the laboratory at periphery and district level as well as their functioning and (2) networking and linkage with other state level laboratories and referral laboratories during routine as well as epidemic situation.

2. Methods

We identified three laboratories primarily. Of these two were at different peripheral level namely (1) laboratory of Bandwan block primary health center and (2) laboratory of Manbazar rural hospital. The third was the laboratory of Deben Mahato Hospital (District Hospital, Purulia) functioning at district level. We visited all three laboratories and had a talk with the laboratory technician(s) and Medical Officer or pathologist-in-charge. We identified the resources in terms of manpower and equipments. We went through the records and registered maintained at the laboratories to get a better understanding on processes. We also identified the various tests that are done at the primary (first level) and secondary (referral) level.

3. Results

Laboratory setting was available at the district hospital, sub-division hospital and other 23 microscopic centers in all the blocks of the district (Figure 1). The Railway Divisional Hospital had a good laboratory facility. There were private laboratories in district headquarters and in blocks. Investigation facilities provided were examination of blood, urine, stool and others at primary, secondary and tertiary level laboratories (Table 1). The district hospital, Purulia and sub railway divisional hospital, Adra are manned with pathologist and laboratory technicians. Laboratory technicians run laboratories at block level/PHC level. Quality control measures were taken as per guideline of different national programme (e.g. sending blood smears for cross checking to designated state/central government laboratory in national anti malaria programme and cross checking of sputum smear by the supervisors in revised national tuberculosis control programme).

Institutional linkage facilities for laboratory were available from Bankura Samnilani Medical College and Burdwan Medical College at divisional level and school of tropical Medicine, Kolkata at state level. Laboratory of All India Institute of hygiene and public health and National institute of Cholera and Enteric Disease, Kolkata were available as referral laboratory at national level.

4. Discussion:

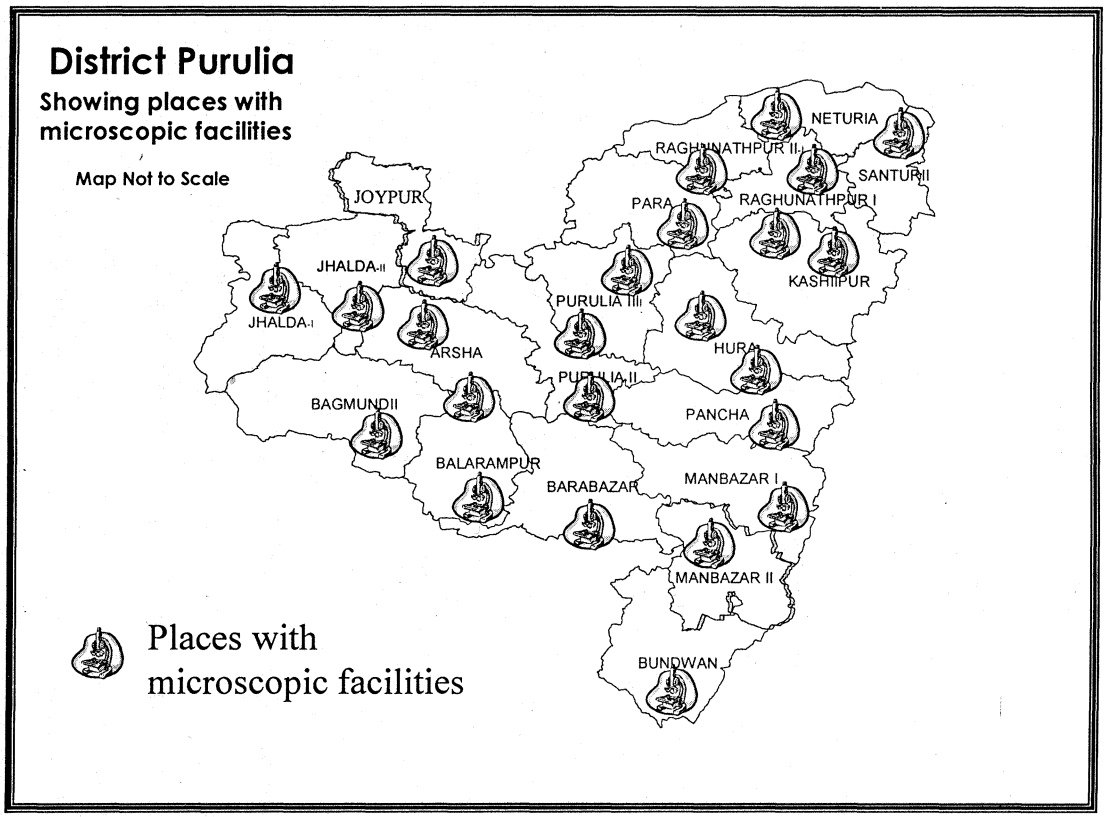
Existing peripheral laboratories at the primary health center level were capable of handling microscopic examination of sputum and blood smears and are currently undertaking this activity under Tuberculosis and Malaria Control Programs. Peripheral laboratories needed minimal structural modification of the laboratory areas in the CHC to perform these functions well. All of them were currently equipped with microscopes for performing microscopy for Tuberculosis and Malaria. But they not equipped with rapid diagnostic tools for diagnosing Typhoid, in those presenting symptoms of prolonged fever and a rapid test kit for fecal contamination of water. The District Public Health Laboratory was the backbone of the laboratory network. The district laboratories situated attached to District Hospitals and primarily perform the functions of a curative laboratory. Currently, the district level laboratory had the weakest linkage both with periphery and divisional level laboratory. The district laboratories were expected to have a major role in the surveillance program and the existing infrastructure and administrative structure to be improved.

Public Health departments needed to reallocate staff with microbiology training to district laboratories. At the district level integration of equipments and trained staff to be improved by bringing together the District Tuberculosis Center (DTC) laboratory staff and Malaria laboratory staff. Integration of DTC and Malaria program at the district level was crucial for effective functioning of the district level laboratory, since trained laboratory technicians were already available with these programs. The district public health laboratory to be included in the Integrated Disease Surveillance Programme (IDSP) computer network, so that transfer of information on identified diseases can be promptly transferred to the district surveillance unit and to the peripheral reporting units, as soon as data becomes available.

Table 1: Laboratory resources and test performed at different level laboratories in Purulia district, West Bengal, India, 2004

Name of the Unit	Man Power			Equipments	Reagents	Tests done
	Pathologist	Medical Technologist	General duty assistant			
Bandwan Block Primary Health Centre	Nil	Two	One	Microscope -2	Adequate	Blood for TC, DC,Hb, ESR, M.P., Sputum for AFB
Manbazar Rural Hospital	Nil	Two	One	Microscope -2 Centrifuge machine -1 Colorimeter -1	Adequate	Blood for TC, DC, Hb, ESR, M.P., Sugar Urine for Routine examination, Stool for Routine examination, Sputum for AFB
Deben Mahato Hospital (District Hospital, Purulia)	One	Six	Two	Semi auto analyzer-1 Centrifuge machine – 3 Colorimeter 3, Hot air oven -3 Autoclave vertical-3 Dry Heat Sterilizer - 1 Microscope – 4	Adequate	Blood for TC, DC, Hb, ESR, Platelet, M.P., Sugar, Urea, Creatinine, Uric acid, Liver function test, Lipid profile, Urine for Routine examination, Stool for Routine examination

Figure 1: Distribution of microscopic facilities by place in Purulia district, West Bengal, India, 2004



Description of existing surveillance system of the Purulia district, West Bengal (India), 2004

1. Introduction

Surveillance is an ongoing systemic collection, collation, analysis and interpretation of data and dissemination of information to those who need to know in order that action may be taken. Surveillance is intended to be the backbone of public health delivery system in the country. It is expected to provide essential data to monitor progress of ongoing disease control programs and help in optimizing the allocation of resources. It will be able to detect early warning signals of impending outbreaks and help initiate an effective response in a timely manner. It facilitates the study of disease patterns in the country / state / district and identifies new emerging diseases. It will play a crucial role in obtaining political and public support for the health programs in the country. India is currently passing through an epidemiological transition. Health problems of some states are predominantly due to communicable diseases, while in others it is due to non-communicable diseases.

Purulia district, west Bengal, India has its health problem predominantly due to communicable diseases. Equity in health delivery is one of the primary concerns of the government. Through an effective disease surveillance program, health of vulnerable populations in under developed regions and tribal populations in Purulia will be better understood and corrective steps will be taken to improve their conditions. In the absence of surveillance, disease may spread unrecognized by those responsible for health care or public health agencies and by the time the outbreak is recognized, it may be too late for intervention measures. Continuous monitoring is essential for detecting the 'early signals' of outbreak of any epidemic of a new or resurgent disease. The universal

application of selected vaccines in infancy and preschool age has resulted in the dramatic decline of tuberculosis, diphtheria, whooping cough, poliomyelitis and measles. The selective application of tetanus prophylaxis in pregnancy has resulted in a similar reduction of neonatal tetanus. Diseases can be brought under effective control through early diagnosis and prompt treatment, reducing the number of patients actively transmitting the infection to others. This strategy is being adopted for the tuberculosis control program. AFP surveillance under National Polio Eradication Initiative is a robust example of surveillance and its contribution to disease eradication / control efforts. The other examples of targeted disease control programs that are under implementation are: The National Anti-malarial Program (NAMP), The National AIDS Control Program (NACP) and The National Leprosy Elimination Program (NLEP). In all these programs, surveillance is an important component to facilitate disease control efforts not only through early detection of outbreaks but also by providing valuable data about the impact of the interventions and time trend analysis of disease.

The objectives of the study are to (a) understand the existing surveillance system of Purulia (West Bengal) so that this document becomes the background for evaluating / designing a surveillance system and (b) make a SWOT (Strength, Weakness, Opportunities and Threats) analysis of the existing surveillance system at various levels that will be useful during evaluation and design.

2. Methods

Study design

Descriptive study based on records and reports.

Study population

Our study population is the population Purulia district

Data collection procedure

We visited the Office of the Deputy Chief Medical Officer of Health II, Purulia and Deputy Chief Medical Officer of Health III, Purulia to collect data from the records and reports. We explained the purpose of the exercise to respective offices and got a verbal permission, and then we proceeded with the data collection. We informally talk with the Chief medical Officer of health and other programme officer about the existing surveillance system, its limitations and scope for improvements. We also visited various level of institutions – five sub centers, 3 primary health center, 3-block primary health center, 32 rural hospitals, sub divisional hospital and district hospital. We collected and gather the reports and records from these institutions. We talk informally with the key health personnel at the sub center, primary health center and block primary health center level on existing surveillance system specially on flow of information.

Analysis plan

We analyzed data on the basis of record and report available with the various levels of institutions and our informal discussion with health personnel. We considered various steps of surveillance while describing the existing surveillance system in Purulia district.

3. Results

Core activities of the system

The disease surveillance activities in the Purulia district were based on reporting patterns received from different levels (sub center, block primary health center, community health center, sub-divisional and district hospital) that included (a) weekly disease surveillance system for acute flaccid paralysis and acute diarrhoeal diseases, (b) monthly reporting of 17 major communicable diseases and 8 other disease conditions, (c) monthly hospital-based surveillance of 67

disease conditions, (d) separate surveillance programmes for vertical diseases like tuberculosis, malaria, leprosy, HIV and vaccine preventable diseases and (e) daily disease surveillance reporting system for epidemic prone diseases during epidemic situation (Table 1).

Data collection

Multipurpose health workers collected data through house visits. It was also obtained from out patient clinics, during various health camps or when patients are admitted to a hospital. During the field visits, they had regular contact with the village elders, particularly ladies and the Pradhan, Panchayat member or other community persons who gave them information. The health workers also got disease information from the Awanwadi workers, community health guide and private practitioners during their interactions for other activities. During epidemics all other activities became secondary to the epidemic work. Health workers often received the first information about epidemics from the community leaders, local Panchayat members or NGOs working in the area. There were rumor registers that were kept in health facilities. In all such situations, the health worker first verified the information for type of disease outbreak and its location before passing it on to the higher authorities. After collecting data it was recorded in pre-designed formats. Reporting was done in duplicate copies (one is sent to the concerned officer and the other is kept for records) weekly or monthly, but during epidemics reporting was on a daily basis and a nil report was also sent.

Data compilation

The data received were mostly in form of frequency tables at the community block level. The data of reporting units were compiled there and send to district via weekly reports and monthly reports. The reporting units also maintained registers to keep records. At the statistical cell of district various data received from block primary health center, community health center, sub-divisional and district hospital were compiled and reports were sent to state headquarter.

Data analysis and interpretation

Currently data was simply transferred from one level to another and there was very little analysis-taking place at the health facilities at community block level. Only limited analysis was apparently carried out at the District level. This consisted primarily of tabulation of data from monthly reports in a ledger style register. The seasonal trend of the epidemic prone disease and cyclic trend were little examined regularly at district level. The monthly trends of the diseases in individual block were not systematically examined by calculating the rates.

Feedback and dissemination

Feedback mechanisms to periphery for surveillance data was poor and consider to be less than optimal at present. After the surveillance data was submitted, it transmitted through various levels (Figure 2) from the primary health center to district to state head quarters but no feedback was given to the ground staff about the interpretation and proposed actions. However the mechanism for feedback was in operation during epidemic.

Action

Any case reported from the primary health center registered in rumor register immediately. A team from health facilities of community block visited the site and examined the patients for verification. If outbreak was confirmed, medical officer informed the district head quarter. From district head quarter an epidemic control team moved according to the demand of situation and patients were referred to health facilities. The Chief Medical Officer of Health of the district informed the state head quarter about the status and for further help, if required.

4. Discussion

The existing disease surveillance system in the district Purulia (West Bengal) at the primary level had active and passive data collection mechanism for not less than 70 different conditions in the district which over burdened the system with a substantial percentage of the time of the health workers spend on surveillance related activities. Quality of reporting was hampered by absence of clear case definitions. There was no horizontal integration of surveillance activities of existing disease control programs. Data was not collected from private practitioners, private laboratories and hospitals. Data collection during emergencies and epidemics was of better quality. There was no system of quality control for the data collected and there was very little analysis and action based on the data. There was no system of feedback to lower levels of the health system. At the district level analysis of data was inadequate for meaningful interpretation. There was lack of skilled personnel and tools (software) for data analysis. The information was not shared across disease control programs. District level response system was activated only in times of outbreak. Non-communicable diseases were not included in surveillance system.

House to house visits were perceived as active surveillance and the most important component of the system in Purulia district. Health workers collected data regularly and aware of the timings and locations of the potential outbreaks of diarrhoeal diseases, cholera, malaria and other epidemic prone diseases. They were more vigilant for such information during the epidemic and a more active search for the cases was done. During the non-epidemic period, only random search for these cases was done. Many health workers enjoyed good relationships with their communities. In their area, people came forward and gave them the desired information. Attempts were made to get surveillance information from local private practitioners but most health workers were not satisfied with the response. Allopathic doctors and practitioners of Indian System of Medicine were generally busy with their clinical practice and maintained few records. Data collected at the health facilities was used very rarely.

Although most health workers claimed that data was reliable as well as valid, they did agree that it did not represent the whole picture. Many patients took care from the private sector and hence, were left out of the reporting system. There were also areas that were left out during surveillance activities because of being scattered over a large geographical area. Duplication of data was also a possibility due to the same patients being contacted during field visits and subsequently attending the health facilities. In the field, some community members gave incomplete or invalid information. The senior officers and health supervisors did not regularly supervise data collection and data compilation processes.

We identified data analysis as the poorest component of the existing surveillance system in Purulia district. Some of the reasons included the absence of knowledge and skills to analyze data as well as an absence of the tools to analyze (software) at the health facility level. We also identified data analysis was sub optimal at the district level and not done in time. This not only resulted in failing to interpret data but also delayed the response mechanism, particularly in outbreak situation. At the community block level most of the assistant computer, responsible for the work were not from science background and were not competent to calculate the rates and other simple statistical analysis.

There was little dissemination of information from the higher level to the periphery. Many times health workers came to know about the response through other channels. Thus most health workers were not sure about the current use of the surveillance data for response, planning and improving health systems.

In case of small outbreaks at the local level, health workers along with medical officers at block primary health center level initiated action without waiting for formal instructions from the district and higher levels. However, if the number of cases is large, help from the district level in the form of logistic supplies, and additional manpower support was sought and provided.

There were a number of parallel systems existing under various programs that were not integrated. The existing programs did not cover non-communicable diseases. There was need to bring the medical colleges and large tertiary

hospitals in the private sector into the reporting system as well as for utilization of laboratory facilities. The laboratory network needs to be improved and there was a need to prescribe clear-cut thresholds for response at each level. Surveillance was necessary not only for detection of epidemics, but for rapid response to arrest spread of disease and to generate essential data for decision making on a regular basis. Presently, surveillance was sometimes reduced to routine data gathering with sporadic response systems. There was a need for increased use of information technology in order to ensure that information was gathered rapidly and responses made immediately. Information technology can also be used to analyze and sort data so as to predict epidemics based on trends of the reported known diseases.

In order to validate existing surveillance system report of the Purulia district we recommended conducting an evaluation of a disease surveillance system in terms of its various attributes. We also recommended considering the issues of data analysis and feedback mechanism to improve the surveillance system in the district by capacity building and logistic support at various levels.

