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 **Debasis Jethy** 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.

for **Director,**

National Institute of Epidemiology,

(ICMR), Chennai.

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FIRST FIELD POSTING

Situation analysis of Cuttack district, Orissa 2007

Introduction (public health scenario)

India is a developing country which has achieved remarkable control of infectious diseases and decline in mortality rates (infant mortality rate 77 deaths per 1,000 live births in 1991-95 to 57 in 2001-05[2], maternal mortality rate from 400 maternal deaths per 100,000 live births in 1997-98 to 300 in 2001-03). However some pockets of poverty (proportion below-poverty line (BPL) 27%), malnutrition and ill health exist. With the change in life style and demographic transition non-communicable diseases are emerging as a major threat. National Rural Health Mission (NRHM) has been recently lunched to strengthen public infrastructure and create a holistic approach of health. There is a steady increase in life expectancy at birth from 60 years in 2001 to 69.25 in 2008.[3,4] However HIV is spreading fast and India has more adults living with AIDS than any other country.[5]

Orissa is coastal state in eastern India with 41% of Scheduled Tribes and Scheduled Castes. It is the most poverty stricken state of India (around 47% BPL against all India average of 26.1%).[9] Frequent droughts, floods, cyclone and other natural calamities not only impoverish the people, but also make them morbidly stoic towards the pace of development. The disease burden is high with communicable, pregnancy-related, and childhood ailments accounting for about 65 per cent of the diseases. The infant mortality rate, a key indicator of the overall status of health, continued

to be the highest in Orissa at 91 per 1000 live births in 2001[i] has slightly declined to 65% in 2007.[2] Coverage of preventive services, particularly immunization has improved from 36% in 2002 to 52% in 2005 (NFHS3). Orissa has been successful in reducing crude birth rate, total fertility rate (2.4 children per woman), maternal mortality rate and child mortality rate as compared to the all-India average figures. However, due to under-nutrition (estimate being 45% stunted, 20% wasted, 41% underweight in under-fives; body mass index being below normal in 40.5% of 15-49 year women) and anaemic problems (74% in 6-35 months old children, 63% in 15-49 year women), infant mortality rate (65% per 1000 births) in the state is fairly higher than the all-India level (57% per 1000 births).[2]

Cuttack district is one of the developed districts of Orissa. Contrary to overall Orissa statistics, Cuttack district has only 3.6% of tribal people, higher standards of living and literacy rate of 76.7% with a concomitant of better health awareness. Cuttack is a coastal district with 27.4 % of urbanization. Natural calamities like flood, cyclone and human activities like industrialization, urbanization make the district prone to epidemics of water borne and vector borne diseases as well as the modern pandemic of HIV/AIDS. Vector borne diseases like malaria is endemic perennially while chikungunya epidemic is now spreading in different periurban areas and villages.

The key elements of the situation analysis were to describe the geographical, demographical and socio-economic characteristics, important health related millennium development goals indicators, organizational set up of the health system, major public health priorities in relation to the Cuttack district, Orissa.

Methods

We collected information on Demographic and administrative profiles the district from the district statistical and district rural development office. Projections to update population are by using the census figure for Cuttack district in 2001, decadal growth rate of 14% and assuming geometric progression. We calculated age and sex wise distribution from the projected population for 2007 basing on 2001 census. We collected millennium development goal (MDG) related health information from the public health and family welfare wings of the district health department. We also searched the World Bank, the millennium development, the World health organization, the UNICEF, Government of India websites for more information on MDG of Orissa and India. . We collected surrogate indicators for MDG to compare with the state and national level.

We also visited few primary health centers and sub centers to observe the primary health care delivery system and availability of infrastructure. We collected information on availabilities of laboratory resources at the district and the block level.

General presentation

Cuttack is a narrow strip of land of area 3932 sq. km, located at latitude of 20° 03 to 20° 40 N and longitude of 84° 58" to 86° 20 E. It has an average elevation of 37 meters. Cuttack city the administrative headquarter is located at the apex of delta formed by the rivers Mahanadi and Kathajodi. It experiences a hot and humid climate in Summer (April to May), characterized by temperature going up as high as above 40 °C and a dry and cold climate in Winter (October to December), with mercury dipping to as low as below 10 °C. Monsoon rains (July to September) lash the city to provide most of the city's annual average rainfall of 150.13 cm.

Topographically Cuttack has two prominent divisions viz., hilly terrain on the West and Mahanadi delta plains in the East. It is traversed by number of rivers and rivulets that twist and interlace in all directions. Large portion of the landmass is low lying. Although highly fertile, it is afflicted by frequent floods submerging the standing crops and casting sand.

Cuttack district has 3 sub-divisions, 11 tehsils and 14 Community Development Blocks. It has 7 towns and 1966 villages.[7]

Population

The district has a population of about 2.34 million (2001 census) with a population density of 595 persons per sq km. There are 938 females per 1000 males and literacy rate is 84%. About 88% of the population lives in the rural areas, while 12.3% of the population lives in the urban areas. The density of population is 494 per Sq. Km. The decadal growth rate has declined to a healthy level at 14%, much below the national and state growth rates. At this rate, by the end of

next two decades, population of Cuttack will stabilize. Main languages spoken in the district are Oriya, Hindi, English and certain tribal dialects viz. Santali, Munda etc.

Economical resources

People of Cuttack (about 76%) depend upon agriculture as the primary means of livelihood however in the recent times, floods, droughts, low yield per hectare hinder the agricultural economy of Cuttack. The prawn cultivation also demands an important position in the economic scenario. Medium and small scale industry mainly provides employment to the bulk of workforce in the core of Cuttack district and serves the domestic economy. Migration of huge number of people to other cites like Mumbai, Surat is responsible for increase in prevalence of HIV infection. Cuttack is the abode of silver filigree business, unique in the arena of art and craft. There are also textiles of woven silk and cotton.

Laboratory resources

At the primary level in PHCs, CHCs, Sub-divisional and area hospital types of Laboratory tests conducted are routine pathological investigations of blood, urine and stool, malaria parasite, sputum AFB.

At secondary level, the district hospital (city hospital) laboratory test facilities available are for malaria, filaria, leprosy, stool (routine, microscopic and occult blood) urine (routine, microscopic), billirubin salt and pigment sputum AFB, and seminal fluid analysis.

Tertiary care facilities are available at the district level medical college (S.C.B. medical college, Cuttack). The laboratory facilities available include microbiology and pathology. In the microbiology laboratory, tests pertain to bacteriology, serology, mycology, and virology (including HIV) and spirochetes. The pathology laboratory tests include hematology and histopathology.

Urban leprosy unit and leprosy eradication units conduct 50 skin smears per month. Leprosy home and hospital only conducts 300 skin smears per month. Blood bank laboratory tests include those of HIV-ELISA-SPOT, HBS Ag-SPOT, VDRL, Blood sampling and cross matching, DC, peripheral smear, malaria parasite. The State Pathology Laboratory is situated at Jobra area of Cuttack city, within one km from the SCB Medical College and 4 km from the district head quarter hospital. It conducts various pathological, hematological, bacteriological and biochemical tests.

Major public health priorities

Foremost concerns of public health are like malaria, chikungunya and HIV/AIDS. Malaria is endemic with PF% of 57. Some areas have very high API with abrupt change in malarial trend. Interventions include early detection and prompt treatment, insecticide treated bed net distribution, Indoor Residual Spray and larvivorous fish, IEC activities. Chikungunya outbreaks have been taking place multifocally in different rural and periurban area for the past few years. The spread is very rapid and the cases are mostly undiagnosed. Cuttack is category C district for HIV. Distribution is heterogeneous with isolated pockets of high prevalence in many parts of the

district. The known predisposing factors like urbanization industrialization and migration are met in the district. There are ICTCs established for diagnosis, counseling, referral etc. and sentinel surveillance in ANC and STD sites to know the trend. There are good Information Education and Communication activities.

Organization of the health system

The Orissa Medical School was established in 1875 following the establishment of the Cuttack General Hospital in 1874. The district health system operates as per the norm set up for the state to achieve the objectives of primary health care, which comprises of preventive, curative and promotive health. It has a wide net work of health institutions starting from sub-center level to tertiary level of healthcare institutions to provide health care services at the doorsteps of the common people if properly planned and managed. (Figure 1)

Chief District Medical Officer is the medical officer in charge of the district. Under the CDMO there is one Additional CDMO and three Additional District Medical Officers. ADMO medical controls the hospital wing. He also is in charge of RNTCP. ADMO family welfare controls the family welfare and immunization and other Reproductive and Child Health activities. The ADMO public health is in charge of the public health and controls the epidemic situation of the district. He is in charge of the Malaria, Filaria, and District task force of the district. Then the district comprises of some subdivisions. There is one SDMO, Sub divisional medical officer in each subdivision. The subdivision is divided in to some blocks. In each block there is one PHC or CHC. In each PHC there is one medical officer in charge and one second medical Officer. The second medical officer is in charge of Family welfare. If it is an integrated child development

scheme (ICDS) block he is in charge of ICDS. In CHC there are four medical officers. Two of them are specialists, one is of pediatrics and another one is Obstetrics and Gynecology. Then the PHC area is divided in to a number of sectors. There is one PHC (N) in each sector. In the PHC (N) there is one medical officer and one health supervisor. The health supervisor takes care of the public health. Under each sector there are sub-centers. In each sub-center there is one health worker male and one health worker female or ANM. They do the public health works, immunization and active and vertical disease surveillance. Each sub center comprises of a number of villages where the total population is 5000 to 10000 and within each 1000 population there is Anganwadi center. There is one Anganwadi worker and one Anganwadi helper for the ICDS programme. They help the health worker male and health worker female. They take care of the expectant mothers and the children below 5 years.