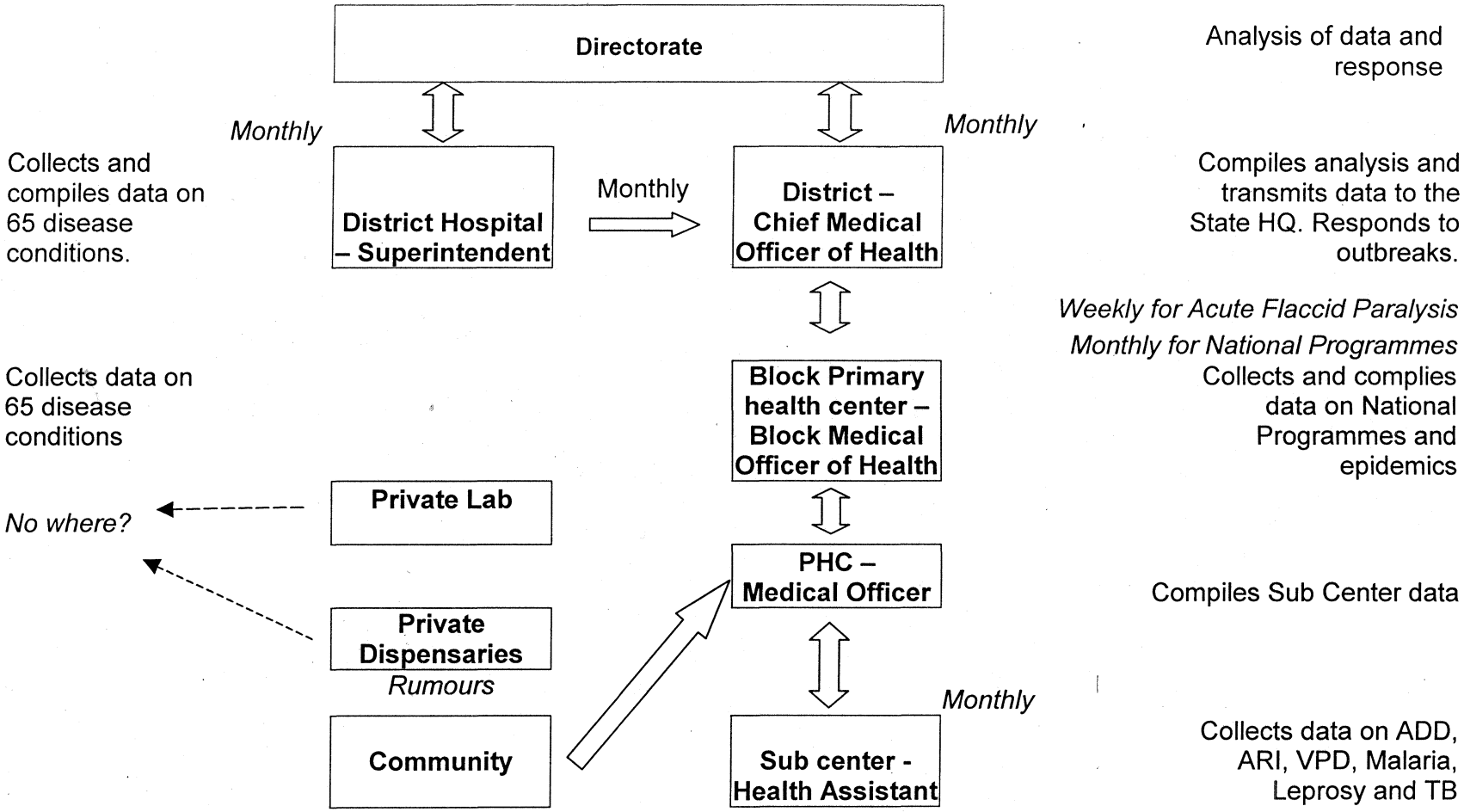
Table 1: Formats by frequency of reporting for surveillance programmes used in Purulia district, West Bengal, India, 2004

Reporting format	Surveillance program	Weekly reporting	Monthly reporting	Quarterly reporting
Report of acute diarrhoeal diseases	Control of acute diarrhoeal diseases	Yes	-	-
Report of Acute Flaccid Paralysis	National Polio Surveillance Programme	Yes	-	-
Monthly PHC report in form no. 6	All national and public health Programme	-	Yes	-
Institutional report in 'RT7' format	Institutional performance (bed occupancy) and disease profile	-	Yes	-
Communicable disease report	Communicable disease report of institution at OPD and IPD (Morbidity & mortality)	-	Yes	-
Malaria epidemiological situation in MF 4 & 5	National Anti Malaria Programme	-	Yes	-
Leprosy monthly report	National Leprosy Elimination Programme	-	Yes	-
Report in form C	National Programme for control of Blindness	-	-	Yes
Report of tuberculosis	Revised National Tuberculosis Control Programme	-	-	Yes
Epidemics	Daily report during outbreak			

Table 2: Reporting system by level of health care facilities in Purulia district, West Bengal, India, 2004

Health care facilities	Reporting personnel	Reporting system
Sub-center	Health assistant (female)	Monthly Reporting in form No.6 which include (1) Vaccine preventable diseases (2) ARI (3) Acute Diarrhoeal diseases (4) Malaria (5) Tuberculosis and (6) Leprosy
Primary Health Center	Health Supervisor & Pharmacist	1. Monthly reporting of 16 communicable diseases which includes acute diarrhoeal diseases, Jaundice, Typhoid, Meningitis, Measles 2. Detail report of outbreak (SOS) with the help of rumor register 3. Detail report of measles cases, if reported. 4. Monthly epidemiological report of Malaria. 5. Monthly report of Tuberculosis 6. Monthly report of Leprosy
Block Primary Health Center / Community Health Center	Assistant Computer	1. Monthly reporting of 16 communicable diseases which includes acute diarrhoeal diseases, Jaundice, Typhoid, Meningitis, Measles 2. Detail report of outbreak (SOS) with the help of rumor register 3. Detail report of measles cases if reported. 4. Monthly epidemiological report of Malaria. 5. Monthly hospital report of 65 disease conditions. 6. Monthly report of Tuberculosis. 7. Monthly report of Leprosy.

Figure 1: Flow of information at different levels in Purulia district, West Bengal, India, 2004



1. Sub center registers and reports, 2003 of Gopalnagar SC (Manbazar RH), Sagma SC (Bansgarh RH), Bahara SC (Para BPHC), Bansbera SC (Barabazar BPHC) and Napara SC (Kolloli BPHC).
2. Primary Health center registers and reports, 2003 of Nodiha PHC (Para BPHC), Talajuri PHC (Kolloli BPHC) and Bamandiha PHC (Barabazar BPHC).
3. Block Primary Health center registers and reports, 2003 of Para BPHC, Kolloli BPHC and Barabazar BPHC.
4. Rural Health Center registers and reports, 2003 of Manbazar RH and Bansgarh RH.
5. Registers and reports of Deputy Chief Medical Officer of Health II, Purulia.
6. Registers and reports of Deputy Chief Medical Officer of Health III, Purulia.
7. Registers and reports of Zonal Leprosy Officer, Purulia.
8. Registers and reports of District Tuberculosis Officer, Purulia.
9. Registers and reports of Superintendent, Sadar Hospital, Purulia.
10. Registers and reports of Superintendent, Raghunathpur Sub-divisional Hospital, Purulia.

Secondary data analysis on malaria epidemiological situation of Purulia district, West Bengal, India, 2004

1. Introduction

Though malaria is preventable, treatable and curable, it is considered as an complex disease. Epidemiologically, entomologically, the genetic complexity of the parasite and more than 40 mosquito species that transmit it, the propensity to develop resistance (both with insecticide and anti malarial drug), and the variations in human susceptibility and immunological response combine with an absolute need for prompt access to quality drugs and a list of other operational imperatives to make malaria control a matter of enormous technical complexity[1]. Analysis of malaria situation is the essential basis and mandatory for planning anti malaria action based upon the epidemiological characteristics. A complete analysis would include a description of distribution of malaria (infection) and its consequences (morbidity, mortality and economic losses) and an explanation of that distribution in terms of its causal factors (geographical, physical, environmental, biological, social, political and economic). It is clear that in reality complete analysis is practically impossible, and therefore malaria control will often have to be planned with imperfect knowledge. However, an important component of any plan should be to collect the additional, valid information necessary for replanning purposes, thereby improving the programme as it progresses. Many factors contributes to the epidemiology of malaria, such as distribution and relative prevalence of plasmodium species and their response to drugs, the distribution of vector species and their susceptibility to insecticides, the intensity of transmission etc. The economic and geographic characteristics of different areas, socio-economical conditions of the populations, climatic and meteorological factors that are not uniformly similar through out the national

territory, also play a major role. Based upon the analysis of malaria situation, certain key decisions need to be made. These include the relative importance of malaria in the politico-socio-economic context warranting action; opportunistic resources for anti malaria action; the magnitude of planning process necessary for malaria control (which part of the area are more involved, what are the organization and agencies should be involved, how can resource be mobilized); the budgetary resources and limitations: and the extend of investment in infrastructures development.

Globally, about 300-500 million people acquired attack every year from malaria, 90% of which are from Sub- Saharan Africa[2]. Malaria accounts for 10% of disease burden, 40% public health expenditure and 30-50% hospital admission in Africa. Malaria exerts its heaviest toll in Africa, shared 90% of total death of world from malaria, which is more than one million annually[3]. Malaria is the leading cause of under-five mortality in Africa and accounting for 20% of all cause mortality. In South-East Asia 80% of population lives in areas with moderate to high risk of malaria and 90% of this population lives in India, Myanmar and Thailand. In 2000, India reported a total 2.10 million cases of malaria including 946 deaths[4]. Plasmodium falciparum contributed to the majority of these deaths.

The Purulia district of West Bengal (a moderately endemic state) is one of the three endemic districts in the state. Situational analysis on disease profiles indicates malaria accounts for 7% of both hospital admission and out patient visit[5]. The disease consumed more than 50% of public health expenditure of Purulia district. We conducted a secondary data analysis on malaria epidemiological situation in Purulia district. The objectives are to (a) understand the current malaria problem by considering the impact of malaria on the health of community, the economic and social effect of malaria, the infection in humans and the clinical manifestations, parasitological factors, the vector mosquito and other aspects of the environment, (b) describe the current malaria control activities and their effect on the malaria problem and (c) recommended strategies for planning of control measures.

2. Methods

Study design

Descriptive study based on secondary data

Study population

The population of the Purulia district, West Bengal.

Operational Definitions

High-risk sub center

As per guideline in Malaria Action Programme, 1995 by National Anti Malaria Programme a sub center is defined as high risk, if (a) there was any death due to indigenous malaria in last three years during transmission season (b) average slide positivity rate (number of blood smear positive per one hundred examined) in last three years is 5% or more (c) slide positivity rate is from 4-5%, but doubled in last three years (d) slide positivity rate is from 3-4% and plasmodium falciparum percentage is thirty percent or above (e) resistant to chloroquin and (f) project area where there is aggregation of labour[6].

Complicated malaria cases

A patient with history of fever and admitted to health care facility with convulsion or unconsciousness is considered as complicated malaria case. Examination of peripheral blood smears indicates presence of plasmodium falciparum parasites.

Sampling procedure

We included all available secondary data from 1995 to 2004 for the twenty block primary health centers along with the district and state head quarter.

Data collection procedure

We collected data on demographic characteristics, malaria epidemiological data (e.g. blood smear examined, total malaria cases, total plasmodium falciparum cases, death due to malaria) and meteorological data on rainfall of the years 2000 to 2004. We visited the district programme officer's office to collect data from the records and reports. We explained the purpose of our exercise and got a verbal permission, and then we proceeded with the data collection. For the data at community block level we collected it from the office of block medical officer of health (n=20). For the denominators we used data available in the District Statistical Cell, Purulia, State Bureau of Health Intelligence, West Bengal and Demography & evaluation cell of Health department, Govt. of West Bengal, Swasthwa Bhawan, Kolkata.

Analysis plan -

We compared malaria cases in Purulia with respect to that of the state of West Bengal. We calculated annual incidence of malaria in Purulia from 2000 to 2004. We calculated age and sex specific incidence of malaria using denominators provided by the block and district health administrations. We draw seasonal trend of malaria episodes from month wise epidemiological data from 1999 to 2002 and compared the trend with month wise epidemiological data of 2003 and 2004. We identified endemic geographical areas (community block) using malaria epidemiological data. We also identified high-risk sub centers using criteria defined in malaria action programme. We also analyzed study reports related to problem with malaria control including drug resistance, insecticide resistance and asymptomatic malaria cases in terms of their distributions and magnitudes in the district. We calculated case fatality ratio from complicated malaria.

3. Results

Disease burden

The annual incidence of malaria in Purulia district during increased from 3.7 per thousand populations in 1995 to 4.2 per thousand populations per thousand in 2004. The district reached a peak annual incidence of malaria at 9.5 per thousand populations in 2000. The proportion of blood smear positive for plasmodium falciparum (of total malaria cases) indicated a sharp increase from 27% in 1996 to 63% in 2004 (Figure 1). During the year 2004, Purulia district contributed 5% of total malaria and 11% of falciparum cases of the state of West Bengal. Total malaria cases detected were 10,498, of which 6,580 cases (63 %) were plasmodium falciparum.

Age and sex distribution

The incidence malaria by age indicated all the age groups including the infants were affected. The highest incidence rates were in the age group of 1-4 years and 5 to 14 years. The incidence rate was 1.8 per thousand among the infants. The incidence by sex indicated higher incidence rate among male (4.6 versus 3.8 per 1000 population) (Table 1).

Seasonality

Analysis of month wise malaria incidence of 2000, 2001 and 2002 indicates there was perennial transmission of malaria with a seasonal rise from the month of July, peak during October and fall after November. During 2003 malaria data did not indicate no such seasonal variation. In 2004 seasonal rises started a little late from the month of October-November (Figure 2).

Geographical distribution

We identified nine endemic blocks that accounted for 9,441 (90%) of total malaria cases. We identified six blocks endemic for plasmodium falciparum that contributed 6,344 (96%) of pf cases of the district (Figure 3). On comparison with

the incidence of plasmodium falciparum with other blocks, these six endemic blocks indicate higher incidence rate than remaining 14 blocks (9.6 versus 0.1 per 1000 population) (Table 2). In addition, one block (Hura) indicated high rise of plasmodium falciparum percentage (of total malaria cases) from 25% in 2003 to 50% in 2004 with in a year. Based on criteria given in Malaria Action Programme, 1995 we identified 111 (29%) of total 385 numbers of sub centers as high risk. Of the identified high risk sub centers 78 (70%) were from the six plasmodium falciparum prone endemic blocks.

Drug resistance

Drug resistance studies during the period of 1995 to 2004 indicated that in the Ajodhya Hill primary health center there was resistance to the chloroquin, primary anti malarial drug. Though the resistance to chloroquin decreased from 42% in 1997 to 28% in 2003, the resistance to alternate drug sulphadoxin-pyrimethamin raised to 13% in 2003. Bandwan block of the district also indicated development of chloroquin resistance to the level of 60% in 2004.

Insecticide resistance

Study on insecticide sensitivity was last done in the district in 1996. Out of the two species of mosquito – anopheles culicifacies and anopheles fluviatilis present in the district anopheles culicifacies developed resistance to DDT 50%.

Asymtomatic cases

Different surveys conducted during 2001 and 2002 reports indicated presence of asymtomatic malaria cases to a range of 16-23% in Ajodhya Hill Primary health center and adjacent foot hill areas.

Mortality:

Mortality data indicated a low case fatality in last ten years. There were decreases in case fatality rate from complicated malaria from 19 (23%) in 2001 to 4 (3%) in 2004.

4. Discussion

Moderate to high incidence of malaria, perennial transmission and low mortality from malaria indicates long-term endemicity of malaria in Purulia district. Salient changes in species ratio from vivax to falciparum were the issue to be considered seriously as it will increase the problem of drug resistance, asympotomatic malaria cases and mortality. Distribution of malaria in the district is restricted in six community blocks. There was seasonal variation of incidence with an increase in post monsoon period when mosquitogenic situation favours. A reduction in mortality indicated improved case management in health facilities.

The overall moderate to high incidence rate, higher incidence among children particularly young children, perennial transmission and low mortality indicates Purulia district is endemic to malaria. The highest incidence in 2000 was due to the cyclic trend, which observed at 7 to 10 years intervals in India, as no epidemic was reported in the district during the period. Though there was little variation in malaria incidence in last 10 years, a salient switch over of species from vivax to falciparum was occurred in Purulia district. This situation also simulates with other endemic districts of the country where similar trend of change in parasite species was seen in last two decades. The situation demands more attention towards control of vectors responsible for plasmodium falciparum transmission, use of appropriate drug, radical treatment with the wide use of primaquin to kill gametocytes and study on resistance stain of parasite.

The difference in incidence among various age groups is similar to that observed in stable endemic areas of other part of country. Though young infant enjoy a period of protection from infection, due to passive transfer of maternal antibody in utero and presence of foetal haemoglobin, incidence among the infant indicates recent and high transmission of malaria in Purulia district. The risk of malaria infections in the district declined as the age progress from childhood to adulthood. At least three level of immune acquisition occur, beginning with protection against severe and fatal outcomes, followed by protection against mild, self limiting clinical disease and much later, followed by an ability to

regulate peripheral infection. Male sex had more incidence rate of malaria than female sex as they are likely to have easier access for diagnosis at health facilities, in addition to their outdoor and clothing life style.

The interaction between temperature and rainfall is responsible for the seasonal variation of malaria. The incidence was less till June when rainfall in district was low. With the start of rainfall from July incidence raised, reached at peak during September and continued to December until temperature fall to stop the mosquitogenic condition and thus, transmission of malaria. During 2003, less precipitation in the district was accountable for seasonal non-fluctuations of malaria incidence. In 2004 as the rain started in late and this resulted in variation of seasonal curve and a delayed rise and peak of curve of malaria incidence.

The geographical distribution indicated that malaria is a focal phenomenon in the district. It is practically restricted to five community blocks around Ajodhya Hill area, Bandwan block and a part of Neturia community block. These six community blocks inhibited by only one fourth of the total population accounted for three fourth of the total number of malaria cases and 95% of plasmodium falciparum incidence. Population movement from plasmodium falciparum endemic area to non-endemic area affected newer blocks like Hura.

The problem of chloroquin resistance in Ajodhya Hill primary health center is long standing since 1973. A change in antigenicity of the parasite, in addition with poor drug compliance, use of low dose of chloroquin by local practitioner or by self-medication, inadequate government infrastructures support may be an explanation of developing such resistance. Alternate drugs sulphadoxin-pyrimethamine were widely use in the area since 1995 and this in tern reduced the use of chloroquin which result in an improvement in chloroquin resistance during 2003 survey and at the same time development of new resistance to sulphadoxin-pyrimethamine with the use of alternate drug. Development of resistance to insecticide (DDT) was explained by the fact that use of low concentrate solution of insecticide during seasonal spray operation, adaptation of mosquito to same insecticide used over years. Presences of asymptomatic malaria cases (patients are not clinically ill but shows parasites in peripheral

blood smear) in Ajodhya Hill area were really a problem to control programme. Since they were not ill they were not come to health facilities for treatment. It may happen that these cases were not treated with primaquin as radical treatment and they carry gametocytes of parasite in peripheral blood. This causes community transmission rapidly and makes the malaria situation worsen. Some asymptomatic patients again had asexual stage of parasite in peripheral blood. It appeared that immune acquisitions occur in them in the form of protection against mild, self limiting clinical disease and an ability to regulate peripheral infection.

We observe overall low malaria specific mortality rate in Purulia district in last years. First we theoretically expect the total number of death due to malaria in an endemic area with an average of 6000 annual plasmodium falciparum cases (of which 50% complicated pf treated by artemether derivatives, others by quinine) to be around 40 [6000 X 0.02 (0.5 X 0.1 + 0.5 X 0.5)] deaths. The possible explanations are under reporting, less adult death in long endemic areas and better case management with artemether derivatives. However, a decrease in case fatality rate of complicated malaria in last five years indicates improved case management in health care facilities.

The study was purely based on the raw data available with the block and district health administrations. This did not examine the completeness of the data, functioning of surveillance system, operational issues related to malaria control and quality control mechanism. So it may or may not simulate with the actual malaria situation in terms of distribution and magnitude of malaria related morbidity and or mortality.

In order to validate secondary data analysis report we recommended to conduct an evaluation of national anti malaria programme based on various input, process, outcome, out put and impact indicators. We also recommended considering the issues of geographical distribution, seasonality, and drug resistance, resistance to insecticides to be given priority during planning of control programme of malaria in the district.

Figure 1: Distribution of malaria cases in Purulia district, West Bengal, India, 2000 - 2004

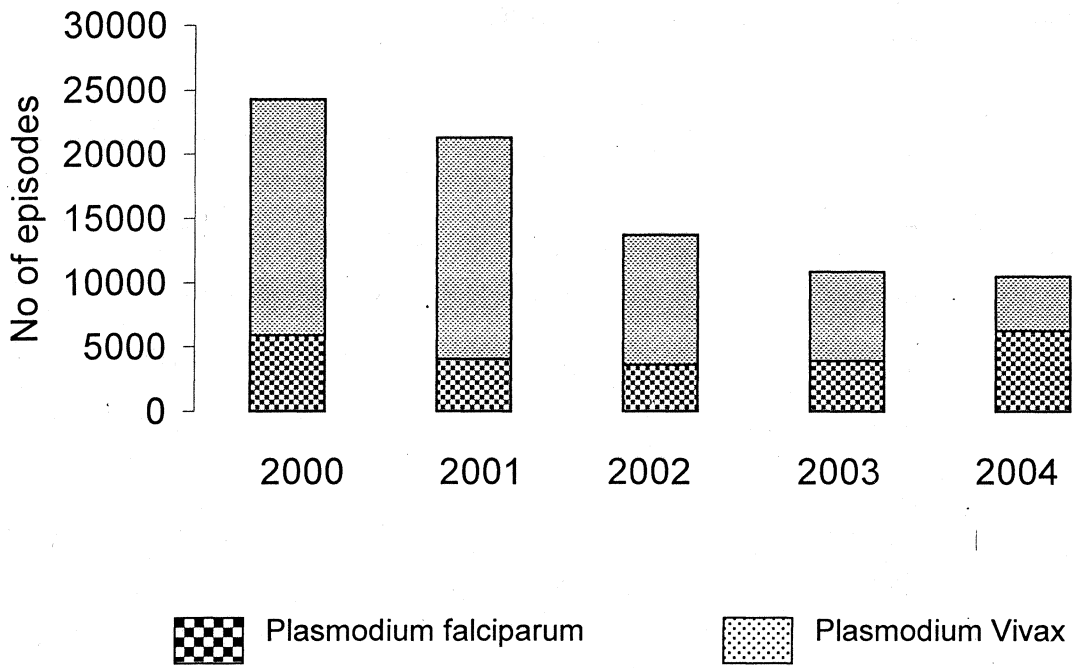


Table 1: Incidence of malaria by age and sex, Purulia district, West Bengal, India, 2004

		Population (in million)	No of episode 2004	Incidence rate per thousands population 2004
Age group (in years)	0-1	0.06	107	1.8
	1-4	0.26	1569	6.0
	5-14	0.65	3585	5.5
	15+	1.53	5237	3.4
Sex	Male	1.3	5915	4.6
	Female	1.2	4583	3.8
Total		2.5	10498	4.2

Figure 2: Seasonal trend of malaria episodes, Purulia district, West Bengal, India, 1999-20002, 2003 and 2004

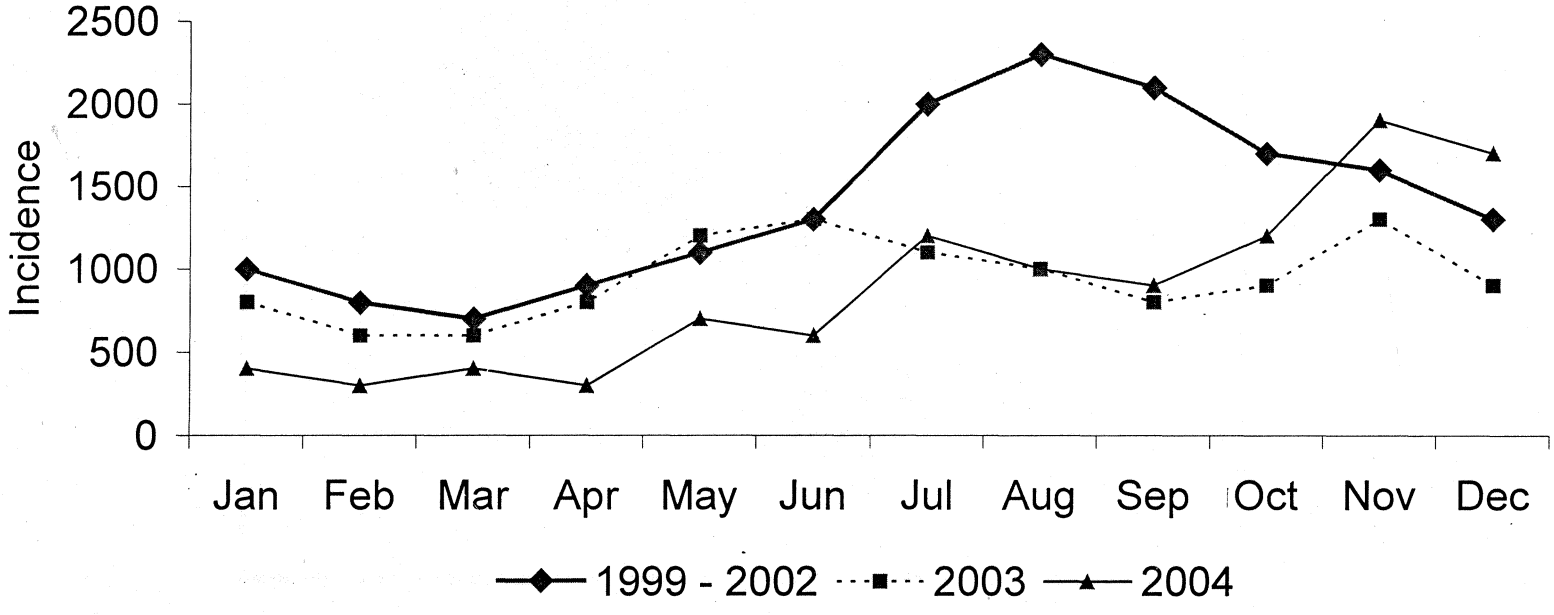


Figure 3: Block wise distribution of plasmodium falciparum. Purulia district, West Bengal, India, 2004

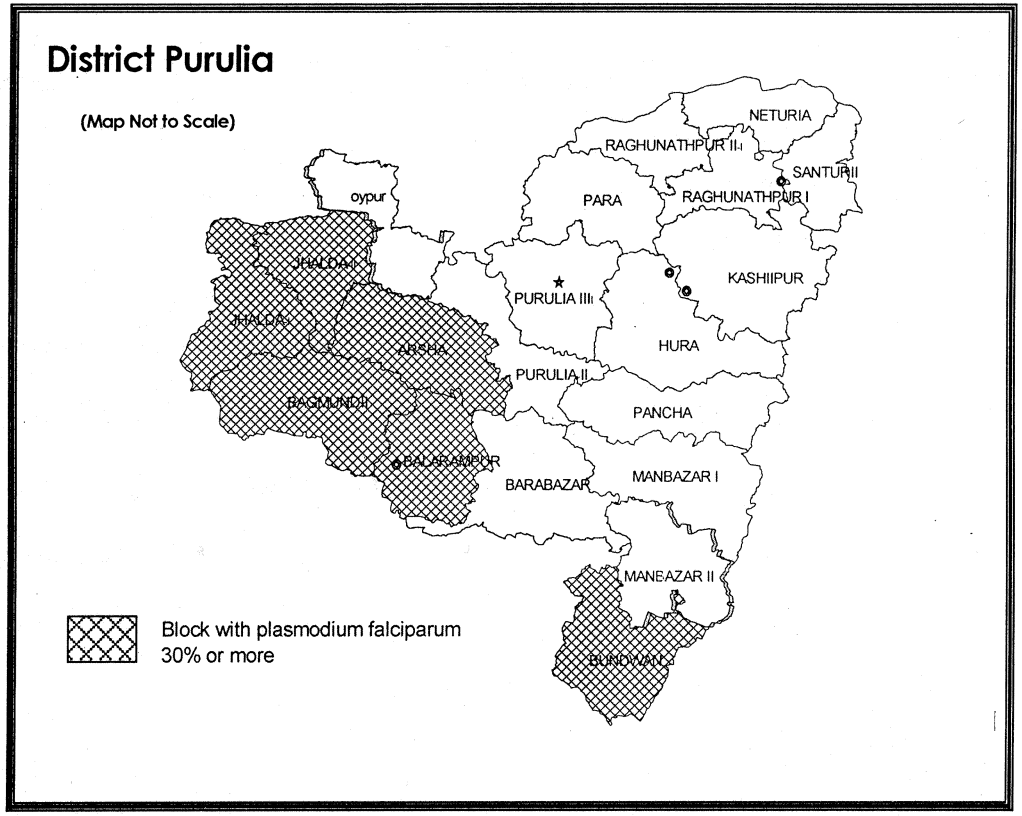


Table 2: Comparison of incidence rates of plasmodium falciparum episodes between six endemic Blocks with other blocks of Purulia districts, West Bengal, India, 2004

Blocks	Population (in million)	No of plasmodium falciparum episodes	Incidence rate of plasmodium falciparum per thousands population
Six plasmodium falciparum endemic blocks (Bandwan, Bagmundi, Balarampur, Arsha, Jhalda II and Neturia)	0.68	6344	9.3
Other 14 blocks in district	1.86	236	0.1
Total	2.54	6580	2.6

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Section 2: Second Field Posting

Evaluation of surveillance of acute flaccid paralysis for poliomyelitis in Purulia, West Bengal, India, 2005

1. Introduction

In 1988, the World Health Assembly passed a resolution to launch a global initiative to eradicate poliomyelitis. After fifteen years, poliomyelitis has been eliminated from all but six countries of the world (Nigeria, India, Pakistan, Niger, Afghanistan and Egypt) at the end of 2003[1]. Three quarter of these cases are linked to a handful of polio "hot spots" in first three countries.

By the end of 2000, 10 out of 11 member states of the WHO South-East Asia Region had interrupted wild poliovirus transmission as a part of global eradication efforts[2]. Bangladesh, Nepal and Myanmar were the three countries to be polio free in 2000. In 2002, the global goal of poliomyelitis was jeopardized as India suffered from the largest outbreak in history. There was five folds increase of the number of cases in 2002 as compared to 2001 with a three-fold increase in the number of affected district[3]. Investigations of the 2002 epidemic indicated that a combination of low routine immunization coverage and an insufficient polio campaigns had led to an accumulation of susceptible children, especially in the states of Uttar Pradesh and Bihar. Because of long boarders with Bangladesh and Nepal, the epidemic also threatened these polio-free countries of the region. As of 2004, only 122 cases were reported, which is the lowest reported number of cases in India during a year.

In West Bengal, only 28 cases of polio were reported in 2003. In 2004, there was a reduction with only two reported poliomyelitis cases[4]. This decrease represented the best opportunity to eradicate poliomyelitis. The Purulia district in the western part of West Bengal has been free from poliomyelitis cases since 2000. The challenges for surveillance of acute flaccid paralysis included threads

of transmission of poliovirus from the adjacent Burdwan district (West Bengal) where cases were reported in October 2004, poor routine immunization coverage (less than 85%) in 6 blocks and fatigue associated with surveillance activities. Surveillance is a key component of polio eradication. Since the eradication programme faces challenges in the district, we decided to evaluate the surveillance system for acute flaccid paralysis. The objectives of the evaluation were to compare the performance indicators of district at different levels with the standards of the national polio surveillance project and to examine the surveillance system in terms of sensitivity, specificity (positive predictive value), representativeness, timeliness, simplicity, acceptability, cost and usefulness.

2. Methods

Description of surveillance system

Surveillance for acute flaccid paralysis is one of the four key elements of the strategies for polio eradication[5]. It allows polio cases to be detected, reported, investigated and controlled. The ministry of Health and family welfare recognized the need to expand and maintain a surveillance system that can monitor the impact of pulse polio immunization and identify areas to focus supplemental immunization in the end stage of eradication. Otherwise the human and financial resources investment to conduct pulse polio immunizations could be in waste. In 1997, the government of India set up the National Polio Surveillance Project (NPSP) in collaboration with World health Organization (WHO). As a result, the level of acute flaccid paralysis surveillance rapidly improved to reach international standards.

Population under surveillance

Experience in other parts of the world indicates that at least one case of non-polio acute flaccid paralysis occurs for every 100,000-population children aged

<15 years per year. This is known as background rate among children. Children under the age of 15 years are under surveillance in Purulia district.

Case definitions

We defined acute flaccid paralysis as paralysis of acute onset (less than four weeks) and the affected limb(s) were flaccid, i.e. floppy or limp. Examination indicates diminished tone but sensation was not affected. Surveillance is carried out for all cases of acute flaccid paralysis and not only for poliomyelitis. Because paralytic poliomyelitis is one of the cause for acute flaccid paralysis, maintaining a high sensitivity for acute flaccid paralysis detection will ensure that all cases of paralytic poliomyelitis are detected, reported and investigated, resulting in preventive control measures to interrupt transmission of disease. The other non-polio causes of acute flaccid paralysis, including GullainBarre Syndrome, injection neuritis, transverse myelitis and traumatic neuritis, account for this background rate, regardless of the occurrence of acute poliomyelitis occurs in the community.

Type of system

As in other part of the country, Purulia district did passive surveillance of acute flaccid paralysis to see possible acute flaccid cases. Efforts made to obtain two stool samples from acute flaccid paralysis cases within 14 days of paralysis onset. When a case of acute flaccid paralysis is seen late in the field, stool specimens may be collected up to 60 days after the onset. The chances of isolating poliovirus in the stool after that time are low. In the case of surveillance for acute flaccid paralysis, late detection of cases indicates failure. The aim is to detect acute flaccid paralysis cases so that a stool specimen can be collected for virology.

Data structure

Each of 23 units in Purulia district reports weekly, even when no case of acute flaccid paralysis has been identified (zero reporting).

Feedback

One individual (the nodal officer) in the reporting unit is responsible for reporting case of acute flaccid paralysis to the district immunization officer using the quickest possible means (telephone/ fax). However, verbal communication be followed by written information as soon as possible. Though block primary health centers and hospitals are main reporting units all private practitioners, health workers, anganwadi workers and traditional birth attendance are encouraged to acute flaccid paralysis report. The district immunization officer records all reported acute flaccid paralysis cases in a standard line-listing format.

Action taken

All reported cases of acute flaccid paralysis are investigated by district immunization officer within 48 hours of notification, to confirm the presence of acute flaccid paralysis and to obtain stool specimen for laboratory investigation. The district immunization officer fills laboratory request form, ships specimen to laboratory and conducts active search. All relevant information gathered in standard form and transmitted to the state immunization officer. The district immunization officer must re-visit every case of acute flaccid paralysis 60 days after onset to determine the presence or absence of residual weakness. At the end of each week, the district immunization officer reports to the state immunization officer the line list of new acute flaccid paralysis cases reported in his district. This summarizes the activities of the district immunization officer and he reports the current status of the investigation and follows up of acute flaccid paralysis cases. State immunization officer then report weekly to the national level.