There are four (all governmental) medical college and hospital namely SCB Medical College, SVP PG Institution, Mental Health Institute, Acharya Harihara Cancer Institute, Cuttack. There is one District Head Quarter Hospital at City Hospital, Cuttack, two sub-divisional hospitals at Athagarh & Banki, fourteen Community Health Center (CHC), Upgraded Primary Health Centers (UGPHC), Primary health centers (PHCs), nine Area Hospitals and fifty-two Primary Health Center New (PHC N). There are also 15 Ayurvedic & 21 Homeopathic dispensaries. In the rural area there are 310 sub-centers.

The treatment and prevention of diseases, family welfare activities and other public health activities are managed by three different wings of Health and Family Welfare department pertaining to medical, family welfare and public health (Figure 1)

Indicators towards millennium development goals

Goal 1: The underweight prevalence among under-five children in the Orissa is nearly equal to the national level; no data available for district. At the national level, vitamin A supplementation of children of age six to 59 months during last six months was 64%, where as it was 25.6% (12-35 months) and 59% (9-35 months) at the state and district level respectively. The proportion of infants under six month who are exclusively breast fed was 46% and 54.5% at the national and state level; data not available in district. We could not collect any information about proportion of population below minimum dietary consumption level.

Goal 4:

The under five mortality rate in Orissa (90.6/ 1000 live birth) is higher than the national level (76/ 1000 live birth), it is 9.2 for the district. The infant mortality in Cuttack (33/1000 live birth) is lower than the state (64.7/1000 live birth) and national (57/1000 live birth) level. In India, measles immunization among children under 1 year of age is 59%.

Goal 5:

Maternal mortality ratio (MMR) in the state (358/100, 000 live birth) is lower than the national (450/100, 000 live birth) data. No information MMR was available for the district. The proportion of birth attended by the skilled health personells is high at the district (trained attendant and institutional together constitute98%) as compared to the state (46%) and national (47%) level. The antenatal care among pregnant women was higher at the district (93%) than (62%) level, where as the coverage was 74% at the national level.

Goal 6:

HIV: In India, the HIV prevalence among antenatal clinic attendees (15 -49 years) is 0.6%, where in Orissa, it is 0.5%. No information was available for HIV prevalence at the district level. The condom use rate at the district (88%) level is satisfactory as compared to the state (6.7%) and national (9.8%) level. The condom use rate during the recent higher risk sexual encounter is high in Orissa (45%) as compared to national (30%) level. Proportion of HIV positive women receiving antiretroviral therapy during pregnancy to prevent mother to child transmission is much higher in Orissa (34%), where as its low at the national (3.6%) level. No data was available for number of children orphaned by HIV/AIDS and percentage of clients diagnosed and treated for STI as per guideline for the district, state and national level.

Malaria: During 2006, in Cuttack district two cases of malaria deaths were reported, where as at the state and national level, it was 184 and 1173 respectively. Only one death due to malaria in the district reported in 2007-08.

Goal 7:

The proportion of population with sustainable access to improved water source was 82% in the district.

Goal 8:

No data was available for goal eight for the district, state and national level.

Discussion

The socioeconomic status and infrastructure facilities of the district are better in comparison to many other districts of the state. The high literacy status as well as the education level is a great strength for implementing any people's friendly programme in the district. The health facilities available in the district are among the first category districts. The wide network of primary health care system and existence state level tertiary referral health institutions are unique for the district. The communication system in the rural and urban areas of the district is very good so that common people avail the Govt. health care facilities with easy access.

The major weakness in the system is that there is no coordination mechanism between Rural and Urban health care system. In Orissa the urban health system and the rural health system are functioning under two different ministries. Cuttack city being the health capital of Orissa, most of the periphery doctors prefer to stay there and hence are irregular in attending their respective PHCs in rural area.

Death due to both malaria and gastroenteritis seem to be underreported. Natural calamity like flood and human activities like industrialization, unplanned urbanization, development of periurban area and migration render the habitat malariogenic. Cyclone and frequent floods afflict this disaster prone district and logs water both in rural and urban area. This creates unhygienic environment in rural as well as urban area. So, there is always apprehension of various water-borne and vector-borne outbreaks. Besides natural calamities human activities like unplanned urbanization coupled with rapid expanse of city population, periurban colonization, industrialization and migration also make the habitat mosquitogenic. So despite antimalarial

activities, the malaria incidence is increasing. Chloroquin is still in use as the first line drug in Cuttack. The resistance of malaria parasite especially falciparum to this is a major set back for malaria control. The migration is likely to increase in HIV/AIDS prevalence.

Challenges of the system: To manage the health situation in disaster situations and in the aftermath there should be a very good institutional coordination mechanism among the health and other related sectors.

Recommendations

For public health purpose a well-oiled coordination mechanism between the two ministries at the district and sub district level is essential. Newer antimalaria drugs like artimisinin should replace chloroquin as the first line drug. Besides, we have to evaluate other factors responsible for failure of current malaria control strategies to bring malaria under control. Presently Govt. of Orissa is planning to include the Indian System of Medicine and homeopathy health institutions in public health programmes. This would definitely increase the skilled manpower strength in public health activities. To estimate and control the chikungunya outbreaks are spreading in different foci, Integrated Disease Surveillance Project should include reporting of cases with fever with joint pain. There is need to estimate the awareness and attitude of health personnel and community towards chikungunya. In a reverine district like Cuttack with migrant population and rapid unplanned urbanization there should be a rapid response team always alert with epidemic preparedness.

References:

1. UNDP India- Orissa Human Development Report Launched Calls For Focused Public Action. *Bhubaneswar, March 2005* available at http://www.undp.org.in/index.php?option=com_content&task=view&id=143&Itemid=131

2. NFHS – III. October 2007.

3. Orissa Statistics. available at http://www.orissainfoline.com/statistics.htm

4. India Together. An Indian life expectancy in our nation. available at http://www.indiatogether.org/health/infofiles/life.htm

5. India life expectancy at birth. Index mundi. available at http://www.indexmundi.com/india/life_expectancy_at_birth.html

6. Adlakha Arjun . International Brief U.S. Department of Commerce Economics and Statistics Administration BUREAU OF THE CENSUS. April 1997. available at http://72.14.235.132/search?q=cache:aSytHHNrw6UJ:www.census.gov/ipc/prod/ib-9701.pdf+life+expectancy+at+birth+india&hl=en&ct=clnk&cd=3&gl=in&client=firefoxa

7. Orissa profile; District Cuttak. available at http://orissaonline.in/Profile/Districts/Cuttack.asp

8. Economy of Cuttak. States of India- Indian states and Union territories ; Indianet zone. available at http://www.indianetzone.com/17/economy_cuttack.htm

9. Satapathy S. Orissa vision 2020; Towards building a new and modern Orissa; available at http://www.yesweb.org/docs/orissa2020.pdf

Figure 1: Organizational structure of public health system in Cuttack district, Orissa, 2007

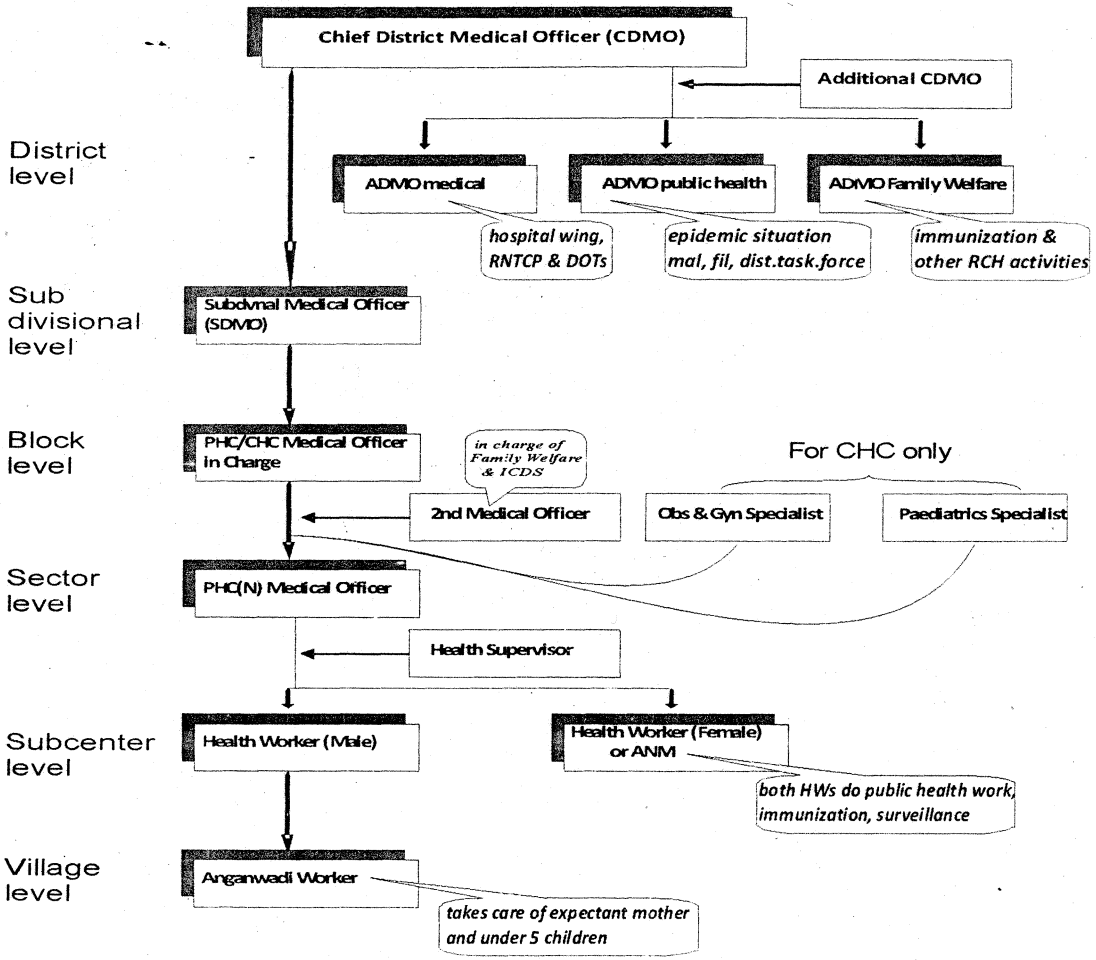


Table 1: Characteristics of the population of Cuttack district, India, 2007

	Population group	Population size in 2007	Proportion of the total
Age	**0-4 years of age**	2,09,393	8.23
	5-14 years of age	5,35,129	21.03
	15-29 years of age	7,26,614	28.55
	30-44 years of age	5,23,643	20.58
	45-59 years of age	2,98,129	11.72
	60 + years of age	2,49,311	9.80
Sex	**Male**	13,12,858	51.59
	Female	12,31,911	48.41
Socio-economic status	**Above poverty level**	23,26,984	91.4
	Below poverty level	2,17,785	8.6
Caste	**General caste & other backward caste**	19,68,246	77.35
	Schedule caste	4,85,660	19.09
	Schedule tribe	90,863	3.57
Total		25,44,769	100

Table 2: **Key public health priorities in Cuttack district, 2007, India**

Public health priority	**Key elements**	**Ongoing prevention and control programmes**
Malaria	• Endemic with PF% of 57 • Some area with API as high as 17 • Despite good literacy and public awareness the malaria indices are worsening	• Early detection and prompt treatment • Insecticide treated bed net distribution • Indoor Residual Spray
Chikungunya	• Recent but very rapid spread • Mostly undiagnosed even clinically	• No programme not even reporting of "fever with joint pain" under IDSP
HIV/AIDS	• Cuttack is category C district for HIV • Distribution is heterogeneous with isolated pockets of high prevalence in many parts of the district • The known predisposing factors like urbanization industrialization and migration are met in the district	• ICTC for diagnosis, counseling, referral etc. • Sentinel surveillance in ANC and STD sites • Information Education and Communication activities

Table 5: Indicators of progress for the health related millennium development goals, Cuttack, Orissa, India, 2007

Goal	Indicator	Indicator		
		Cuttack (2007)	In Orissa (Year)	In India (Year)
al – 1	Prevalence of underweight children <5 yrs of age	NA	45.9%[1, 3]	43% (2000-06)[8]
	Proportion of population below minimum level of dietary energy consumption	NA	NA	NA
	% of children 06 to 59 month of age who received one dose of Vit. A in the past 6 month	59%	25.6%[2, 3]	64%[9]
	Proportion of Infants under 6 months who are exclusively breast fed	NA[1]	54.5%[2]	46(2000-06)[9]
al – 4	Under-5 mortality rate	9.2	90.6[4]	76 (2006)[9]
	Infant mortality rate	32.5	64.7[4]	57[9]
	Measles Immunization among children under one	NA	81.1%**[2]	59 (2006)[9]
al –5	Maternal mortality ratio	NA	358[5]	450 (2005)[9]
	Proportion of births attended by skilled Health personnel	98%	46.4%[4]	47% (2000-06)[9]
	Contraceptive prevalence rate	88%	59.4%[4]	56%[9]
	% of women receiving antenatal care	93%[1]	61.8%[4]	74% (2000-06)[9]
al – 6	HIV prevalence among 15 to 24 year old pregnant women	NA	0.5[3,6]	0.6[4,6]
V)	Condom use rate of the contraceptive prevalence rate	86%	6.7%[4]	9.8[4]
	No. of children orphaned by HIV / AIDS	NA	NA	NA
	% people using a condom during must recent higher risk sexual encounter	NA	45%[4]	30%[9]
	% of STI clients who are diagnosed & treated according to guidelines	NA	NA	NA
	% of HIV +ve. Women receiving antiretroviral treatment during pregnancy to prevent mother to child transmission of HIV	NA	34%[7]	3.6%[10]

[1] Children under three years underweight
[2] Children (12 – 35 month) who received vit A dose in last 6 months
[3] Antenatal clinic attendees (15 – 49 age group)
[4] Antenatal clinic attendees (15 – 49 age group)

Secondary data analysis of Malaria in Cuttack district, Orissa, India, 2007

Introduction:

About half the world's population (3.3 billion) lives in 109 malarious countries with some risk of malaria transmission and one fifth (1.2 billion) live in areas with a high risk of malaria (more than 1 reported case per 1000 population per year)[1]. Globally an estimated 247 million cases (91% falciparum) led to nearly 881,000 deaths in 2006[1]. Of this, 85% were of children under 5 years of age[9].

In South-East Asian region, malaria accounts for 30% morbidity and 80% mortality of global share[2]. In India, around 2 million laboratory confirmed cases of malaria are reported annually out of which 40-50% is due to *Plasmodium falciparum* (Pf). India contributes the maximum number of cases (70%) and deaths due to malaria in the South-East Asia region.

India had an estimated 10.6 million malaria cases in 2006 that account for approximately 60% of cases in the WHO South-East Asia Region. With over 100 million slides examined every year, all reported cases are confirmed; about half are due to *Plasmodium Falciparum (Pf)*[8]. National

Malaria Control Programmes reported 301,000 malaria deaths, or 34% of estimated deaths worldwide in 2006. In the plains of India, *Plasmodium vivax* peak is followed by *P. falciparum* and in all other endemic areas *P. falciparum* predominates. *P. falciparum* abounds in communities lacking awareness, resources and suffering from endemic poverty[7].

Orissa with only 3.8% of India's population contributed around 365593 (25 %) cases and 214 (15 %) deaths due to malaria in 2007[6]. Falciparum load is 87%, which is a potential danger. Earlier coastal districts of Orissa were non-endemic but now there are reports of high transmission of malaria and deaths. Cuttack being one of the coastal districts is facing the problem of malaria to a great extent.

National Anti Malaria Programme aims at reducing malaria as much as possible. Eradication is more desirable but not currently a realistic goal in endemic countries. The objectives are to ensure rapid cure of the infection; reduce morbidity and mortality, including malaria-related anaemia; prevent the progression of uncomplicated malaria into severe and potentially fatal disease; reduce the impact of malaria infection on the fetus during pregnancy; reduce the reservoir of infection; prevent the emergence and spread of drug resistance; and prevent malaria in travellers. Malaria control encompasses the following strategies: (1) Early diagnosis and prompt treatment, (2) Vector control, (3) Personal protection, (4) Chemoprophylaxis and (5) IEC activities.

We conducted a secondary data analysis of malaria with the objectives to (1) examine or describe trends of malaria over time, place and person (2) describe the ongoing malaria control activities and their impact (3) propose recommendation to improve the situation.

Methods:

Study design: Our study design was descriptive epidemiology based on secondary data of different blocks of Cuttack district.

Study population: Our study population was that of Cuttack district.

Data collection: We collected data on malaria epidemiology from the malaria surveillance records of the district. We reviewed the malaria surveillance data from 1990 to 2007. We also interviewed the district program officers and the block medical officers dealing with malaria control program. Secondary data sources are National Anti MalariaProgramme, National Vector Borne Disease Control Programme, Orissa Multi-Disease Surveillance System and Integrated Disease Surveillance Project of Cuttack District.

Data analysis: We used the Microsoft excel sheet for calculation of different epidemiological indices for morbidity and mortality due to malaria for total population disaggregated for blocks, sex and age. We calculated different indices of malaria.

Operational definitions:

Case definition: in malaria active surveillance by the Multiple Purpose Health Worker in the field the definition of malaria is syndromic i.e. any fever patient with or without chill and rigor.

Malaria epidemiological indicators

ABER: (Annual blood examination rate): It is the number of blood smear collected during the year per 100 persons in a year.

This parameter reflects the efficiency and adequacy of case detection mechanism. NAMP has fixed a minimum ABER of 10 % per year based on estimate of fever in India. If blood slide collection is low (i.e. low ABER) then both SPR and API will be affected. If more slides collection is more from healthy persons then the SPR will be affected though it will not materially affect API. Therefore where ABER is deficient, SPR is the better indicator of malaria endemicity than API.

SPR: (Slide positivity rate): It is the number of blood smears found positive for malaria parasite per 100 blood smear examined.

SPR provides information about (1) the trend of malaria transmission. This is a dependable parameter for determining the progress of containment measures and gives information of parasite load in the community, (2) The monthly/yearly parasitic load on population under

surveillance, (3) The parasite prevalence in the community and its species distribution gives an estimate of the transmission level of malaria in an area during the epidemiological year or in any other time frame such as monthly intervals

Inferences that can be drawn from SPR include (1) Impact of control measures on local transmission, (2) Information on build-up of parasite reservoir in the population, (3) Prediction of an outbreak [have close observation of monthly SPR], (4) An SPR >2 than the monthly averages is suggestive of ineffectiveness of control measures

P. falciparum percentage (P.F. %): It is the number of blood smear found positive for Plasmodium falciparum per 100 blood smear found positive for malaria parasite.

This parameter gives the relative proportion of P. falciparum and identifies trends of P. falciparum incidence in relation to total caseload of malaria parasite in the community. Gradual increase in Pf % can occur due to (1) Environmental changes through developmental activities. It has long term impact on vectors and the parasites, (2) Inadequate treatment, (3) Ineffective intervention measures

API: (Annual parasite incidence): It is the number of blood smears found positive for malaria parasite per 1000 population under surveillance in a year.