Indicators

We used indicators to access various attributes of the surveillance system of acute flaccid paralysis. The list included (1) number of health assistant used the case definition of acute flaccid paralysis (simplicity), (2) number of health center providing reports each week (acceptability), (3) number of acute flaccid paralysis

cases per 100,000 under 15 population (sensitivity), (4) proportion of AFP cases with 2 adequate stools taken within two weeks after paralytic onset (predictive value positive), (5) number of site reporting acute flaccid paralysis (Representativeness), (6) interval between onset and notification (timeliness), (7) interval between notification of a suspect case and investigation(timeliness), (8) interval between specimen dispatch and receipt at laboratory(timeliness), (9) follow up of cases at 60-70 days(timeliness) and (10) qualitative assessment of whether this could be used for measles (flexibility

Methods used to evaluate

The evaluation included interviews in semi structured questionnaires of randomly selected health workers at sub centers, health facilities and district officials and done during January 2005. We reviewed surveillance records and reports during the period 2000 to 2004 available at health facilities, hospitals and district. We included all reporting units of acute flaccid paralysis in district Purulia in sampling frame. To evaluate sensitivity, representativeness, timeliness and flexibility we visited all the reporting units and we collected surveillance data and records for the period 2000 to 2004. To evaluate simplicity of surveillance system we selected 63 sub centers by population proportionate to size method. We sorted blocks alphabetically and listed sub centers alphabetically. We selected the first sub center by simple random sampling. Subsequently we selected other sub-centers at sampling interval. We interviewed the health assistant (female) of selected sub-centers by pre-tested questionnaire (in local language)

We calculated the sample size of 63 using EPI 6 assuming the highest possible utilization of definition of acute flaccid paralysis for reporting by health assistants at sub-centers at 95 %, alpha error and precision both set at 5% for a total number of 385 sub centers. The principal investigator and his team who was trained in December 2004 in the method conducted all interviews at reporting units and sub-centers level. We analysed data was analyzed using Excel and EPI 6.

4. Result

In Purulia district, a network of 23 reporting units, which includes health facilities and hospitals, did passive surveillance of acute flaccid paralysis to see possible acute flaccid cases.

Simplicity

Of 63 health assistants 60 (95%) used the case definition of acute flaccid paralysis to report cases. Twenty-three of 23 of medical officers (100%) and 23 of 23 public health nurses (100%) had the knowledge of collection and transportation of stool specimen.

Acceptability

Of the 23 reporting units all (100%) reports every week to district.

Sensitivity

The reported rate of acute flaccid paralysis per 100,000 children <15 years were 2.4 in 2000, 1.5 in 2001, 1.8 in 2002, 1.2 in 2003 and 1.6 in 2004 in the district. The analysis by block indicated an average annualized rate that varied from 0.4 to 4.4 (Table 1). An overall analysis of the last five years indicates that among reported cases, 58 of 87 cases (66%) were below 5 years, 55 of 87 case patients (63%) were male and 71 of 87 cases (82%) were of Hindu community.

Positive value positive

Stool samples were sent adequately with in 14 days for laboratory examination were 20 of 24 (83%) in 2000, 11 of 16 (69%) in 2001, 13 of 18 (72%) in 2002, 9 of 13 (69%) in 2003 and 16 of 16 (100%) in 2004 of acute flaccid paralysis reported cases (Figure 3).

Representativeness

Of the 52 weeks of 2004, the proportion of reporting unit that reported on time varied from 85% - 96% (average 92%).

Timeliness

The interval between case onset and notification was with in 14 days was 21 of 24 (87.5%) in 2000, 81.2 13 of 16 case patients (81.2%) in 2001, 15 of 18 case patients (83.3%) in 2002, 13 of 13 case patients (100%) in 2003 and 16 of 16

case patients (100%) in 2004 of acute flaccid paralysis reported cases (Table 2). The interval between case notification and investigation was 1-2 days (median 1 day). The proportion of stool specimens sent for laboratory examination was 20 of 24 specimens (83.3%) in 2000, 15 of 16 specimens (93.8%) in 2001, 17 of 18 specimens (94.4%) in 2002, 10 of 13 specimens (76.9%) in 2003 and 16 of 16 specimens (100%) in 2004. of 97 case patients 93 were followed up (95.4%). Four case patients (4.6%) died between 2000 to 2005.

Flexibility

Of 23 medical officers 22 (95.7%) opined in favour of use of the same surveillance network (for case reporting and investigation) in integrated disease surveillance programme (planned to be started by 2006)

4. Discussion

There are several ways of assessing the quality of polio surveillance. The two most important criteria from a programmatic point of view are (1) the reported rate of acute flaccid paralysis per 100,000 children <15 years of age and (2) the proportion of acute flaccid paralysis cases have adequate stool collected within 14 days. Sensitivity of surveillance of acute poliomyelitis in the district during 2000 to 2004 was all through good and well above the expected annual rate of one acute flaccid paralysis per 100,000 children <15 years. However the analysis by block indicated that two blocks (Arsha and Balarampur) had five-year average annual rate of acute paralysis below one. The distribution of cases by sex indicated a predominance of males during reporting, which suggest underreporting among female. However, caste distribution of reported cases are correlated with the proportionate caste distribution of <15years age group.

An adequate number of reporting units indicate proper representative-ness of the surveillance system. As a rule of thumb, when laboratory confirmed cases are no longer reported, the goal should be to have a minimum of 2-3 reporting unit per 100,000 children <15 years of age. An all through 2.3 units per 100,000 children

<15 years of age explain the proper representative ness. At the reporting units level maximum knowledge of specimen collection and transportation of medical officer and public health nurse not only explain the simplicity of the system but also it proves the use of surveillance mechanism. So far as case investigation time taken for case investigation after notification was within specified standard (48 hours) of national polio surveillance project and follow up of acute flaccid paralysis cases (standard 60 days), not only reflects timeliness but also high quality of response and control mechanism. Issues related to stool specimens for laboratory investigation is another key areas for quality assurance of the surveillance system. Two issues i.e. percentage of stool specimen to notified cases and percentage of stool specimen with adequate stool with in 14 days are examined in evaluation process. Except in 2000 and 2004, there is less percentage to specified standard (80%) of national polio surveillance project. Again there are differences in percentage between the two issues. Since investigations of cases were done in time, a delay in case notification and death of a few cases before collection of stool may be the possible reason. Comparative changes in percentage of adequate stool collection within 14 days shows changes from 2000 to 2004 but not statistically significant (chi-square 6.85, degree of freedom 4, p-value 0.14).

The uses of case definition for acute flaccid paralysis by health assistants at the sub center level are below the specified standard (100%) of the national polio surveillance project. Lack of knowledge and attitude of health worker to use the definition may be the possible reason for the gap. Regarding case reporting number of health facilities reporting each week in time and interval between case onset and notification are considered. A persistent more than eighty percent reported units in all 52 weeks reflects high standard of timeliness in reporting. An improvement to minimize the interval between case onset and notification was observed in 2003 and 2004 as compared to previous years. Poor sensitivity to surveillance in terms of exhaustiveness or completeness of acute flaccid paralysis was observed in two community blocks namely Arsha and Balarampur. Of persisting challenges for polio surveillance are in the area of timeliness and

prompt laboratory investigation (within 14 days of onset of paralysis). In some areas these indicators are below the standard of specified by the national polio surveillance project. Surveillance for acute flaccid paralysis is flexible for integration with other programme, including the integrated disease surveillance programme.

A flexible surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocation of funds. The huge investment in human and financial resources for acute flaccid paralysis surveillance network was opined for its flexibility to the medical officer in-charge for use in integrated disease surveillance programme (planned to be started by 2006) and the positive response indicates the high flexibility of the acute flaccid paralysis surveillance system. Use of the infrastructure and reporting mechanism is very worthy and time saving so far for the integrated disease surveillance programme. The completeness, sensitivity and timeliness of acute flaccid paralysis surveillance contributed to the achievement and persistence of polio-free status in the district Purulia, West Bengal in the last five years.

This study allowed recommending measures to improve surveillance of acute flaccid paralysis for poliomyelitis in Purulia district. First, maintain the existing timely and sensitive surveillance system of acute flaccid paralysis in the final lap of polio eradication. Second, improve the sensitivity of acute flaccid paralysis in the two-community blocks. Third, hold advocacy meetings for the medical community and the network of quake practitioner to build awareness and engage them to increase the sensitivity. Fourth, conduct intensive active search and submit stool sample in time in blocks with poor surveillance indicators. Last, arrange refresher training of health assistant to improve the use of case definition to report acute flaccid paralysis.

Figure 1: Logical frame indicating surveillance attribute indicators corresponding to different strategies of surveillance of acute flaccid paralysis, Purulia district, West Bengal, India, 2004.

Surveillance attribute	Case reporting	Case investigation
Sensitivity	No. of acute flaccid paralysis cases per 100,000 under 15 population	
Positive predictive value		Proportion of AFP cases with 2 adequate stools taken within two weeks after paralytic onset
Representativety	No. of site reporting acute flaccid paralysis	
Timeliness	Interval between onset and notification	- Interval between notification of a suspect case and investigation - Interval between specimen dispatch and receipt at laboratory - Follow up of cases at 60-70 days
Simplicity	No. of health assistant use the case definition of acute flaccid paralysis	
Acceptability	No. of health center providing reports each week	
Flexibility	Qualitative assessment of whether this could be used for measles	

Figure 2: Reported rate of acute flaccid paralysis (AFP), Purulia district, West Bengal, India, 2000 – 2004

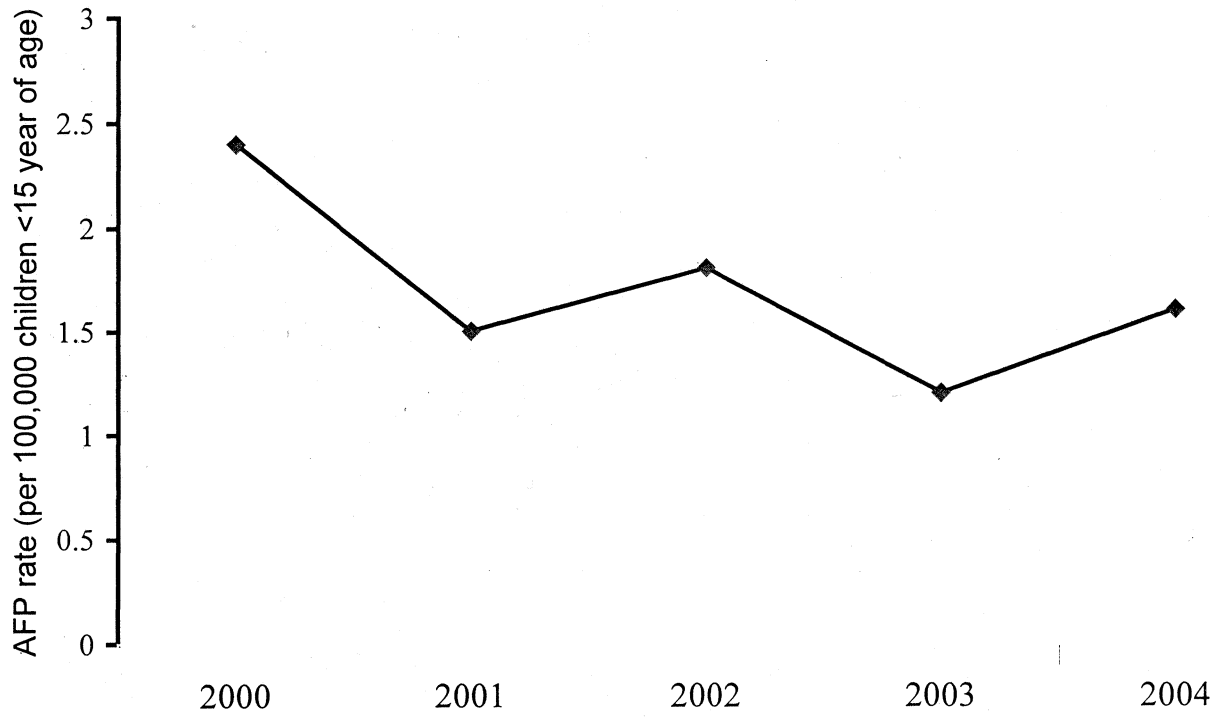


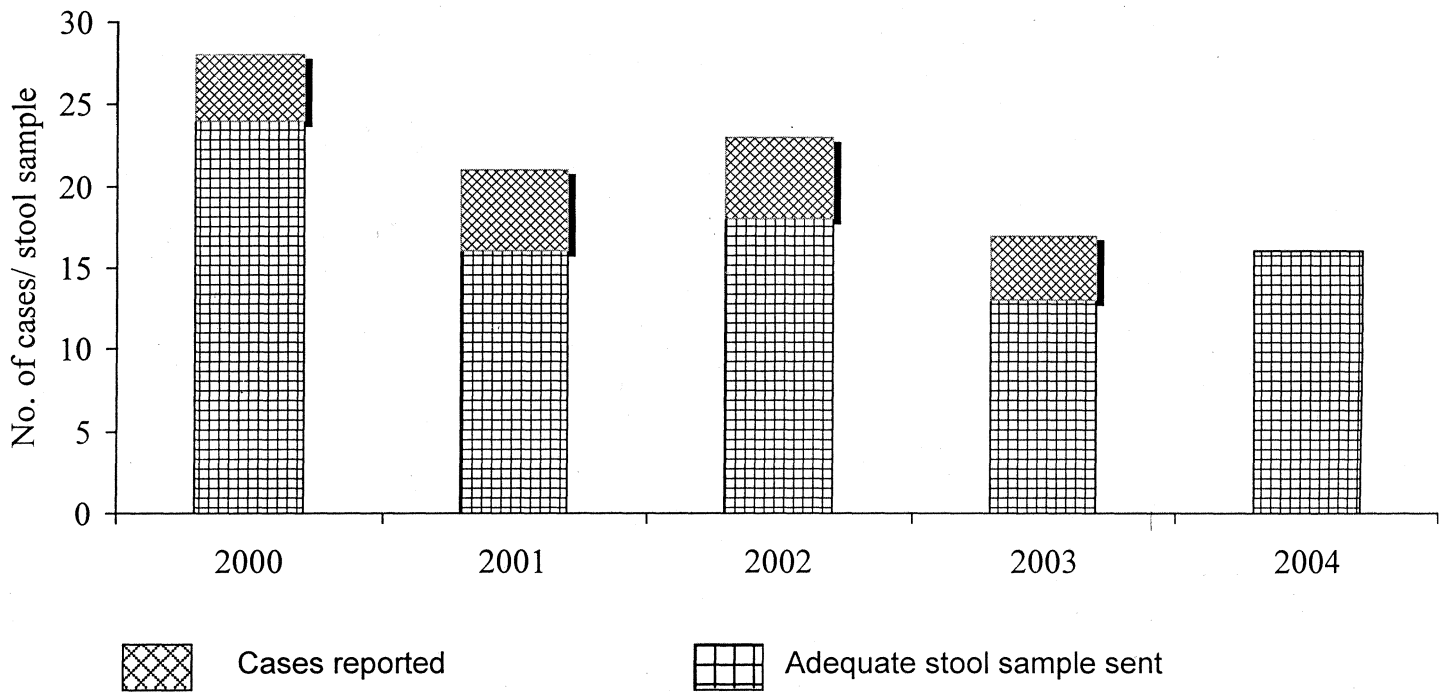
Table – 1: Average reported rate of acute flaccid paralysis by age, sex and religion wise, Purulia district, West Bengal, India 2000 - 2004

		Population (million)	Acute flaccid paralysis cases 2000 – 2004		Average annual AFP rate
			No	%	
Age group	<5 years	0.3	58	67	11.6
	5 – 15 years	0.7	29	33	0.8
Sex	Male	0.5	55	63	2.2
	Female	0.5	32	37	1.3
Religion	Hindu	0.8	71	82	1.8
	Muslim	0.15	16	18	2.1
	Others	0.05	0	0	0
Total		1.0	87	-	1.7

Table – 2: Timeliness of case notification, acute flaccid paralysis surveillance, Purulia district, West Bengal, India 2000 - 2004

Year	Case reported	Case reported within 14 days of onset	Proportion (%)
2000	24	21	88
2001	16	13	81
2002	18	15	83
2003	13	13	100
2004	13	13	100

Figure 3: Stool sample sent from reported cases, acute flaccid paralysis surveillance, Purulia district, West Bengal, India, 2000 - 2004



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Evaluation of the National Anti Malaria programme in Purulia district, West Bengal, India, 2004.

1. Introduction

In 2005, malaria still considers as a major public health problem in more than one hundred countries inhabited by a total of approximately 2,400 million people, representing about 40% of the world's population[1]. WHO estimates the annual burden of malaria as 1.1 million deaths and 300-500 million cases in 1999[1]. Over 90% of the disease burden is in Sub-Saharan Africa and the vast majority of deaths occur among young children in that part of the world. The remaining burden is distributed between the Indian sub-continent, South-East Asia, Oceania and the Americas.

The malaria burden in the South-East Asia WHO Region remained stable between 1991 and 2000 with about three million cases reported annually[2]. An estimated 1,200 million people - 80% of South East Asia Region population - are at risk of malaria. Of these, 90% at moderate to high risk of malaria lives in India, Indonesia, Myanmar, Srilanka and Thailand. India accounts for 85% of the total number of malaria cases in the South-East Asia WHO region. In 2000 India, reported 2.15 million cases of malaria and 948 deaths[3]. Though the total number of reported malaria cases has been stable around two million annually in the country since 1994, there has been a shift in the species. Plasmodium falciparum, the main cause of severe malaria, now accounts for more than 60% of malaria cases and 90% of malaria deaths in the country. It became the major species, particularly in endemic and forest areas[4]. The states of Orissa, Jharkhand, Bihar, Chhatisgarh, Madhapradesh, Gujrat, Rajhasthan and the North-Eastern region are the most affected areas in the country.