High risk area for malaria: Criteria on the basis of which a place is declared high risk include (1) recorded deaths due to malaria (clinical/microscopic) during any of the last 3 years with evidence of locally acquired infection in an endemic area, (2) Doubling of SPR : during last

3years provided the SPR in 2nd and 3rd year reaches 4% or more and where SPR does not show the doubling trend as above but the average SPR of the last 3years is 5% or more, (3) Falciparum proportion is 30 % or more provided the SPR is 3 % or more during any of the last three years, (4) Any area having a focus of chloroquine resistant to P. falciparum, (5) Tropical aggregation of labourers in project areas and new settlement in endemic/receptive and vulnerable areas

Results:

Malaria indicators: the ABER increased from 5.5 in 2001 to 7.5 in 2007 (Fig 2). However in 2004 it had decreased to 4.9 only. SPR decreased from 2.9 in 2001 to 1.3 in 2007. API decreased from 1.6 in 2006 to 0.9 in 2007. There has been a steady decline in Pf% from 75% in 2006 to 57% in 2007.

Descriptive epidemiology

Incidence over time: In Cuttack district during 1990 to 1994, there was alarming rise of PF% from near 50% to 85% (Fig1). Since then there has been some decline but it remained always above 55%. After 2004 the ABER steadily increases while all other indices namely Pf%, API and SPI decrease. The death due to malaria was 7 in the year 2002. It was 5 in 2005 and decreased to 2 and 1 respectively in the year 2006 and 2007. (Fig2)

Incidence by area: Blocks with API > 5 like Narsingpur and Banki (table2) have achieved reduction in malaria transmission. On the contrary in Mahanga API shows a dramatic epidemiological alteration. Its API was low (0.58) in 2006 suddenly increased to 17.2 in 2007. Of the 14 blocks 6 have been declared as high risk area. In three blocks namely Berhampura, Kanpur and Subarnapur the slide positivity rate (SPR) is above 2. In all other blocks it is less than 2. In Bindhanima and Dompara there is a very high Pf% i.e. 97.4 and 90.4 respectively. Next in order are Tangi (83.9), Kanpur (79.2), Maniabandha (72.9) and Mahanga (59.6).

Incidence by age and sex: according to the reported data females have less attack malaria than males. Similarly in age distribution we have younger the children lesser is the reported malaria incidence. (Table1)

Drug resistance: Chloroquin is still the first line antimalarial and the main stay of NAMP strategy in Cuttack district. Chloroquin resistance was first described in India in the year 1970's. Subsequently there have been many documented reports in different parts of India, including Orissa of varying degree of resistance to Chloroquin. [5]

Discussion:

The prevailing endemicity malaria and change in malaria scenario in Cuttack district is due to rapid unplanned urbanization with improper sewerage system, fast development of industries, irrigation projects and migration etc. These developments have changed the topography and ecological conditions of the district. Tribal people from different malaria zones of Orissa come to

Cuttack district for earning their livelihood and become the malaria transmission sources. Mostly they contribute to the malaria problem in urban and peri-urban areas.

Since declaration of 6 blocks as high risk area and intensification of antimalarial intervension ABER has been increasing and all other indices decrease reflecting improvement in situation.

In the blocks with API >5 the reduction in index is due to the impact of anti-malarial activities like Indoor Residual Spray (IRS) and Insecticide Treated Bed-Nets (ITBNs) supply there. However instance of Mahanga block where there has been a sudden upsurge alerts that any place can be potential for malaria transmission. So, anti-malarial activities should be conducted in all area.

In three blocks namely Berhampura, Kanpur and Subarnapur the high SPR > 2 implies high parasitic load, high transmission level and ineffectiveness of the control measures. Compared to Annual Parasite Index, SPR is a better indicator for malaria endemicity for blocks like Niali, Nischintakoili, Salipur, Tangi, Bindhanima, and Berhampura where ABER is deficient

ABER should ideally be 10 or more and this is so in only two blocks viz. Mahanga and Dompara. In all other blocks it is subnormal that is there is poor surveillance.

Although in Bindhanima and Tangi Pf% is high, yet magnitude of problem is not so due to negligible API and SPR (less than one). Four blocks namely Mahanga, Dompara, Maniabandha and Kanpur have all indices (API, SPR & Pf%) high and the condition is critical there. in all these there is high ABER also which implies augmented active surveillance for the cases.

The gradual increase in Pf% during 1992 to 1994 implies developmental activities leading to environmental changes coupled with improper design for mosquito control. This has long term impact on parasite and vector. Inadequate and un-timely chemotherapeutic measures and no prompt radical treatment RT to kill the circulating gametocytes in the community results in increased malaria transmission and larger number of secondary falciparum cases. Falciparum malaria is notorious for leading to complication and death and also for developing resistance to chloroquine and other anti-malarial drugs.

The lesser incidence of malaria in females and children may be due to the fact that females and children do not opt for blood testing when fever is there and as such the low incidence is an underreporting. (Table1)

Resistance to chloroquin has not yet been studied properly in Cuttack district though clinicians of different health institutions opine that many patients do not respond to chloroquin instead respond to Quinine and Artesunate.

Even today in rural areas of Cuttack district people do not have much idea about how to take control measures for malaria at personal / household and community level.

Recommendations:

High Pf percentage in the district needs intensive public health attention for control of malaria. People participation and inter-sectoral coordination are key aspects for control of malaria and this should be strengthened.

In Cuttack city the drains should be treated

Assessment study should be conducted to estimate the functioning of NAMP to find out the Strengths and gaps and to plan for newer strategies. There should be integration between malaria surveillance and NAMP at Block and District level to estimate the real burden of Malaria in respective areas. Supervision at village level should be particularly strengthened in area with low ABER. The disease is not responding to control measures by NVBDCP showing steady increase indicating the need for change in control strategies and better intervention tools. Proper studies should be conducted to measure the exact magnitude of resistance developed to chloroquin in different blocks / areas of Cuttack District.

References

1. WHO Global Malaria Programme- World Malaria Report; 2008, accessed at http://malaria.who.int/wmr2008/

2. www.searo.who.int/en/section21/section340_4018.htm

3. Care health indicators, World Health Statistics, 2007

4. Overview of malaria control activity and progress India, country profile, roll back Malaria monitor and evaluation 2005

5. Ashwani Kumar, Neena Valecha, Tanu Jain, and Aditya P. Dash. Burden of Malaria in India: Retrospective and Prospective View. National Institute of Malaria Research, Delhi, India.

6. http://www.nvbdcp.gov.in/Doc/Malaria1.pdf

7. http://www.ias.ac.in/currsci/may252006/1323.pdf

8. WHO Global Malaria Programme- ; 2008, available at http://malaria.who.int/wmr2008/MAL2008-CountryProfiles/MAL2008-India-EN.pdf

9. WHO Global Malaria Programme- World Malaria Report; 2008, accessed at http://malaria.who.int/wmr2008/malaria2008.pdf

Table1. Incidence of malaria by age and sex in Cuttack district, Orissa, India 2007

		# of malaria cases	Population	Incidence per 100,000 population
Age group				
	0-4	97	209393	46
	5 to 15	444	535129	83
	15+	1994	1797697	111
Sex				
	Male	1627	1312858	124
	Female	908	1231911	74
Total		2535	2544769	100

Table2: Malaria indices of different blocks of Cuttack district, Orissa, India 2007

Name of PHC / block	Death due to Malaria	ABER	SPR	SFR	API	PF %
Adaspur	0	8.5	0.5	0.2	0.5	40.5
Bentkar	0	8.5	0.1	0.03	0.1	31.3
Mahidharpada	0	9.9	0.3	0.1	0.3	40
Mahaga	1	11.4	1.7	1.0	17.2	59.6
Niali	0	7.2	0.1	0.008	0.08	7.7
Nischinta koili	0	7.4	0.2	0.02	0.2	11.5
Salipur	0	7.1	0.1	0	0.1	0
Tangi	0	6.9	0.6	0.5	0.4	83.9
Cuttack CMC	0	3.4	1.5	0.8	0.5	52.1
Berhampur	0	6.0	2.8	0	1.7	0
Bindhanima	0	7.3	0.7	0.7	0.5	97.4
Dampara	0	11.4	3	2.7	3.4	90.4
Maniabandha	0	9.8	1.8	1.3	1.8	72.9
Kanpur	0	9	2.8	2.2	2.5	79.2
Subarnapur	0	9.4	2.3	0.2	2.1	8.6
TOTAL	1	7.5	1.33	0.75	0.99	56.88

Fig.1 Falciparum percentage in Cuttack district, Orissa, India, in different years

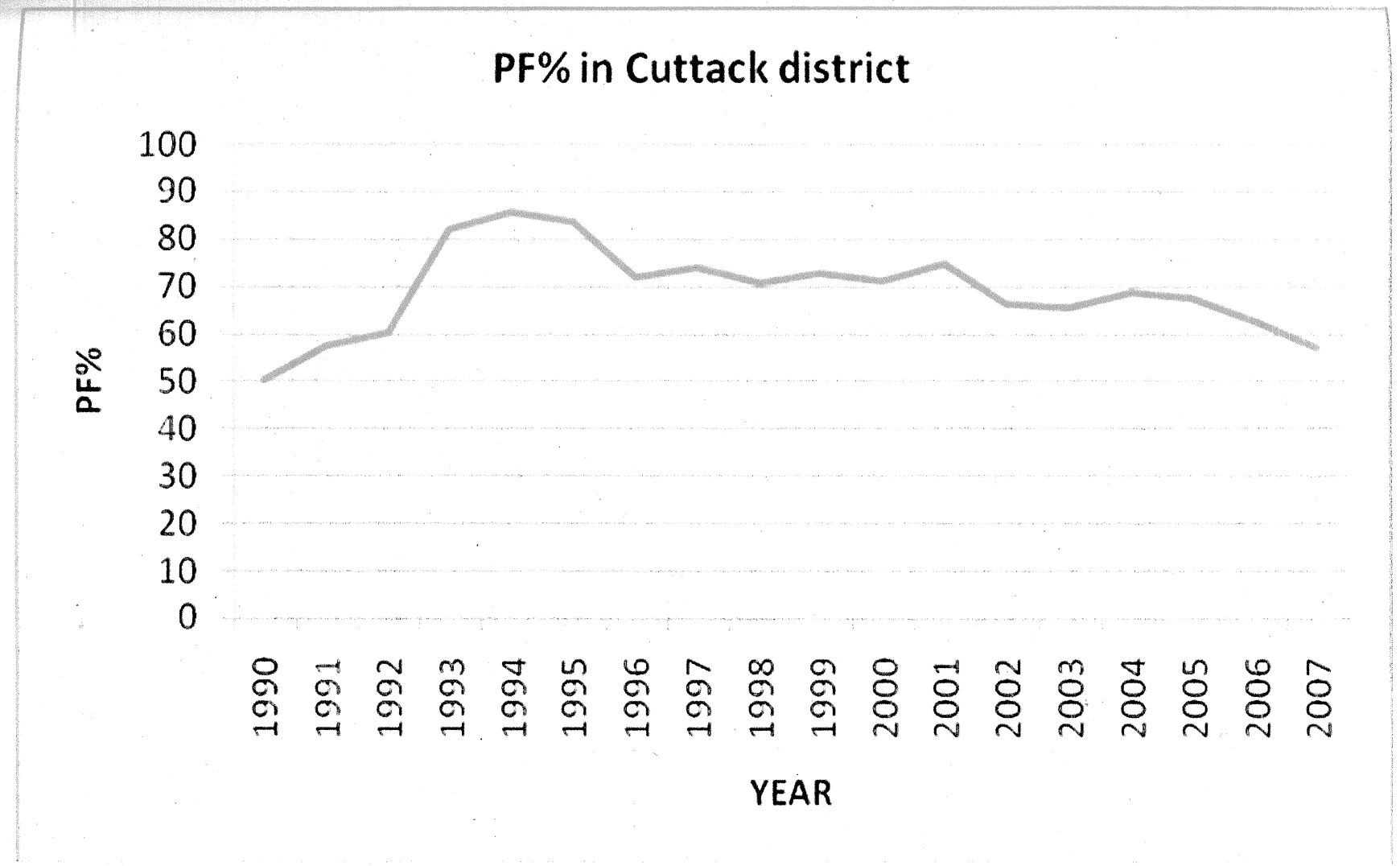


Fig.2 Malarial indices and case fatality in Cuttack district, Orissa, India, in different years

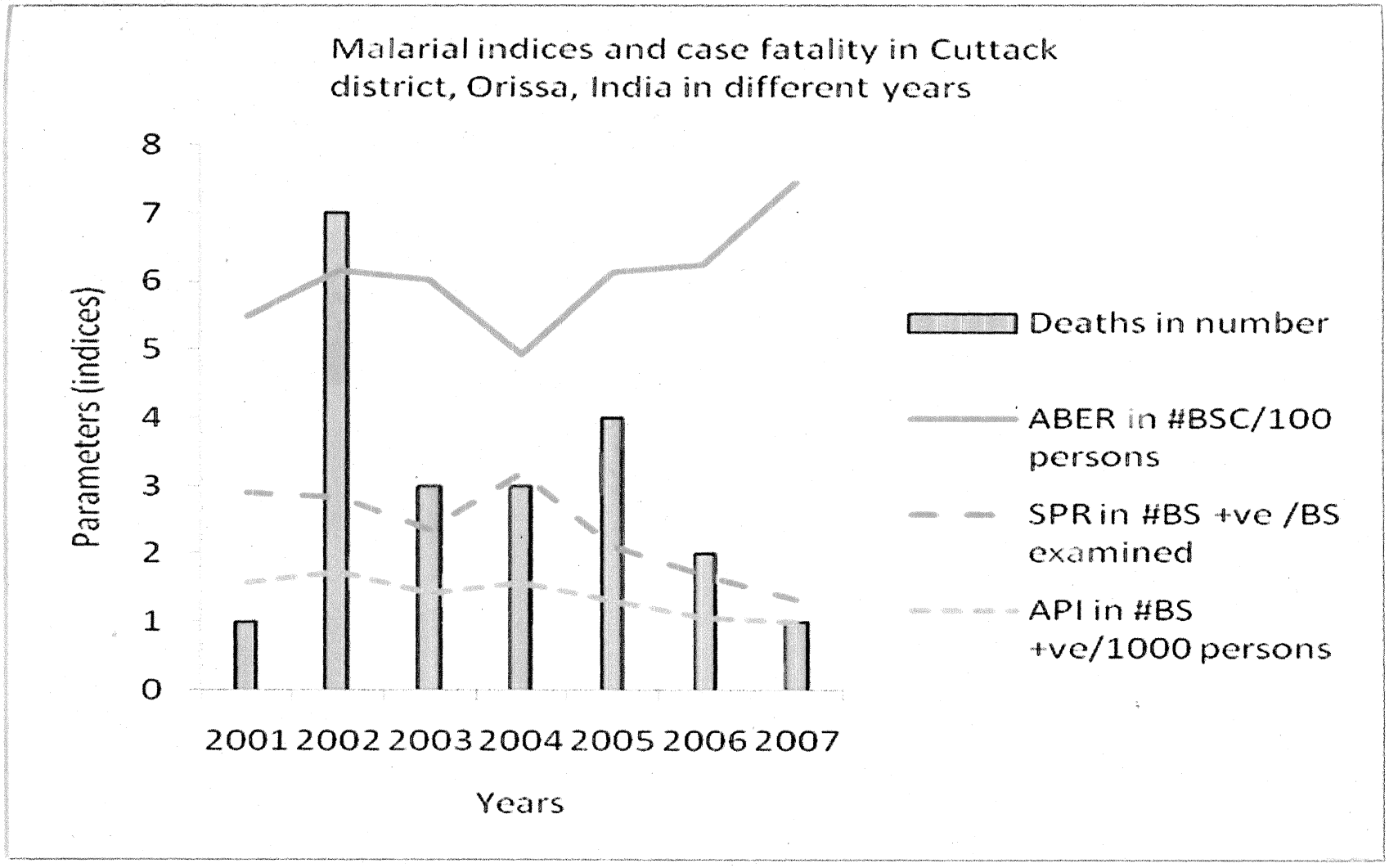


Fig.2 Malarial indices and case fatality in Cuttack district, Orissa, India, in different years