West Bengal, one of the eastern states of the country is not highly endemic for malaria. However, three rural districts (Jalpaiguri, Coachbihar and Purulia)

and one urban district (Kolkata) are endemic and account for more than 90% of the burden of malaria in the state[5]. The district of Purulia located in the western part of West Bengal is highly endemic for malaria. Surveillance data analysis indicates perennial transmission. Six community blocks, inhabited by 25% of the district population contributes to 50% of the caseload and 75% of reported plasmodium falciparum cases[6]. The potential for outbreaks adds to the public health importance of the disease in the district. We evaluated of the activities of the national anti malaria programme in Purulia district, West Bengal, India. The objectives of this evaluation were to (1) describe the performances of different components of the national anti malaria programme in terms of input, process, outcome and impact (2) explore the community knowledge and participation in malaria prevention and control, including health seeking behaviors and (3) formulate recommendations on leading issues that the programme is facing.

2. Methods

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 on different operational issues of the programme in Purulia district with programme managers at district, health facilities, microscopic centers and sub center level.

Indicators used

We considered the rural population of Purulia district to evaluate the national anti malaria programmes in terms of input, process, outcome and impact indicators.

Input indicator

Our input indicators, included the proportion of medical officers, laboratory technicians and health assistants trained and in position, the proportion of health facilities that utilized 95% of their malaria fund in 2003-04, the proportion of health facilities with adequate stock of anti-malarial drugs, residual insecticides and materials for information, education and communication.

Process indicator

Our process indicators included the median time taken to examine a blood smear and start of radical treatment for positive cases from day of blood smear collection, discrepancy rate in laboratories, the proportion of malaria patient treated with correct anti-malarial drugs at health facilities and the proportion of health institutions monitored and supervised regularly by superior officers.

Outcome indicator

Our outcome indicators included the proportion of microscopic center functioning to its requirement, the proportion of health facilities full filling the target of annual blood examination rate (10% of population), the proportion of complicated malaria cases cured, the proportion of population sprayed by insecticide and the proportion of health facilities had not run out of stock of anti-malarial drugs for at least week. We used knowledge and participation of community as an outcome measure of information, education and communication activities. Our impact indicators included the case fatality ratio at health facility, the annual parasite index (number of blood smear positive for malaria by microscopic examination per 1000 population), the slide positivity rate (number of blood smear positive for malaria by microscopic examination per 100 examined smear), percentage of the plasmodium falciparum and percentage of high-risk sub centers.

Survey

We conducted a survey of all blocks of district Purulia where the National Anti Malaria Programme was implemented. We selected thirty villages with a probability proportional to population size. In each cluster we selected fifteen

households. In each household we selected one adult above the age of 20 years randomly for interview. We also selected sub centers, microscopic centers and health care facilities in which the population of the sample had access to. We calculated the sample size of 450 by using Right size software, assuming the highest possible utilization rate of health services at the community level at 50% (as there was no data available about the percentage of utilization of the services), an alpha error set at 5%, a precision at 5% and an anticipated proportion of non-response of 15%. We used pre-tested questionnaire to collect information from the district, health facilities, microscopic centers, sub centers and the community. We translated pre-tested questionnaires of sub center and household into Bengali. The principal investigator and his trained conducted the interview. We analyzed evaluation data by using excel and EPI 6. We also analyzed programme data routinely reported from the sub center to the district.

3. 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 selective vector control, (3) promote community use of bed net (especially insecticide treated), and (4) built capacity for community participation in prevention and control through capacity building with a network of community health services. From operational point of view, the aim was to identify high-risk areas in the country. The criteria for high risk area[7] were (1) recorded deaths due to malaria (on clinical diagnosis or microscopic confirmation) with plasmodium falciparum infection during the transmission period with evidence of locally acquired infection in an endemic area, during any of the last three years, (2) a slide positivity rate (percentage of smear positive for malaria parasite to number examined) above 5% on average in last three years, (3) a slide positivity rate of 4%, doubled in last three years, (4) a slide positivity rate is 3% with a proportion of plasmodium falciparum of 30% or above, (5) a

focus of chloroquin resistant plasmodium falciparum or (6) an area with tropical aggregation of labour or new settlement. Each year, district had to compile the epidemiological data and earmark sub-centers as high risk.

Early diagnosis and prompt treatment

Early diagnosis and prompt treatment is the most important activity to prevent malaria-associated mortality at the periphery. The malaria action programme described three types of facilities. First a malaria clinic with facility for presumptive treatment, smear collection and microscopy had been in each health facility. Second a fever treatment depot with facility for presumptive treatment and smear collection had been available for one thousand populations. Third Anganwadi worker or any other volunteer (e.g. community health guide) had to establish a drug distribution center with facility for presumptive treatment. The case detection was strengthened by fortnightly domiciliary house-to-house visit to detect episodes of fever and collect blood smears. Microscopic facility had to be available at the ratio of one for every 30,000 population in plain area and one for every 20,000 population in tribal areas. Laboratory technicians sent the report of blood smear within 48 hours of examination to the peripheral staff for radical treatment (gametocytocidal action for plasmodium falciparum and anti-relapse action for plasmodium vivax), if required. Quality control of the laboratory was to be done through a cross checking results at laboratories at the regional office of health and family welfare and at the state headquarter.

Residual insecticidal spray

While early detection and prompt treatment prevented mortality in the population, the residual insecticidal spray aims at preventing transmission to reduce morbidity in the community. 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 index (number of blood smear positive for malaria parasite annually per thousand population) of two or above and a selective additional round in a few villages with perennial transmission. To obtain the best result, the national programme coverage of rooms had to exceed 80% and insecticide had to be used in recommended quantity as per programme guideline.

Bed net as personal protection

Bed nets especially insecticide treated are amongst the most effective tools to reduce malaria transmission and mortality. Use of bed net during sleep prevented the contact between the host and the vector.

Information, education and communication

Participation of the community in the prevention and control of malaria was a key for success of malaria control. Information, education and communication played an important role in promoting protective and preventive habit among individuals and in the community. Also patient education created demand for appropriate services from the health 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 and refresher training courses for the medical Officers, laboratory technicians, supervisory staff and multipurpose health workers.

Evaluation of the programme

We evaluated 20-health facilities, 20 microscopic centers and 30 sub-centers. Of the 450 community members sampled in 30 villages 441(98%) were available for interview. Of the nine community members not available in respective household, six (67%) were locked and three (33%) had no eligible member.

Input indicator

In health facilities, microscopic centers and sub centers, 96 of 107 medical officers (90%), 30 of 42 laboratory technicians (71%) and 601 of 770 health assistants (78%) were in position to sanctioned post. Of the personnel in position 20 of 96 medical officers (21%), 18 of 30-laboratory technician (60%) and 357 of 601 health assistants (60%) had been trained in malaria. Three of 30 villages had drug distribution center (10%). 18 of 20 of health facility (90%) utilized 95% of the received malaria funds during the financial year 2003-04. Of 58 gangs requirement for spray operation 21 spray gangs (36%) worked. Of 206 metric tones of insecticide (50% DDT) stock required for spray

operation 106 metric tones (52%) stored. None of 20 health facility (0%) had the required stock of 50% DDT.

Process indicator

The interval between blood smear collection and examination ranged from 1 to 3 days (median 1 day) for passive case detection in health care facilities and from 7 to 12 days (median 8 days) for active case detection. The interval between blood smear collection and radical treatment ranged from 10 to 19 days (median 12 days). No blood smear was sent for crosschecking to referral laboratory during 2004. Two experienced technicians from the district headquarter re-examined all positive smears and 10% of the negative smears in December 2004 to estimate discrepancy rate. The overall discrepancy rate in district was 55 of 3,523 (1.6%) but 8 of 20 of microscopic centers (40%) had discrepancy rate of two or above. Out of 6,228-plasmodium falciparum patients, 292 patients (5%) were admitted with diagnosis of complicated malaria. Of these 270 patients (92%) received appropriate anti malarial drugs. Out of 270 malaria patients received appropriate anti malarial drugs 101 patients (37%) received Artemether derivatives. District health officials supervised 10 of 30 sub centers (33%) once in a year. Medical officers supervised 20 of 30 sub centers (67%) once in every quarter and malaria inspector supervised 11 of 30 sub centers (37%) once in a month. Health workers visited 76 of 441 households (17%) with in fortnight and 311 of 441 households (71%) with in a month.

Outcome indicator

Of 77 centers required 27 (39%) were sanctioned and 21 (27%) were functioning as per malaria action programme in district. Of 20 health facilities 8 (40%) and of 30 sub centers 11 (37%) were able to examined blood smear to specified annual target. Of 292 patients with complicated malaria 255 (87%) were cured. Of 292 patients 32 (11%) were referred to higher center. The case fatality ratio was 5 of 292 (2%). Of 20 health facilities 2 (10%) and of 30 sub centers 3 (10%) were reported weekly or longer stock-outs of anti malarial drugs. Of 20-health facility 16 (80%) were sprayed with insecticide 50% DDT in 2004. Sprayed population was 0.54 million compared to qualified

population (sub center with annual parasite index two or more) of 1.37 million (37%) in 2004. Household survey data indicated 40 of 441 households heads (10%) had their household had been sprayed in 2004. Regarding ownership of bed net 201 of 441 households (44%) surveyed owned at least one bed net and 92 of 441 households (21%) surveyed used bed net during sleeping. 15 of 441 households (9%) knew the location of the drug distribution center respectively. 121 of 441 households (27%) sough health care from medical officer of the health facility, 115 of 441(26%) from the health assistant and the rest from the local private practitioner. 197 of 441household heads (44%) knew that malaria was transmitted through vector mosquito, 33 of 441(8%) knew it was transmitted through other routes and the rest did not have an opinion about the transmission. 273 of 441 household heads (62%) knew how to recognize the symptoms of malaria.

Impact indicator

While malaria was endemic in the whole district, it clustered in six endemic community blocks. These six blocks accounted for two third of the number of high risk sub center (96 of 146), 90% of the total incidence of malaria cases (9007 of 10286) and 95% of all plasmodium falciparum cases (5630 of 6106).

4. Discussion

The national anti malaria programme in Purulia had good infrastructures support and logistic supply and used sufficient funds for early detection and prompt treatment activity of. Human resources (i.e. medical officers, laboratory technicians and health assistants) were in positions in most of the centers. However limited number of drug distribution center, fortnightly domiciliary visit by health workers, monitoring and supervision increase the workload in health care facilities. Laboratory support was weak and there was no crosschecking mechanism in place. Insecticide residual spray operations were insufficient. Only one fifth of households used bet nets during sleeping. Few microscopy centers were sanctioned and functioned to the requirement. This limited the process of decentralization of microscopic center at primary

health center level (one in thirty thousand populations). The poor performance of laboratory 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. Although cross checking of examined blood smear indicated an overall low discrepancy rate in district, two-fifth of the laboratory were highly discrepant. The proportion of complicated plasmodium falciparum malaria cases was higher than national average (2-3%). Possible reasons include delay in case detection, delay in start of anti malarial treatment and misclassification between uncomplicated and complicated malaria. However correct use of anti-malarial drugs and use of Artemether derivatives at peripheral health facilities explained for low case fatality rate in district. Monitoring and supervision was insufficient at each level. This could lead to a failure of detection of early warning signals of outbreaks in high-risk sub centers. Many staff members, especially medical officers and laboratory technicians, had not been trained. This may led to poor active surveillance, high discrepancy rate in laboratory and misclassification of malaria cases.

Insecticide residual spraying was the weakest part of the programme. Limitations were both in input and process, including insufficient stock of insecticides, insufficient sanction of spray gang, improper timing of spray operation, overall poor room coverage and a difference between the reported and actual coverage limited the benefit insecticide residual spray.

The district had poor material support for information, education and communication (IEC) activities. None of the health facility and sub center provided with any IEC materials. However, more than half of the community sought health care from government sector and most community members knew how to recognize symptoms.

Use of bed net as personal protection method was uncommon in the district. Two factors may explain this situation. First, less than half of the households had at least one bed net in their residence. Several studies in country and aboard indicates demographic characteristics, socio-economic conditions and knowledge, attitude and practices of households and individuals played important role towards ownership and non-ownership of bed net. Second, those who had a bed net did not consistently use them. Poor ventilated

house, outdoor sleeping habit and lack of knowledge about transmission of malaria may be the possible reasons of differentiate using and non-using issues bed nets.

One of the potential biases of our study was interviewer bias. To minimize the possible interviewer biases, team members are carefully selected to avoid exchange of members between sub center and community. Further, team member reviewed records and interviewed in pair rather than individually. Some information provided by health workers and community members could have been inaccurate due to recall bias. Consistency between report and records of treatment of malaria patient were based on manual calculation by evaluation teams, human error in calculation cannot be ruled out.

This study allowed recommending measures for improving the national anti malaria programme in Purulia district. First, we recommend setting up more number of functioning microscopic centers at primary health center level (one per 30,000 populations) with placement of human resources. Second conduct quality insecticidal residual spray in time and logistics in six endemic blocks in proper time (March-April and August-September). Third, promote use bed nets particularly insecticide treated ones as personal protection methods. Lastly, effectiveness of bed net in control of malaria depends on various factors, such as acceptability, feasibility and affordability related to ownership and use of it. A community study to identify factors associated with ownership and uses of bet nets along with knowledge, attitude and practices to improve the situation of use of bed net.

Figure 1: Logical frame indicating input, process, outcome and impact indicators corresponding to different strategies of national anti malarial programme, Purulia district, West Bengal, India, 2004.

	National anti malaria programme stretgies			
	Early detection and prompt treatment	Insecticidal residual spray	Personal protection	Information, education and communication
Input	• Percentage of • Medical officer • Lab. technician • Health assistant • in position • Percentage of health facility able to utilize 95% of fund	• Percentage of health facility having adequate stock of insecticide • Percentage of spray gang sanctioned	• Percentage of spray gang having average daily coverage as per guideline	• Percentage of health facility have IEC materials for malaria
Process	• Interval between blood smear collection and examination • Discrepancy rate in laboratory • Percentage of patient hospitalized with a diagnosis of severe malaria and receiving correct anti-malarial • Percentage of health facility supervised		• Percentage of house-hold having bed net are in practice of its use	• Percentage of health facility conduct community meeting
Outcome	• Percentage of health facilities able to confirm malaria diagnosis • Percentage of health facility able to collect blood smear as per target of national policy • Percentage of patient cured • Percentage of health facilities reporting no disruption of stock of anti-malarial drugs for 1 week	• Percentage of house-hold covered with insecticide residual spray	• Percentage of house-hold having at least one bed net	• Percentage of community member able to recognize symptoms of a febrile illness
Impact	• Case fatality rate • Annual Parasite incidence • Slide positivity rate • Plasmodium falciparum percentage • Percentage of complicated malaria • Percentage of high risk sub-center			

Table – 1 Selected indicators at health facilities and microscopic center level of the national anti malaria programme evaluation, Purulia district, West Bengal, India, 2005

Component	Indicators	N /n	%
Input	Medical officer in position	96 /107	90
	Laboratory technician in position	30 /42	71
	Medical officer trained in malaria	20 /96	21
	Laboratory technician trained in malaria	18 /30	60
	Use of 95% of malaria funds	18 /20	90
	Insecticide stock in metric tones	106/206	52
	Spray gang allotted	21 /58	36
	Supply of information, education and communication material	0 /20	0
Process	Complicated malaria patient treated with correct anti malarial drugs	270/292	93
	Complicated malaria patient treated with Artemether	101/292	35
Outcome	Complicated malaria patient cured	255/292	87
	Health facilities fulfilling the target of annual blood examination rate	8 /20	40
	Health facilities having stock-out of anti malarial drug for more than one week	2 /20	10
Impact	Incidence of malaria per one thousand population	10,286 /24,30,000	4
	Case fatality rate from complicated malaria	5 /292	2
	High risk sub center	146 /385	38

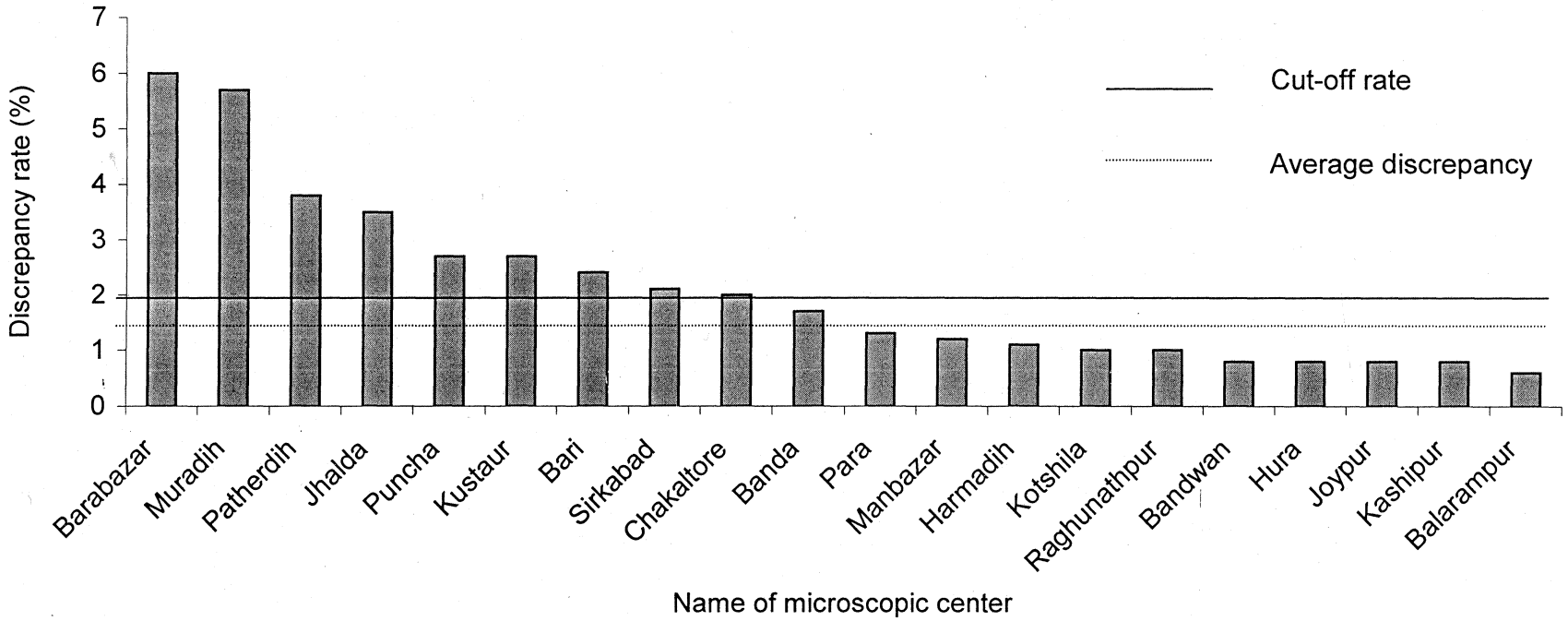
Table – 2 Selected indicators at sub center level of the national anti malaria programme evaluation, Purulia district, West Bengal, India, 2005

Component	Indicators	N /n	%
Input	Health assistant in position	49 /60	82
	Health assistant trained in malaria	36 /49	76
	Supply of material on information, education and communication	3 /30	10
Process	Sub center visited by district official once in a year	10 /30	33
	Sub center visited by medical officer once in a quarter	20 /30	67
	Sub center visited by malaria inspector once in a month	11 /30	37
Outcome	Sub center fulfilling the target of annual blood examination rate	11 /30	37
	Sub center having stock-out of anti malarial drug for more than one week	3 /30	10

Table – 3 Selected indicators at community level of the national anti malaria programme evaluation, Purulia district, West Bengal, India, 2005

Component	Indicators	N /n	%
Input	Village with functioning drug distribution center	3 /30	10
	Knowledge of location of drug distribution in village	38 /441	9
Process	Fortnightly domiciliary visit by health assistant	76 /441	17
	Monthly domiciliary visit by health assistant	387 /441	88
	Household sprayed in last year	44 /441	10
Outcome	Household owned a bed net	201 /441	46
	Household use a bed net during sleep	92 /441	21
	Health care sought from government facilities	226 /441	54
	Knowledge that malaria is transmitted by mosquito bite	197 /441	47
	Recognition of symptoms of malaria	273 /441	62

Figure - 1
Discrepancy rate* in microscopic centers, Purulia distict. West Bengal, India, December, 2004



*Discrepancy rate – percentage of dis-agreement of microscopic report.

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Section 3: Outbreak investigations

1. Introduction

Measles is the leading cause of childhood morbidity and mortality from vaccine preventable diseases. 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. In communities with low measles vaccine coverage, the incidence of disease is very high, mostly affecting children below 5 years of age. As vaccine coverage increases, the time in between outbreak increases and a shift in incidence among older age group occurs as observed in Sri Lanka and Thailand[2]. The case fatality rate ranges from 0.06 to 2.2 per 1000 cases in population with good nutrition and medical care to as high as 20 to 150 per 1000 in developing countries, where malnutrition is prevalent. Three main interventions can reduce death from measles complications. These are (1) administering two doses of vitamin A to all children with measles, (2) treating complications (e.g. diarrhoea, pneumonia, otitis media) and (3) ensuring that all children 9 months or older are vaccinated against measles. Based on implementation of a combination of measles immunization and surveillance strategies worldwide, countries are considered to be 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 includes three objectives (1) a routine immunization coverage of exceeding 90% (2) a second opportunity for measles vaccination to be administered through the routine system or through supplementary immunization activities and (3) enhanced surveillance and case management.

In India, measles is the major cause of childhood morbidity and mortality. Prior to the implementation of universal immunization programme, cyclic increases in incidence of measles were recorded every third year. During 1987 about 250,000 cases were reported, whereas after implementation of universal immunization programme, the number of cases comes down to 39,000 during the year 1999[4]. However, large numbers of cases go unreported. National polio surveillance project, India estimated that 2-3 million measles cases and 100,000 – 200,000 measles deaths occur every year in India[5]. The lack of reliable surveillance data and understanding of local measles epidemiology makes it difficult to fully appreciate the public health burden in India and to organize targeted measles morbidity and mortality reduction strategy. The measles vaccine used now in India is a live attenuated strain of measles virus. Immunity is long lasting. However, these vaccines are not 100% effective. In countries where immunization is undertaken at 12-15 months of age, measles vaccine efficacy ranges between 90% and 95%. In India, where the first dose is given at 9-12 months of age, the vaccine efficacy is approximately 85%. Although measles immunization is an effective prevention strategy outbreaks can continue to occur. The accumulation of susceptible children leads to measles outbreak. Such accumulations occur either because of a failure to vaccinate children at the right age or because of failure of children to respond to vaccination. Occurrence of a measles outbreak in a highly immunized population does not necessarily represent a failure of the routine immunization programme. Investigation of outbreaks provides an opportunity to identify high-risk groups, detect changes in measles epidemiology, weaknesses in routine immunization programme or in the management of measles cases.

On 18th March 2005, the Block Medical Officer of Health of Jhalda-I (an administrative division at sub-district level) block primary health center reported clustering of 55 cases of measles, all identified in a small community in the neighborhood of Majherpara, in a village called Hussendih. Three children were reported to have died from the disease. On 19th March 2005, the Field Epidemiology Training Programme scholar of National Institute of Epidemiology, Chennai initiated an outbreak investigation with the help of

district and block health administration. The objectives of the investigation were to (1) estimate the magnitude of the outbreak, (2) improve the management of cases (3) analysed data including estimation of vaccine efficacy and (4) propose recommendations for control.

2. Methods

Descriptive epidemiology

Multipurpose health workers notified the measles cases by domiciliary visits. We searched for door-to-door active case. We used WHO case definition for measles and occurrence of fever and maculo-papular non-vesicular rash with at least one of the following cough, coryza (runny nose) or conjunctivitis (red eyes) in neighborhood of Majer-para, Husendih, during the period 9th February to 25th April, 2005. We collected information on age, sex, residence, date of onset, vaccination status, symptoms, sign, post measles complication and outcome for each case. Complications and deaths were considered as a sequel of measles if these occurred within 30 days of onset.

We also collected information on laboratory confirmation of outbreak, historic trends of measles, year of introduction of measles vaccination, measles vaccination coverage, history of any supplementary measles immunization activities with coverage, supply chain of vaccine and cold chain status. We draw a map of the village by location of households to show the distribution of measles cases by residence. We calculated the attack rate of measles by age group, sex groups using population data obtained from the block health authorities. We examined the dynamic of the outbreak through the construction of an epidemic curve.

We also examined the measles vaccination coverage and thus, accumulation of susceptible of the community block.

Analytic epidemiological methods

We conducted a retrospective cohort study. Our study population was the children between the age group 7 months to 10 years (as no case had age beyond this range in line list) of Majherpara Husendih, Purulia. Our null

hypothesis was that the measles vaccine was not associated with any protection against the disease. Our exposure variables were the vaccination status. Our outcome variable was the disease status. To ascertain the immunization status we either reviewed the records in eligible couple and child register (children under 60 months of age) or used mother's interviews children 60 months of age and older). Children who have had measles in the past, as reported by mother were excluded, as they are not susceptible. We calculated attack rates of measles by age and vaccination status. We also calculated the vaccine efficacy after excluding the children under 10 months of age which was the lowest cut off month for measles vaccination in India.

3. Results

Descriptive epidemiology

So far as the extent of the outbreak we identified 68 cases in a population of 120 children from 7-120 months of age (attack rate: 57%, Table 3). Three deaths occurred (case fatality ratio: 4%). The attack rate was highest among children under nine months of age [12 case patients (100%)] who had not reached the age of eligibility for measles vaccination. Spot map showing distribution of measles cases by household indicated that almost all households were affected in Majherpara (Figure 1). All the cases were from a small isolated community of religious minority, known for poor participation in measles immunization activities. The dynamic of the outbreak in epidemic curve (Figure 2) indicated that there were number of generations of cases with a peak around 3-4 March, one incubation period after a religious festival held on 20 February 2005. History of fever was reported by 67 (98.7%) of cases. Cough, coryza (runny nose) or conjunctivitis (red eyes) was reported by 66 (97%), 41 (75%) and 34 (50%) measles cases respectively. Almost 50% children had some complications. The most common complications were respiratory tract infection 34 (50%), followed by diarrhoea 17 (25%). Of the 68 case patients, 14 (22%) had been vaccinated. Block health administration conducted supplemental measles immunization in Majherpara and all other

nearby localities of Hussendih. No cases were treated with any dose vitamin A supplementation.

Immunity

There was no reliable data on historic trends of measles. Measles vaccination was introduced in to expanded programme of immunization in 1984. The vaccination coverage in the overall block never exceeds 80% since 1999 which lead to accumulation of susceptible children by years (Table 3). In Majherpara only 52 (43%) of 120 children from 7-120 months of age were vaccinated. Measles vaccine has been recommended for administration between nine to twelve months of age. There was no recent history of supplementary immunization activities for measles in the area.

Cohort study

Attack rates of measles by age and vaccination status indicated 54 case patients of 68 non-immunized (79%) compared to 14 case patients of 52 immunized (27%) children. The calculation of vaccine efficacy among those to expose to the vaccine yielded an estimate of 64% when children under 10 months of age were excluded.

4. Discussion

A measles outbreak affected the neighborhood of Majherpara Hussendih, Jhalda I administrative block of Purulia district India between February 2005 and March 2005. All cases were from a religious minority community. The age group most affected was below 9 months of age when children were not yet eligible for measles vaccination schedule. The case fatality ratio was high which was at the upper end of those reported in developing countries (range 1% to 4%). The measles vaccination coverage was low in the block for last 5 years. Low vaccine coverage was seen in comparison to other areas with in the administrative block. In addition, the vaccination had piece of low vaccine efficacy. On 20th March 2005, the health administration initiated preventive

supplemental measles immunization in Majherpara and all other nearby localities of Hussendih. This outbreak ceased in April 2005.

Despite the widespread availability of a safe and effective vaccine, failure to administer at least one dose of measles vaccine to all infants continues to be the main cause of measles mortality and morbidity. A high proportion of vaccine preventable cases in this outbreak suggested that a failure to vaccinate children was a contributing factor. The results of the investigation indicated that the outbreak occurred in a population with low vaccine coverage. There were a sharp reduction in measles immunization coverage between Purulia district to Jhalda-I administrative block and between Jhalda-I administrative block and neighborhood of Majherpara of Hussendih village. Poor delivery of immunization services and /or low demand in community might be the cause of this low vaccine coverage. The religious minor community of the neighborhood was known for poor participation in vaccination effort. The possible reasons for poor participation in immunization activities by the religious minority community must explore and all effort to be taken to improve immunization coverage.

The measles-containing vaccines currently uses are safe and effective. In this outbreak setting vaccine efficacy was found to be low as a whole and also across all age groups. It was likely that there had been a cold chain failure, or that reconstituted vaccine had been kept in the refrigerator and later used, or that there was a problem with the original potency of the vaccine (as oppose to inappropriate immunization practices). Review of cold chain system including the programmatic features might be investigated further to rule out the inappropriate immunization practices.

Highest attack rate among 7-9 months of age children raised the issue of shifting the age of immunization schedule at earlier month. But, vaccine administered before nine months of age, efficacy is much lower than the 85% expected when vaccine is administered at nine months. So the alternative i.e. strengthening routine immunization must be the priority.

Measles occurring in a population of vitamin A deficiency is associated with higher complication rates and mortality. Administration of two doses of vitamin A to measles cases has reduced the risk of mortality by 48% to 81%. Though measles case management was given non administer of vitamin A

supplementation in this outbreak due to non acceptance of medicine by religious community resulted in high case fatality.

It is critical to recognized that supplementary immunization activities may not have a substantial impact on the course of ongoing measles outbreak; and that, even when they are successful, the cost per prevented case can be high. Transmission during a measles outbreak is very rapid. The advantages of outbreak response vaccination includes (1) a possible effect on the number of cases and deaths and (2) the satisfaction among local stakeholders who get a sense that something is being done to stop the outbreak.

It is expected that the diagnosis of measles would be laboratory confirmed during the outbreak. In the case of this outbreak, it was not possible to obtain laboratory confirmation for logistical reasons. We identified measles cases in this outbreak investigation by using WHO case definition. This lack of serological confirmation constitutes a limitation of this outbreak investigation.

The results of the investigation indicated that the outbreak occurred in a religious community, known for poor participation in routine measles immunization activities, with low vaccine coverage over years. Strengthening routine immunization, raising awareness of vaccination and effective clinical case management should be the priority area to prevent future outbreaks. The laboratory confirmation and the investigation of most outbreaks should be ensured. In the mean time when faced with a measles patient, and even in absence of outbreaks, clinicians should manage them with Vitamin A according to WHO recommendations, other supportive treatment and antibiotics when necessary.

On the basis of the result of the investigation, we formulated the recommendations for the district to improve immunization as well as to prevent outbreaks. First, strengthen the routine immunization service delivery to increase routine coverage. Second, examine ways to increase the demand for vaccine for religious minorities. Third, review the cold chain system and other programmatic features (age at measles vaccine administration) that could affected the effectiveness of the vaccine. Last improve measles surveillance in the district.

Figure 1: Distribution of measles cases by households, Majherpara neighborhood, Husendih, Purulia, West Bengal, India, 2005

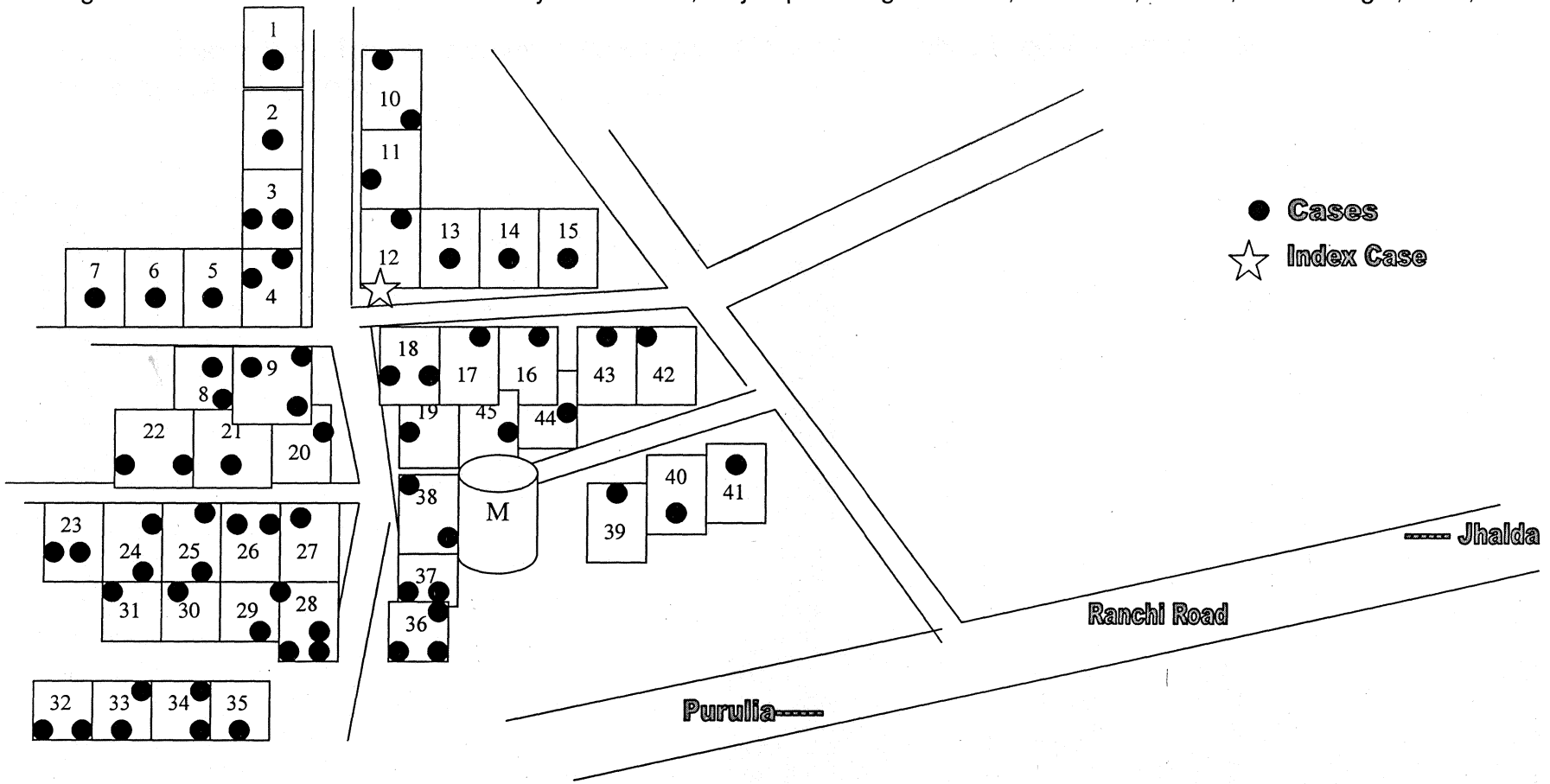

Figure 2: Distribution of measles cases by date of rash,Majherpara neighborhood, Hussendih,Jhalda-I, West Bengal, India, 2005