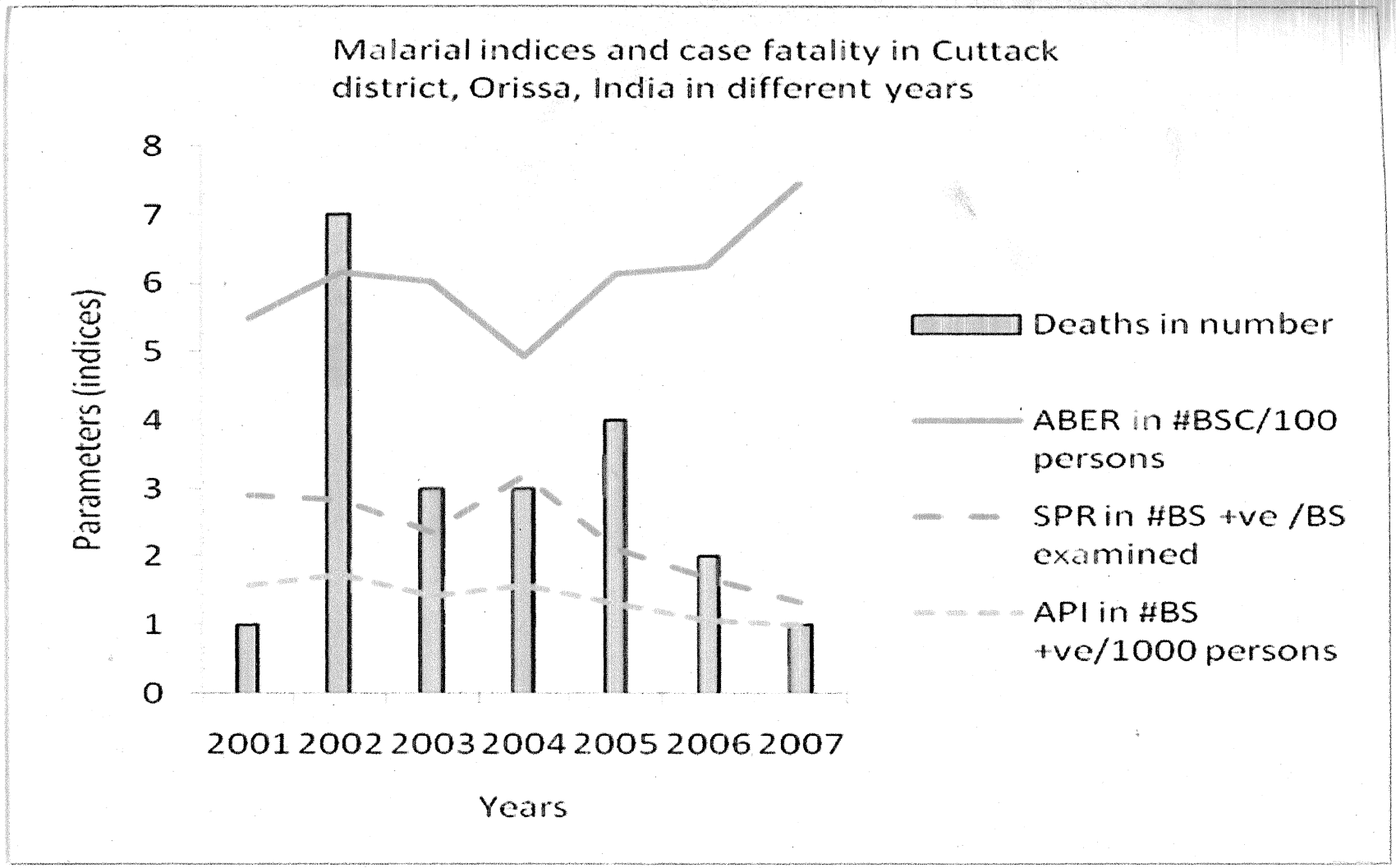
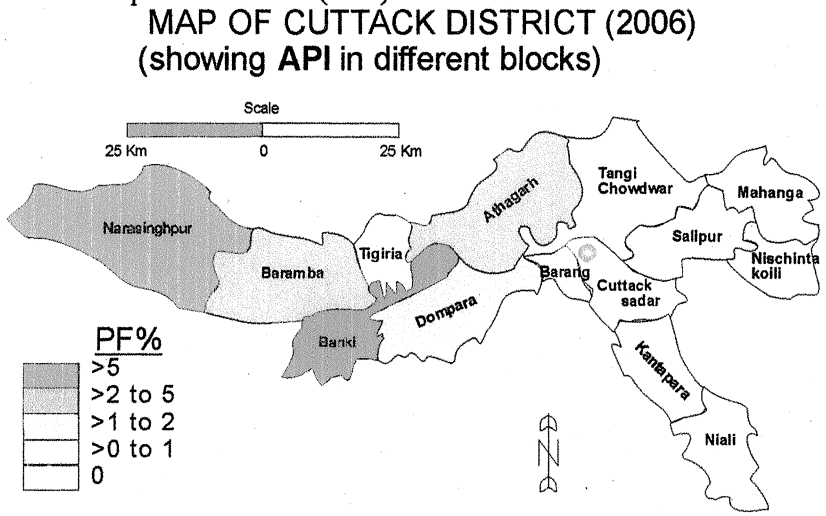
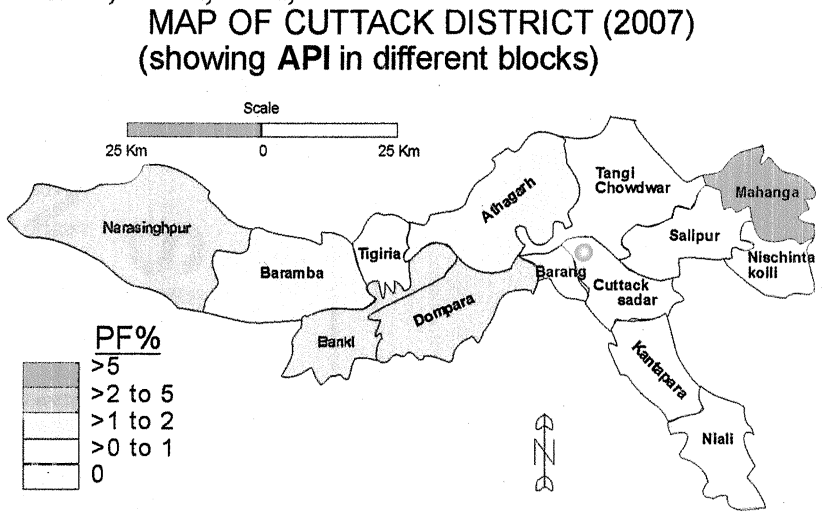


Fig3. Annual parasite index (API) of malaria in the blocks of the Cuttack district, Orissa, India, 2007





SECTION 2
SECOND FIELD POSTING

Description and Evaluation of HIV Surveillance in Cuttack District, Orissa, 2007

Introduction

Globally, 33 million people were living with HIV in 2007; out of them 2.1 million were children, 2.5 million were new infections, and 2.1 million people died of AIDS-related illnesses.[1] At the end of 2007, nearly 3 million people were receiving antiretroviral therapy, reaching 31% of people in need. About 33% of pregnant women with HIV received anti-retroviral treatment (ART) to prevent mother-to-child transmission[1]. And this modern pandemic continues to grow.

According to the estimate in 2007, there are 2.31 million people living with HIV/AIDS in India of whom 39% are females and 3.5% are children.[3] The presence of the infection in all parts of India has shown a predictable phenomenon of the spread of infection from urban to rural areas and from high risk Population to general population like housewives.

In Orissa, 10,862 people have been affected by HIV during 2002-2008.[4] Orissa is one of the 10 states with high HIV prevalence (≥7.3 %.) among injecting drug users (IDUs). The government has increased the number of Integrated Counseling and Testing Centres (ICTCs) to 129 by April 2008.[4]

Cuttack is grouped as category C district for HIV infection. That is there is less than 1% in ANC prevalence in all sites during the last three years with less than 5% in all STD clinic attendees or any high risk group with known hot spots (Migrant, Truckers, large aggregation of factory workers, tourist etc.). However spread of AIDS is heterogeneous in terms of routes of transmission as well as geographic spread. So there are isolated pockets of high HIV prevalence in many parts of the district. There is gradual but sustained increase in prevalence among high risk groups. Strategic information on these epidemics and the response is essential to guide programme planning and implementation, sustain commitment, and ensure accountability.

HIV surveillance closely monitors and tracks the level, spread and trends of the epidemic as well as the risk behaviours that predispose the growth of epidemic. Inputs from these give direction to the programmatic efforts by showing the impact of the interventions and areas that need focus of different initiatives. Objectives of HIV surveillance in are to (1) find prevalence of HIV infection in different sub-populations (2) determine the geographical spread of HIV infection (3) monitor the time trends in the HIV epidemic (4)generate data use in estimation and future projections of HIV (5)use such data to generate external support for the programme, for appropriate planning of health and medical care services and evaluation

To achieve these aims, data collected and analyzed through the HIV sentinel surveillance are triangulated with data from other HIV surveillance activities and complementary data sources such as ICTCs and blood bank etc. because the HIV Sentinel Surveillance is conducted only once a year, does not take into account children, unmarried young population, and is located only in the Medical college in Cuttack (which is in urban only and has very high catchment area from

different parts of Orissa and not only Cuttack) the data that we mainly take from HIV sentinel surveillance needs to be supplemented with the daily, routine HIV data of ICTCs.

With this background, we evaluated the HIV surveillance system in Cuttack district with the objectives of (1) describing the surveillance system (2) evaluating the system in terms of various attributes and (3) determining whether the surveillance system met the UNAIDS-WHO-NACO guidelines.

Methods

Description of the surveillance system

We primarily evaluated the HIV sentinel surveillance (HSS) but supplemented this with information of ICTCs and blood banks. For this we reviewed the data of current and previous years available in district office, OSACS. However strict maintenance of confidentiality did not consent us to review details of their registers, reports and databases. We followed various NACO guidelines for HIV surveillance to describe the surveillance. We interviewed the stakeholders for how they collect and transmit the data. We interviewed NACO consultant of state AIDS cell, Bhubaneswar to know how they analyze data using what indicators and what public health decisions they make after analysis. We also interrogated the doctors, counselors and field workers. We interviewed the concerned laboratory technicians to know the serological investigation procedures for diagnosis of HIV/AIDS.

Analysis of the surveillance system

We collected information from HIV sentinel sites, ICTCs and blood banks data for assessing various attributes of HIV surveillance as follows:

Simplicity: We asked if the stakeholders find difficulties in filling the form and then reviewed the surveillance flow chart to detect opportunity for simplification.

Flexibility: we asked the stakeholders about their willingness of the stakeholders to include additional information about HIV and other diseases.

Acceptability: We inquired whether the stakeholders find their work burdensome, objectionable and embarrassing.

Sensitivity: it is evaluated from the number of clients in ICTCs that different departments refer.

Positive predictive value: It is the laboratory findings and not the clinical criteria that underlie the diagnosis of HIV. As such we can't determine the positive predictive value. Moreover the ICTCs do not send the specimens for external quality assurance. We asked the stakeholders about when to suspect an HIV/AIDS patient.

Representativeness: It is inferred by assessment of the extent of surveillance coverage for each population subgroup with different risk of HIV infection. We also calculated the rural and urban distribution of blood samples collected from the sentinel sites.

Timeliness: We estimated the proportion of sentinel sites sending blood samples to testing centers weekly and proportion of testing centers reporting testing results to the state nodal officer weekly and the proportion of ICTCs and blood banks sending reports monthly. We saw whether sentinel surveillance time period is according to the national norm or not.

Cost: we reviewed the funds, logistics incurred and utilized for surveillance activities.

Usefulness: we asked about the feedback given during monthly meeting to the ICTCs stakeholders. we also inquired about the analysis of sentinel data to determine the trend of HIV/AIDS epidemic in terms of time place and person, and the feedback given by them.

Result

Description of the surveillance system

The existing HIV surveillance mechanism comprises of three broad areas: annual HIV sentinel surveillance (at ANC and STD sites), monthly routine AIDS case surveillance (at 7 ICTCs) and screening of blood donors (at 3 blood banks).