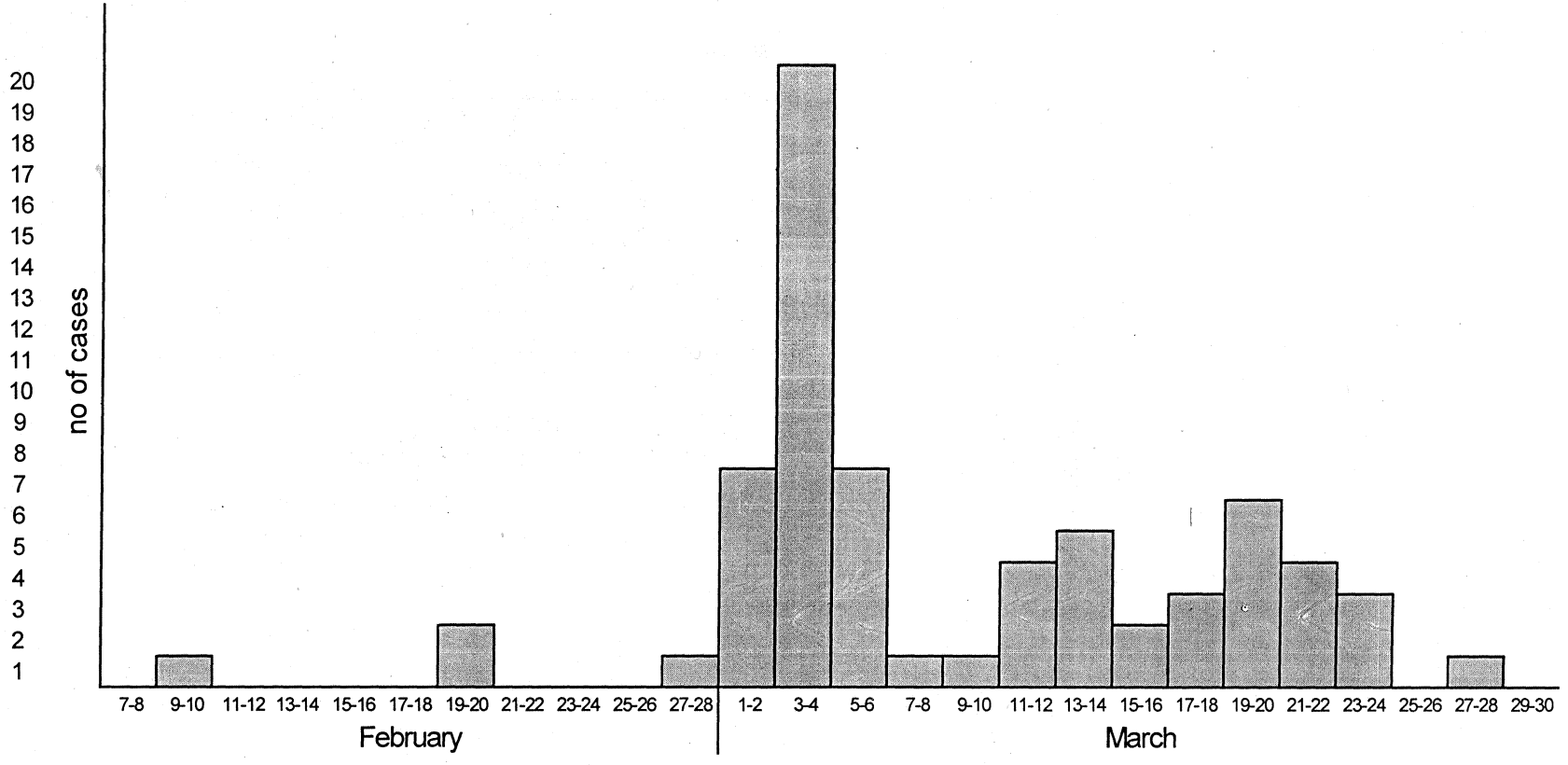

Table 1: Attack rates of measles by age and sex, Majherpara neighborhood, Hussendi, Purulia, West Bengal, India, 2005

		Number of Cases	Population	Attack Rate (%)
Age Group (in months)	7-9	12	12	100
	10-12	4	8	50
	13-24	10	16	63
	25-60	27	39	69
	61-120	15	45	33
Sex	Male	36	65	55
	Female	32	55	58
Total		68	120	57

Table 2: Attack rates of measles by age and vaccination status, Majherpara neighborhood, Hussendi, Purulia, West Bengal, India, 2005

Age Group (month)	Children immunized against measles			Children not immunized against measles		
	Cases	Total	Attack rate (%)	Cases	Total	Attack rate (%)
7-9	0	0	0	12	12	100
10-12	2	5	40	2	3	67
13-24	3	8	37	7	8	88
25-60	4	13	31	23	26	88
61-120	5	26	19	10	19	53
Total	14	52	27	54	68	79

Table – 3 Measles vaccination coverage and accumulation of susceptible population in Jhalda I administrative block, Purulia, West Bengal, India, 1999-2004

Year	Birth cohort	Coverage	Susceptible population	
			Vaccine efficacy = 85%	Vaccine efficacy = 64%
1999	3,171	78%	1068	1588
2000	3,254	75%	1180	1692
2001	3,340	72%	1296	1801
2002	3,432	74%	1273	1807
2003	3,519	70%	1425	1425
2004	3,601	75%	1305	1873

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Factors associated with diarrhea in an expatriate community, New Delhi, India, 2005

1. Introduction

People from industrialized countries who reside in developing countries for official employment including diplomatic assignments and international cooperation are usually referred to as expatriates. Since they have little immunity against enteropathogens they come in contact with in developing countries, they are subject to diarrhoeal episodes[1]. Recommendations are available to prevent diarrhoeal diseases in these communities[2]. As a result, they engage in practices that limit the risk of infection with pathogens transmitted through fecal oral route. However diarrheal diseases remain a source of morbidity, discomfort and concern among expatriate communities, residing in developing countries. Incidences of protozoal diarrheal diseases ranging from 40 to 100 per 1000 per year have been reported among expatriate communities residing in Africa[3] and South East Asia[3]. Incidence of diarrhea due to enterobacteria of 60 per 1000 per year was also reported from an expatriate community residing in Africa[4] and Nepal[4]. To prevent these cases of diarrhea that may occur in spite of good preventive practices, risk factors need to be identified.

WHO estimates that in 2000, there were 1.8 billon episodes of diarrhea in India. These led to about 700,000 deaths and 60 million DALY's lost[5]. Surveillance data from the Indian sub-continent indicates a distinct seasonal pattern in many geographical areas in the country[6]. In temperate climates, bacterial diarrhoea occurs more frequently during the warm pre monsoon season, whereas viral diarrhea, particularly diarrhoea caused by rotavirus is more common in winter. Most of the pathogenic organisms that cause diarrhoea are transmitted primarily through faecal-oral route. Faecally contaminated drinking water is a major source of infection for bacterial, viral and parasitic intestinal pathogen in India. An

estimated 88% of the Indian population has access to drinking water considered as safe according to the criteria used for Millennium Development Goals (i.e., tap water, tube well, protected well). However, those sources of water, particularly protected well, may also be contaminated with pathogens when they are not disinfected at regular interval. Failure to adopt and maintain preventive practices (e.g. exclusive breast feeding, improved weaning, use of clean drinking water and personal and domestic hygiene, as well as poor food handling practices) are other common causes of diarrhea in India[6]. In addition 69% of Indian population does not have access to adequate sanitation facilities.

Expatriate community A, in New Delhi, India has been facing a problem with diarrheal diseases for a number of years. As a result, laboratory diagnosis based upon stool examination was made available to all persons cleared for care at the clinic of the main compound of the community, regardless of symptoms. Surveillance data from this community based upon the results of laboratory investigations indicated high rates of identification of pathogens in the stools in 2003 and 2004 (45 isolations per 1000 population and per month) with a peak reaching 70 isolations per 1000 population and per month during the months of April and May. This seasonal recrudescence was a cause of concern among those affected and in the boarder community. In April 2005, laboratory surveillance based at the clinic reported again high rate of isolation of pathogen. In May 2005, expatriate community A requested the assistance of the Indian Field Epidemiology Training Programme (FETP) at National Institute of Epidemiology (NIE), Chennai to address this recrudescence. We investigated this cluster to (1) identify risk factors associated with diarrheal diseases in Expatriate community A, in New Delhi, India and (2) evaluate the effectiveness of recommendations in place to prevent diarrheal diseases expatriate community A, in New Delhi, India.

2. Methods

Study population

We defined the study population as expatriate community A, New Delhi, India. Specific inclusion criteria included (1) being cleared for medical care at the clinic compound one and (2) working on compound one or belonging to a family of an employee working on compound one.

Surveillance

We conducted simulated passive surveillance at the clinic of compound one from 2 May to 27 May 2005. Compound one clinic is the usual place where members of community A seek medical care as it is free and operated under standards of the country from which the community is originating. We defined a case as the occurrence of acute diarrhea (at least three loose motions a day) with pathogen identified in the stools.

Study design

We conducted an unmatched prospective case control study. We identified cases using the surveillance case definition among members of the study population between 2 and 27 May 2005. We recruited friend controls with no history of diarrhea in the last six months and excluded control subjects who developed diarrhea during the investigation.

Data collection

Trained nurses collected information using pre-tested, standardized, close-ended questionnaires administered directly to participants or to guardians in the case of children. Information collected included geographic characteristics, life style, water consumption, food consumption, dietary habits, hygienic practices and leisure activities.

Sample size calculation

We planned to recruit 45 cases and 45 controls to detect an odds ratio of at least four with a power of 80% and a 95% confidence level assuming a prevalence of exposure of 50%.

Data analysis

We calculated age and sex specific incidence of diarrhea using denominators provided by the administration of expatriate community A. We compared demographic characteristics of case patients and control subjects and calculated p value to test the statistical significance. We calculated odds ratio and their 95% confidence intervals t compare exposures among case patients and control subjects. We adjusted all odds ratios using three groups because the preliminary analysis indicated that case-patients were older than control-subjects. We also examined variables that we expected as potential third factors and variables significantly associated with the outcome in the univariate analysis for confounding and effect modification using stratified analysis.

Human subject protection

We attained permission from the administration of the community to investigate this cluster. The administration informed the community of the investigation and its objectives. We obtained oral informed consents from participants or their guardian in the case of minors. Our standardized consent form explained the objective, risk and benefits of the investigation. The information we collected was kept confidential and we used code numbers for identification. We could not seek ethical committee clearance because this was considered a rapid response to a perceived outbreak.

3. Results

Descriptive epidemiology

The total number of reported cases was 32. Of these, 17 (53%) were reported among females (Table 1). The rate of diarrhea was 66 per thousand with highest rate (124 per thousand) in the 30-44 year age group (Table 1). Laboratory investigation led to the identification of giardia (n=12, 38%), amoeba (n=17, 52%) or both (n=3, 10%) in the stools of case patients.

Case control study

Cases and controls were similar with respect to most general characteristics (Table 2). However, cases were more likely than controls to be 30 years of age or older (87% versus 64%, p=0.016). Overall a high proportion of both case-patients and control subjects engaged in practices that are recommended to prevent infection with pathogens transmitted through the fecal oral route (Table 3) Case-patients reported boiling water to disinfect it more commonly than control-subjects (18% versus 6%, age adjusted odds ratio [AAOR]: 11, 95% confidence interval [CI]: 1.2 – 100). Case-patients were also more likely to report three or more diarrheal episodes in the household in the last six months than control-subjects (AAOR: 4. 95% CI: 1-17). Other exposures were not significantly associated with being a case (Table 3). There was a dose response relationship between the number of diarrhea episodes in the household in the last six months and being a case-patient (χ^2 for trend = 19, p = 0.0001) [Table 5]. The association between systemic hand washing and diarrhea was stronger among those reporting three or more diarrheal episodes in the household in the last six months than among those who did not (AAOR: 23, 95% CI : 1.7-670 and AAOR : 0.9, 95% CI : 0.1-9, respectively, Woolf's test for effect modification : 4.3, p = 0.03) [Table 4].

4. Discussion

The incidence rate of diarrhoea among the expatriate community A was lower than expected from the years before. Case practiced better hand hygiene practice than the control subjects. Case patients had history of diarrhoea in the household in last six months indicating some in-house transmission of pathogen. They used to drink boiled water more frequently than the control subjects.

High incidence of diarrhea was reported through active laboratory surveillance earlier. Expatriate community was concerned because of report of high incidence in the preceding years. Overall diarrhea incidence was lower than expected as we used symptoms as criteria for case definition. Age specific incidence rate indicated high incidence in the age group of 33-44 years age group. This could be due to more number of representations from that age group. Incidence rate was equal in both genders.

Boiling water to disinfect it was associated with diarrhoea. It is unclear from our investigation, whether it results from causal phenomenon or from a consequence of artifact. Odds ratio indicated strong association, but we failed to document any dose response relationship. However, we found no evidence that this was actually better than using standard distillers. In fact, boiling as a way to disinfect water requires additional hand manipulations. These hand manipulations represent opportunities for contamination. A study assessing drinking water quality and effect of home purification efforts conducted in South Asia indicates ineffectiveness of boiled water to disinfect it.

There was an association between hands washing and diarrhoea and persons who were engaged in hand washing practices were more likely to develop diarrhoeal episodes. This finding is opposite to usual believe and there is no consistency of this result with other studies that identify association between hands washing and diarrhoea. Further analysis of our data indicated that this association was only present in those who had been exposed to three or more

diarrhoea episodes in their households in the last six months. Thus persons who exposed to repeated diarrhoeal episodes in the last six-month might have been more concern with the disease and washed their hands more consistently. So, strictly speaking, the association between hands washing and diarrhoea that was identified in this study was limited to those who had been exposed to three or more diarrhoea episodes in their households in the last six months as they started the practices from raised concern.

We planned to recruit 45 cases and 45 controls initially. During the study period we recruited 32 case-patients and 50 control-subjects. This results in reduction of the power of our study. There may be association of other exposures with diarrhoea in this study, but we failed to demonstrate that with this smaller number of case-patient recruitment.

Members of the expatriate Community A, New Delhi had a high level of hygienic practices as recommended to prevent diarrhoeal diseases. Laboratory surveillance based on isolation of pathogen raised concern among the community but our investigation indicates moderate incidence once we took clinical symptoms in to account. Diarrhea clusters in households, possibly due to household transmission or because of epidemic fear. Households affected by diarrhea were engaged in better hand washing practices. Boiling water to disinfect was associated with diarrhea. The study does not differentiate between real and artificial association of boiling water to disinfect with diarrhoea.

Recommendation

This investigation allowed recommending newer measures for the prevention and control of diarrhea in the expatriate community A. First, the medical unit conducts prospective surveillance and collects systematic information on all persons with diarrhea to better detect clusters and optimize control efforts. Second, continue and encourage good hygienic practices. Third, families more affected by diarrhea offer special assistance by the medical unit to prevent further cases. Last, investigate household transmission of diarrhea in detected clusters.