HIV sentinel surveillance is an annual cross sectional survey of the same risk group in the same place by unlinked anonymous testing. It is carried out once a year in designated sentinel sites for twelve weeks. This data represents as a surrogate for the general population with similar risk and other characteristics. Bias are minimised in two ways. Firstly, to minimise the participation bias it adopts unlinked anonymity i.e. the blood is primarily collected for some other purpose and the results are not linked to any individual. Secondly, in order to minimize the selection bias of samples, consecutive sampling procedure is adopted. There are two sites

For general population: The ANC site collects 400 blood samples from pregnant women.

For high risk population: the STD site collects 250 blood samples (100 from Obstetrics & Gynecology and 150 from Skin & Venereal Disease).

ata transmission, analysis: Data collected at each HIV sentinel site is reported in the prescribed rmat as per the reporting schedule. The data is then transmitted as described in figure1.

The results of sentinel surveillance is to be disseminated not only to those responsible for rmulating policy but also to staff of sentinel sites and testing centers, supervisory teams, health are providers, NGOs and other stakeholders, working for the control and prevention of IV/AIDS in the country.

Integrated Counseling and Testing Centre (ICTCs) is a place where a person is ounseled and tested for HIV, of his own free will or as advised by a medical provider.

Serodiagnosis: HIV diagnosis is based on is based on sero-surveillance i.e. screening of lood for HIV antibodies (2 ELISA/Rapid in HSS and 3 ELISA/Rapid/Simple in ICTCs) to ccount for both sensitivity and specificity to declare a client whether positive for HIV. pecimen found reactive in all is considered to be HIV positive.

The NIHFW and NIMS-ICMR, act as nodal agencies for coordination and centralized ata management with support from NACO. The regional institutes (RI) are responsible for aining, supervision, monitoring, data entry (data entry in addition to SACS) and analysis of egional and state level data. The state and national reference laboratories are responsible for IV testing and Quality Assurance (QA) procedures in coordination with regional institutes. ACS implements surveillance activities with technical support from identified RI and State urveillance Teams (SST).

opulation under surveillance

HIV surveillance covers exhaustive population in ICTCs and blood bank but limited opulation in sentinel sites. For generalized epidemic, we have sentinel surveillance in antenatal inics sites and for concentrated or low-level epidemic, we have the surveillance system focused n populations at increased risk e.g. STD site. The sentinel sample size is only 400 in ANC site nd 150 in STD site.

Case definitions

Serosurveillance is the basis of diagnosis of HIV surveillance and thus virtually there is o role of case definitions.

Type of system

HIV surveillance is active in sentinel site but passive in blood bank and ICTCs.

Action taken

The data generated through HIV Sentinel Surveillance is used to estimate the level of infections n the country at regular intervals. The annual surveillance and estimation helps to understand the course f epidemic stage in different regions. NACO utilizes this information for effective planning and mplementation of its programmes. While adult HIV prevalence is estimated using the Workbook method s well as from Spectrum Software, the number of infections for all ages is estimated by the Spectrum oftware.

Feed back

At the sentinel sites the in charge conducted pre-programme and weekly review meetings to iscuss performance, target achievements and problems. At the district level there are monthly review neetings but in absence of analysis at district level the feed back to different blocks is not adequate.

Analysis of the surveillance system

Simplicity:

In sentinel sites the stake holders find the system simple. In the ICTCs the form is clear and understandable to all except one counselor who has still doubt in a particular section only. So she finds difficulty in filling that part of form.

Acceptability:

During the sentinel surveillance, both the ANC site and STD site in the district sent serum samples to their designated testing centers weekly.

In ICTCs, maintenance of several records is cumbersome to 80% of counselors. Only 20 % of them being females feel embarrassed to counsel the male clients. 80 % however find that male clients hesitating to ask questions to female counselor regarding various aspects of HIV. There is absolutely no social stigma among counselor to work with HIV infected patients.

Representativeness:

Sentinel for general population: we have only pregnant women in ANC sentinel site as a representative for general population is an underestimate as it includes only the heterosexual mode of transmission in married persons in reproductive age group only. It can not be extrapolated to the children, and the most vulnerable adults with high risk behaviors.

Seroprevalence in pregnant women can not reflect the certain behavioral changes like consistent condom use and abstinence. With a sample size of 400, numbers in each five-year age band may have been too small to yield any reliable trend data. Moreover, ANC site is located in apex institute like SCB medical college which has a large catchment area covering nearby districts also. So these 400 samples are not from pregnant women of Cuttack district only. So prevalence of HIV in Cuttack district is indeterminate there being no definite denominator. The sentinel sites functioning only in the urban areas predominantly cover urban women and thus the surveillance under-represent rural populations.

Sentinel for high risk population: in Cuttack operates only in STD sites and does not cover injecting drug users (IDUs), female sex workers (FSWs), men who have sex with men (MSMs), migrants and truckers etc.

The ICTCs being established in different territories represent relatively wider geographical area as compared to sentinel sites in the district. However, there are only five ICTCs functioning out of which two are in Cuttack city and other 3 out of 14 different blocks. So these can not represent the whole population of Cuttack district.

Flexibility:

Stakeholders of both sentinel sites and ICTCs are ready to accept additional details regarding HIV in the form and also about other diseases like hepatitis B etc. if these are possible in the same set up. In this regard this surveillance is quite flexible.

Timeliness:

The sentinel sites sent the sera samples to testing centers weekly. The testing centers sent the results to state nodal officer weekly. Analysis of the data took fifteen days. From the state level the feedback of the report comes after two months of the surveillance period. All ICTC centers report to Asst. District Medical Officer (public health) and OSACS by 5th of every month. Only 20% of them where the workload is high want relaxation in this schedule.

Cost:

NACO provides facilitation, guidance and budget for each level in order to accomplish the task of HIV surveillance. The funds provided are for the review meeting, traveling cost, remuneration to the functionaries and any emergent cause during the surveillance period (Table 2).

Usefulness:

HIV sentinel surveillance data helps to estimate current HIV prevalence as well as temporal and special spread in the area. As of 2007, about 20% of the estimated HIV positive persons in Orissa have been detected through ICTCs.

Analysis of the data generated by both sentinel surveillance and ICTCs identifies the endemic areas and outbreaks and to take new decisions. Dissemination of information based on these data through different media creates awareness to combat against this deadly disease. We prioritize target population groups needing interventions.

Discussion

The first objective of HIV surveillance is to determine the prevalence. In this regard both sentinel and ICTC have their respective limitations. The antenatal sentinel site accounts for only the pregnant women and thus gives an underestimate of the whole population. In the ICTCs the referred cases have high risk behavior and so it gives an overestimate of the actual prevalence in the general community. We need to impart correct knowledge about HIV transmission among the population. Gradually with increase in awareness, higher percentage of HIV negatives in ICTCs will lead to dilution effect. As a result, although the absolute number of positives increases yet the percentage decreases exponentially till the establishment of a plateau. At this point sentinel estimate will meet ICTC estimate and then both become highly sensitive.

The second objective of HIV surveillance i.e. to find the geographic spread does not seem to have fully met with the surveillance owing to certain inadequacies of sentinel surveillance such as small sample size, urban location, STD clinic being the only high risk sentinel site etc. The ICTCs located in 3 blocks only can not represent the population of 14 blocks of the district. There remains a need for greater use of data for decision making, including program data and epidemiological data.

The main limitation of our study is inability to get detailed data regarding time, place, age, sex, behavior etc. due to strict maintenance of confidentiality.

We need to analyze the data in terms of time, place and person at and block and village level to find clusters of high HIV prevalence. There should be monitoring and evaluation of different ICTC of the district at district level to give feed back in monthly meetings.

In the sentinel surveillance the collected blood samples should have demographic information while maintaining anonymity (no personal identifying information). This will

estimate the denominator of the samples drawn according to place time person and will be representative of respective parameter.

There should be more number of sentinel sites and ICTCs in rural area also to estimate the HIV prevalence in general population.

There is a need for expanding the surveillance among high risk groups such as IDU (injecting drug user) and migrants. Surveillance among high risk groups will provide information on the impact of our interventions.

There is need for opening composite rural ANC sites.

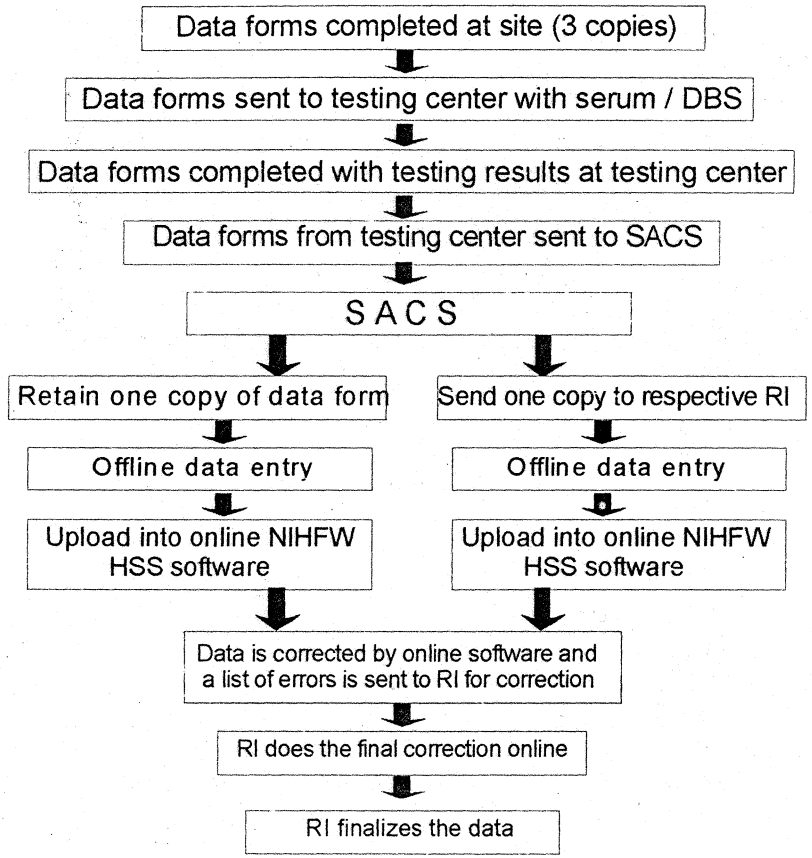
We recommend the analysis at the district head quarter so that it will be possible to analyse the data block wise and give feedback in monthly meetings to the ICTCs.