Table 1: Incidence rate of diarrhoea (in four weeks) by age and sex, expatriate community A, New Delhi, India, 2005

		Population	No. of case-patient	Incidence rate per thousand
Age Group (years)	0-4	18	1	56
	5-14	85	3	35
	15-29	74	0	0
	30-44	137	17	124
	45-59	151	11	73
	60+	23	0	0
Sex	Male	250	15	60
	Female	238	17	71
Total		488	32	66

Table 2: Characteristics of diarrhoea case-patients and control-subjects, expatriate community A, New Delhi, India, 2005

Characteristics	Cases (n=32)		Control (n=50)		P-values
	No	%	No	%	
Age greater than 30 years	28	87	32	64	0.016
Female sex	17	56	25	50	0480
Direct response to the questionnaire	28	87	37	74	0.115
Residence of the main compound	11	34	15	30	0.429
Residence in India for more than 12 months	24	75	31	62	0.128
Travel more than seven days in South-East Asia	16	50	18	36	0.505
Embassy employee /volunteer	23	72	26	52	0.071

Table 3: Selected exposures among case-patients and control-subjects, expatriate community A, New Delhi, India, 2005

Exposures		Frequency of exposure				Age -adjusted odds ratio	
		Cases (N=32)		Controls (N=50)			95% confidence
		No	(%)	No	(%)	Estimate	interval
House hold and life style	More than 3 episodes of diarrhoea in the household	26	81	19	38	4.0	1.5-10.5
	Presence of toddlers in diapers in the household	3	9	6	12	0.8	0.1-3.8
Drinking water	Daily consumption of commercially bottled water	20	63	25	56	1.4	0.5-3.7
	Daily consumption of water from refilled plastic bottle	18	56	30	60	1.2	0.5-3.1
	Consumption of boiled water	6	18	1	2	11.1	1.2-100
	Daily consumption of water from distiller	24	75	38	76	1.4	0.5-4.2
	Consumption of tap water from compound system	15	47	22	44	1.2	0.5-3.2
	Consumption of municipal tap water	1	3	0	0	NA	NA
Food Intake	Daily consumption of food prepared by domestic help	20	63	31	62	1.0	0.4-2.8
	Excellent hygienic practices of domestic help	17	61	30	60	0.7	0.1-4.2
	Systematic hand washing by domestic food handler	19	83	27	90	1.3	0.5-3.7
	Weekly consumption of compound cafeteria food	14	44	21	42	0.9	0.4-2.4
	Consumption of food at compound Indian canteen	16	50	19	38	1.2	0.4-2.4
	Weekly food consumption in five star restaurants	2	6	2	4	1.6	0.2-16.6
	Weekly food consumption in other restaurants	2	6	7	14	0.5	0.08-3.4
	Weekly food consumption in cocktail parties	4	13	2	4	3.8	0.6-33.3
	Weekly food consumption in buffets	4	13	3	6	3.0	0.6-16.6
Dietary habit	Weekly consumption of raw salads and vegetables	21	66	33	66	1.2	0.4-3.0
	Daily consumption of raw fresh fruits	21	66	31	62	1.4	0.5-3.7
	Daily consumption of ice in cold beverages	13	41	22	44	1.2	0.5-3.0
	Systematic dis-infection of fruits and vegetables	32	100	46	44	NA	NA
Life, leisure and hygienic practices	Swimming in a pool	24	75	28	56	2.5	0.7-8.2
	Presence of a pet at home	15	47	24	48	1.0	0.4-2.6
	Systematic hand hygiene before meals	25	78	29	58	2.0	0.7-5.9
	Systematic hand hygiene before food handling	27	90	24	63	4.0	1.0-16.7
	Systematic hand hygiene after using the rest room	28	88	42	84	1.1	0.3-3.7
	Systematic hand hygiene after touching pets	7	33	9	21	1.4	0.4-4.5
	Weekly use of hand sanitizer/ Toilettes	15	47	21	42	1.1	0.4-2.7

Table 4: Association between hand hygiene and diarrhoea among those exposed to diarrhoeal episodes, expatriate community A, New Delhi, India, 2005 India, 2005

Strata	No. consistent hand hygiene before food handling /total (%)		Prevalence ratio (95% confidence interval)*
	Cases	Control	
≥ 3 cases of diarrhoea in household	23/24 (96%)	5/10 (50%)	23 (1.7-670)
< 3 cases of diarrhoea in household	4/6 (67%)	19/28 (68%)	0.9 (0.1-9)

* Woolf's test for effect modification: 4.3 p value = 0.037

Table 5: Trend of increasing risk of diarrhea among those exposed to diarrhea episodes in their house holds, expatriate community A, India, 2005 [1]

Number of diarrhoeal episodes in the household in the last six month	Cases (n=32)		Control (n=50)		Odds ratio
	No	%	No	%	
No episode	2	6	16	32	1
1-2 episodes	4	12	15	30	2.1
3-4 episodes	6	19	10	20	4.8
5-6 episodes	10	31	6	12	13
7+ episodes	10	31	3	6	27

[1] * χ^2 for trend=19, p=0.0001

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Section 4: Journal critique

Critical Evaluation of Published Research 1

Name of the published research to be evaluated

Sinistrality—a side effect of prenatal sonography: A comparative study of young men by Helle Kieler, Sven Cnattingius, Bengt Haglung, Juni Palgren and Ove Azelsson, submitted in November17, 2000 and accepted in February9, 2001. The article was published in journal Epidemiology 2001;12:618-23.

Introduction

With the increase in practice of ultrasound scanning in pregnancy that led to the increase foetal ultrasound exposure, demands study related to adverse effect of ultrasound. Non-invasive diagnostic techniques became popular as they do not require any incision or any prick of a needle. Though some misuse in cases of sex-determination followed by female foetal abortion non-invasive ultrasonography has several advantages in prenatal diagnoses of diseases. Sinistrality—a side effect of prenatal sonography: the comparative study of young men by Helle Kieler et al describes an association between prenatal ultrasound exposure and non-right handedness is interesting and important from the public health point of view. So it is worthy to go through the article and make a critical review on that. Moreover, for a clear understanding in the field of research and to plan activities accordingly knowledge of critiquing is essential to improve individual skill and potential.

The objective of this journal critique is to identify the strengths and weaknesses of the published research in order to ensure that beneficiaries receive intervention based on the best available evidence.

Methodology

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

Review of 'Name and Abstract' of the published research

The research question is clearly expressed in name. So the name is appropriate. In abstract section the objective of study is clearly given in a single sentence. A prospective cohort study was conducted in Sweden among men born from 1973 to 1978. 6858 men born in hospital having USG exposure at the time of prenatal screening and 172537 men born in hospital without USG were studied using logistic regression analysis. The study indicates there was no difference in left-handedness between USG exposed and unexposed from 1973 to 1975 but the risk of left-handedness was higher among those exposed to USG compared with those unexposed from 1976 to1978. The reason behind the difference in incidences in between 1973-75 and 1976-78 was not clear. One possible explanation was given that 1973-75 was introduction phase and in 1976-78 USG was offered more widely that failed to relate it with fetal brain damage.

Review of 'Introduction' of the published research

Ultrasound scanning in pregnancy is widely used in last three decades in the developed countries. An extended number of scans, use of high-resolution scanners and little regulations on ultra-sonoghaphic during pregnancy contribute to increased fetal ultrasound exposure. Although a few epidemiological studies addressed possible adverse effects of ultrasound. However, an association between prenatal ultrasound exposure and non-right-handedness among boys has been reported in two randomized, controlled trials. Left-handedness that runs in families occurs in 8-9% of population. Factors influencing are different population groups and the methods determining the handedness a lesion to the left side of brain before the age of six years have been found to cause a shift to non right-handedness in genotypic right handed children. Since brain continues to develop through out the gestational period (unlike other organ that completed development with in 12 weeks) a disturbance of migration of neurons to cortical

regions on one side would favour the growth of the region of opposite side. The prevalence and factors determining is well described and explained. But it is not clear that why the damage of brain due to ultrasound is unilateral.

Review of 'Subjects and Methods' of the published research

Study population is the birth cohort during 1973-78, who had enrolled in any one of six-enrollment center of Sweden during the period 1991-96. The population is well described with clear demarcation of inclusion and exclusion criteria for both exposure and unexposure group. Exposure group is the newborn in Malmo Hospital born during 1973-78 (as per Swedish Medical Birth Register) and registered in military service in any one of the six-enrollment centers of the country. Un exposure group is the same new born with all the criteria of exposure group except they were born in other hospital of the country. Definition of left handed ness (outcome) was determined by preferred hand in handling a replica rifle to enroll – only enrollers who shoot left handed was registered. Outcome measurement is uniform both in exposure and unexposure group. The exposure and unexposure group are demarcated according to the institution in which they were born. It is not necessary that all male born between 1973 to 1978 at Malmo Hospital had undergone prenatal ultrasonography or all male born between 1773 to 1778 at other hospital in Sweden had not undergone prenatal ultrasonography. So possibility of misclassification between exposure and unexposure group cannot be ruled out and that can affect the association in study findings. Calculating odds ratio with 95% confidence interval estimated by logistic regression does statistical analyses between groups. Possible confounding factors like place of birth, enrollment center, year of enrollment, maternal age, pre-term birth, low birth weight, birth asphyxia and mother's country birth are considered and analysis done after controlling those confounders in logistic regression analysis. Assessment of risk of left handed ness between 1973-75 and 1976-78 in groups are considered as introductory and full scale phase of ultrasonography respectively.

Review of 'Results' of the published research

The proportion of left handed ness enrolled was higher among new born in Malmo campared with those born in other hospital (10.9% versus 9.5%). Comparing birth cohort between 1973-75 and 1976-78 both adjusted for year of enrollment and other confounding factors Malmo versus other hospitals indicates an odds ratio of 1.2 (95% confidence interval 1.2-1.5). Comparing new born between 1969-1972 at Malmo versus other hospital in Sweden adjusted for place of birth, enrollment center, year of enrollment, maternal age, pre-term birth, low birth weight, birth asphyxia and mother's country birth indicates no difference in risk of left handed ness. To prevent biasness the researchers expanded the model to include enrollees at all enrolment centers of the country and thus they justified their result. But the same researchers expressed earlier that most cases were from southern district mainly from Malmao and complete register was not available.

Review of 'Discussion' of the published research

The idea of the discussion was: "In this study we found an increased risk of left-handedness in young men exposed to ultrasound in fetal life, suggesting that prenatal ultrasound influences the development of the fetal brain." The researchers mentioned two previous objective trials that were criticized for not using objective tests for handedness, and finding excess only in non right-handedness and not in left-handedness. For this reason in this study researchers determined preferred hand objectively by handing replica rifle to the enrollee. It was stated that prevalence of left-handedness to USG exposed fetus from 1973 to 1978 was slight high (9.6%) than normal(8-9%). LBW and difference in test procedures were identified as main two confounders. The majority of men born and living in Malmao were enrolled in the same centre in the south of Sweden, which performed the test for handedness more frequently than other centers. The rise in prevalence of left-handedness during the study period was found only in Malmao and not among males born in other university/regional level hospital without ultrasound scanning indicating that socio-demographic factors

had negligible effects on results. But beside the university hospital in Malmao 11 other hospitals introduced ultrasound scanning before 1980 though they were not considered in the study due to absence of reliable documentation. It was found that number of left-handedness was only increased in the 1976 to 1978 phase when a second trimester scan had been introduced as well as a second scan at 32 weeks. It might be speculated that the increased prevalence of left-handedness was an effect on second trimester scan or the scan regime because fetal brain is presumably more susceptible to external effects because of the high developmental activity that includes completion of the early migration stages, proliferation and connectivity of the cortex. But it was earlier stated that USG was initially performed at 28th weeks since 1972, and then gradually changed to 19th week during 1974-75 and from October 1976 two examinations at 19th and 32nd weeks. Therefore the statements were contradictory. In a "meta-analysis" of the two controlled trials, it was concluded that "left-handers are no different from right-handers" that "a positive association between ultrasound during pregnancy and sinistrality among boys should not lead to the conclusion that ultrasound causes harm to the developing brain in male fetuses." It is also been argued that the previous findings of an association between prenatal ultrasound exposure and non right-handedness were weak and of uncertain public health or clinical significance. ...". Whatever criticism would have it, the importance and sincerity of the study should be highlighted. Moreover this study had explored a new side, that was, adverse effects of noninvasive investigation techniques, which had been advised very commonly with a view that they did not harm the patients.

Critical Evaluation of Published Research 2

Name of the published research to be evaluated

Zinc supplementation in young children with acute diarrhoea in India by Sunil Sazawal, Robert E. Black, Maharaj K. Bhan, Nita Bhandaary, Anju Sinha and Sanju Jalla. The article was published in journal The New England journal of Medicine volume 333, dated the 28th September 1995..

Introduction

Zinc is a component of many enzymes. It is active in the metabolism of glucides and proteins, and is required for the synthesis of insulin by the pancreas and for the immunity function. Zinc is present in small amount in all the tissues. Zinc deficiency has been reported to result in growth failure and sexual infantilism in adolescents. Role of zinc in diarrhoea and its supplementation in management of diarrhoeal disease in children along with oral rehydration fluid and normal diet has been studied in developing countries with mixed result. So the study 'Zinc supplementation in young children with acute diarrhoea in India' by Sunil Sazawal et al to describe an association between diarrhoea in children and zinc supplementation is interesting and important from the public health point of view. So it is worthy to go through the article and make a critical review on that. Moreover, for a clear understanding in the field of research and to plan activities accordingly knowledge of critiquing is essential to improve individual skill and potential.

The objective of this journal critique is to identify the strengths and weaknesses of the published research in order to ensure that beneficiaries receive intervention based on the best available evidence.

Methodology

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

Review of 'Name and Abstract' of the published research

The research question is clearly expressed in name. So the name is appropriate. The abstract is structured one and informative. It contents 300 words, which are more than the standard limit of international journal. Result section uses appropriate numbers and statistical tests. Sections are interesting enough to capture the interest of reader, but details of the subject are not with in. the study is important and worth knowing about the diarrhoeal diseases that are very common in developing country like India. It affects infants and young children, more in those with malnutrition and impaired immune status both of which may be associated with zinc deficiency. Therefore it will be helpful to know how zinc supplementation affects infants and young children with diarrhoea.

Review of 'Introduction' of the published research

Diarrhoea is consistently found in children with zinc deficiency. Zinc deficiency can result in growth retardation, especially shunting and impairment of immune function. Introduction expresses the hypothesis that zinc deficiency has a link between these risk factors and duration of diarrhoea and supplementation of zinc in responding to diarrhoea quickly. The literature review establishes a clear need for the study and catches the interest of the readers. Need for the present study – supplementation of zinc in children with diarrhoea in addition to oral dehydration and normal diet has been well made. The purpose of the study has been stated very clearly. Diarrhoea leads to excess zinc loss that is associated with the immune status and shunted growth of the children.

Review of 'Subjects and Methods' of the published research

A double blinded randomized control trail conducted at Kalkaji, neighborhood of New Delhi between September 1992 and November 1994. A special diarrhoea clinic was operated at the study area and child meeting inclusion criteria (that were well defined) were recruited for the study. Inclusion criteria were children of 6-35 months age group who were reported to have passed at least four unformed stool in the previous 24 hours, who had diarrhoea for less than seven days and who were permanent residence of Kalkaji. Exclusion criteria were children presented to the clinic a second time, those who are judged by the physician to have malnutrition requiring hospitalization and those whose parents denied consent for zinc supplementation. Baseline assessment including a detail physical examination was performed on each patient and their methods of examination and definition of operational variables were well described. Intervention strategy was well designed and monitoring and supervision was in built in study design. For control of bias and ensuring randomization the solutions were identical in test and colour. The code was kept by WHO personnel and was not available till the end of study. Methods of tacking non-respondence and or compliance at follow up visits were not mentioned although the instruction that was given to the mothers was summarized. Mothers in giving oral rehydration salt, normal foods or in following the instructions that was given did not state the uniformity of treatment at home, both these factor are also important for health as well as for standardization. Reasons for discontinuation in the study by some participants were mentioned and were satisfactory.

Review of 'Results' of the published research

The results have been presented in four tables. They are duration of episode of diarrhoea, persistent and severity of diarrhoea, analysis in sub group and adverse reaction. Out of the total 931 diarrhoeal episode 44% resolved within 3 days of enrollment and 84% resolved within 7 days of enrollment. Supplementation with zinc was associated with 25% reduction among stunted growth, and for those who had low plasma zinc concentrations, it was 27%.

Using Kaplan Meier curves, the relative risk of continued diarrhoea in the supplementary group as compared with the control group was 0.93 (95% confidence interval 0.78 – 1.09) during first three days of supplementation and 0.62 (95% confidence interval 0.52 – 0.73) after three days of supplementation. Using logistic regression model, the odds ratio for diarrhoea lasting more than 7 days was 0.79 with zinc supplementation (95% confidence interval 0.64 – 0.96). the odds ratio was 0.74 (95% confidence interval 0.57 –0.95) when restricted to children enrolled within 3 days of onset of diarrhoeal attack. The overall finding of the study in reduction of mean number of watery stool per day in supplementation group was 39% (95% confidence interval 6 – 70) [p = 0.002]. There was 21% reduction (95% confidence interval 10 - 31) in the number of days with the watery stool. The effect of zinc on reduction of number of days with watery stool was greater in children with stunted growth than with the normal growth, relative risk was 0.59 (95% confidence interval 0.48 – 0.73) versus 0.95 (95% confidence interval 0.79– 1.15). The analysis is very much focused on the stated objectives. It quantifies clearly the importance and effect of zinc supplementation in children with diarrhoea.

Review of 'Discussion' of the published research

The investigators have highlighted the positive findings of the results and discussed the limitation of the study. The hypothesis made in the introduction is well supported in discussion section. In general the description and discussion of the importance of zinc supplementation in normal, stunted growth children with diarrhoea and those having low plasma zinc concentration is quite adequate. The investigators had mentioned about the earlier studies where no significant results were found to support the theory of adding zinc supplement to children with diarrhoea. The investigators also recommended for further studies in the developing countries towards a decision of policy changes were very relevant and meaningful from public health point.

Section 5: Paper presentation

An outbreak of measles in Jhalda – I, Purulia district, West Bengal, India, 2005 (an abstract)

Background
WHO estimates that the annual global burden of measles includes 30 millions cases and one million deaths. Although a safe and effective vaccine is available, low coverage among children continues to cause measles outbreaks. We investigated an outbreak of measles at Hussendih village, Purulia district, West Bengal, state, India. The objectives of the investigation were to estimate the magnitude of the outbreak and to formulate recommendations for prevention and control.

Methods
We searched for cases actively using the WHO case definition for measles. We collected information on age, sex, location of residence, date of onset, symptoms, signs, vaccination status and outcome and analyzed it by time, place and person. We conducted a retrospective cohort study among children between 7 and 120 months of age to estimate the vaccine efficacy. We ascertained the measles immunization status using interviews of the mothers.

Results
A total of 68 cases occurred (overall attack rate: 57%). 3 deaths were reported (Case fatality ratio: 4%). No patient received vitamin A treatment. Laboratory confirmation could not be obtained. The number of cases by day peaked around 3-4 March, one incubation period after a religious festival. The highest attack rate was observed among children <9 months of age (100%). All cases were identified in a part of the village inhabited by members of a religious community among which immunization coverage was usually lower. Of 68 case-patients, 14 (22%) had measles vaccine. Overall, the measles coverage had been below 80% since 1999 in the block. The attack rates of measles among vaccinated and non-vaccinated children were 79% (54/68) and 27% (14/52) respectively for a vaccine efficacy estimated at 64% (95% confidence interval).

Conclusion
This outbreak of measles was caused by a combination of a failure to vaccinate and vaccine failure. The routine measles immunization system requires strengthening, including (1) communication and outreach efforts to increase the participation of minorities and (2) a review of the factors that may have affected the vaccine efficacy. Access to laboratory confirmation needs to be secured and the management of patients with Vitamin A must be promoted.

This abstract was accepted for a poster presentation in Third bioregional TEPHINET scientific conference at Chennai, India 9-12 January 2006.