In ICTCs adequacy of referral from different departments is to be evaluated.

References

1. WHO: HIV surveillance, estimations and monitoring and evaluation. Available at http://www.who.int/hiv/topics/me/en/index.html
2. A Technical Brief-HIV Sentinel Surveillance and HIV Estimation in India 2007. NATIONAL AIDS CONTROL ORGANISATION MINISTRY OF HEALTH AND FAMILY WELFARE GOVERNMENT OF INDIA; OCTOBER 2008. Available at http://www.nacoonline.org/upload/Publication/M&E%20Surveillance,%20Research/HIV%20Sentinel%20Surveillance%20and%20HIV%20Estimation%202007_A%20Technical%20Brief.pdf
3. **Orissa Current News** | Orissa Diary, Latest News Orissa, News Headlines, and more. December 2008. Available at http://www.orissadiary.com/CurrentNews.asp?id=9394
4. **Mahapatra Devi p. HIV Scenario in Orissa;** available at http://ezinearticles.com/?HIV-Scenario-in-Orissa&id=121344

Figure1.Transmission and analysis of data from HIV Sentinel Site, Cuttack, Orissa, India 2007



NIHFW: National Institute of Health and Family Welfare, New Delhi
RI: Regional Institute; for Orissa it is National Institute of Epidemiology, Chennai

Table 1: Logic frame indicating surveillance attribute indicators of HIV sentinel surveillance, Cuttack District, Orissa, 2007

	Indicators	Data needed	Source of data	Design
otability	▪ Proportion of sentinel sites sending samples to the testing centers	▪ Number of sentinel sites sending samples to testing centers	▪ Testing centers	▪ Review of records
		▪ Total number of centers in operation	▪ State AIDS Control Society records	
	▪ Proportion of testing centers reporting prevalence data to the State Nodal Officer	▪ Number of testing centers reporting data	▪ State AIDS Control Society records	▪ Review of records
		▪ Total number of testing centers in operation	▪ State AIDS Control Society records	
bility	▪ Proportion of Medical Officers in sentinel sites willing to participate in HIV surveillance	▪ Proportion of Medical Officers willing to participate sentinel surveillance	▪ Interview of Medical Officers	▪ Qualitative interview
		▪ Total number of Medical Officers working in the district sentinel sites		
	▪ Compatibility of the system with the surveillance of other diseases	▪ Proportion of medical officers opinionated to include hepatitis-B and C surveillance	▪ Interview of Medical Officers	▪ Qualitative interview
		▪ Total number of Medical Officers interviewed		
esentativeness	▪ For each group, proportion of blood samples from urban and rural population	• Proportion of serum samples collected from urban and rural population for low, high risk groups and bridge population.	▪ Surveillance data	▪ Review of records ▪ Literature review
	▪ Cost incurred for the sentinel surveillance activities	▪ Cost of testing ▪ Remuneration of centers ▪ Costs at the district level	▪ State HIV surveillance officer	▪ Qualitative interview ▪ NACO guideline
iness	▪ Median time interval between surveillance period and feedback to the district	▪ Surveillance period of last year ▪ Dates of feedback to the district	▪ State AIDS Control records	▪ Review of records
icity	▪ Review of the surveillance flow chart to detect opportunities for simplification	▪ Description of the actual system	▪ Qualitative interviews with participants	▪ Qualitative interview

Table 2: Cost of Sentinel surveillance per sentinel sites

Items	Expenditure
Honorarium for personnel at sentinel sites, HIV testing Laboratory and secretarial assistance	Rs.10000
Consumables (HIV test kits, VDRL kits, gloves, disposable Syringes, storage of vials, labels Plastic apron, test tubes, stationary etc.	Rs.40000
Expenditure on transportation of blood samples & TA/DA and other contingency expenditure	Rs.10000
Cost per sentinel site	Rs.60,000

Table-3: Selected indicators for evaluating the different attributes of HIV surveillance of Cuttack district, Orissa, India, 2007

Attributes	Indicators	n/N	%
Acceptability	Proportion of integrated counseling and testing centers reporting prevalence data to the state	5/5	100
	Proportion of blood bank reporting prevalence data to the state	3/3	100
	Proportion of sentinel sites reporting data to the state	2/2	100
Flexibility	Proportion of Medical officers saying the system could be utilized to in incorporate Hepatitis B & C	5/5	100
	Proportion of health workers knowing when to suspect HIV/AIDS	40/60	67%
	Proportion of health workers knowing where to send the patient for testing	40/60	67%
Representativeness	Proportion of patients coming from the rural area in the STD clinic (District hospital)	336/1200	28%
	Proportion of patients coming from the rural area in the AN clinic (sentinel sites)	1168/3658	32%
Cost	Proportion of allotted budget utilized by the sentinel sites	60,000/ 60,000	100
Timeliness	Time interval of final feedback to the district and sentinel sites in 2007	2 months	

Table 4: Proportion of patients attending the sentinel sites during the surveillance period, September to November 2007, that were covered by the surveillance

Sites	Patient attended	Sample collected	%
Antenatal clinic,	1320	400	30
STD clinic	570	150	26

Evaluation of National Anti Malaria Programme, Cuttack District, Orissa 2007

Introduction

About half the world's population (3.3 billion) lives in 109 malarious countries with some risk of malaria transmission and one fifth (1.2 billion) live in areas with a high risk of malaria (more than 1 reported case per 1000 population per year)[1]. An estimated 247 million cases (91% falciparum) led to nearly 881,000 deaths in 2006[1]. Of this, 85% were of children under 5 years of age[2]. Africa has the largest number of people (86%) living in areas with a high risk of malaria, followed by the South-East Asia Region (9%). In South-east Asian region (2006), there were 4,338,000 cases (56% falciparum) of which about 2000 died due to malaria.

India had an estimated 10.6 million malaria cases in 2006 that account for approximately 60% of cases in the WHO South-East Asia Region. With over 100 million slides examined every year, all reported cases are confirmed; about half are due to *Plasmodium Falciparum (Pf)*[3]. National Malaria Control Programmes reported 301,000 malaria deaths, or 34% of estimated deaths worldwide in 2006. In the plains of India, *Plasmodium vivax* peak is followed by *P. falciparum* and in all other endemic areas *P. falciparum* predominates. *P. falciparum* abounds in communities lacking awareness, resources and suffering from endemic poverty[7].

National Anti Malaria Programme tagged with National Vector Borne Programme aims at reducing malaria as much as possible. Eradication is more desirable but not currently a realistic

goal in endemic countries. The objectives are to ensure rapid cure of the infection; reduce morbidity and mortality, including malaria-related anaemia; prevent the progression of uncomplicated malaria into severe and potentially fatal disease; reduce the impact of malaria infection on the fetus during pregnancy; reduce the reservoir of infection; prevent the emergence and spread of drug resistance; and prevent malaria in travellers.

Orissa with only 3.8% of India's population contributed around 365593 (25 %) cases and 214 (15 %) deaths due to malaria in 2007[4]. Falciparum load is 87%. It is a pity and surprise that, the malaria situation in the state is worse than that in Africa[5]. The malaria prevalence in children under 5 and the mosquito inoculation rate is similar or even higher than that in Africa[5]. The inaccessible forests and forest fringes on the hill ranges occupied by tribal ethnic groups are not fully covered by the malaria control programme and hence highly endemic to malaria. Perennial transmission of malaria is a terrible restraint to the socioeconomic progress of people in Orissa. Natural disasters like draught and flood break down the economy of Orissa directly as well as indirectly by rendering the habitat mosquitogenic. About 60 percent of the state's population, particularly in tribal belts, is at risk of infection[6]. When there is 10 percent resistance to a drug, it is considered serious. And here nearly half of the 30 districts have developed over 90 percent resistance and the rest have developed over 50 percent resistance[6].

The Pf % is >85%, and if untreated proves fatal. Malaria is now a major public health concern in Orissa. Though the hilly, terrain areas and tribal districts of the state are heavily burdened with the morbidity and mortality due to malaria, no part of the state is exempt. Earlier coastal districts of Orissa were non-endemic but now there are reports of high transmission of malaria and

deaths. Cuttack being one of the coastal districts is facing the problem of malaria to a great extent.

We evaluated of the activities of the national anti malaria programme in Cuttack, Orissa with the objectives to (1) assess the achievement of the objectives of the anti malaria programme in Cuttack district (2) Identify existing gaps and factors contributing to the gaps (3) Suggest appropriate measures to narrow down the identified gaps

Methods

Description of the programme

We reviewed in detail the operational manual for malaria action programme (MAP) of the national anti malaria programme (Government of India). We also discussed about different operational issues of the programme in the district with programme managers at district, health facilities, microscopic centers and sub-centers to know the scenario of the programme. We interviewed the community.

We carried out the study during January 2008 to July 2008. We took the whole population of Cuttack district into account to evaluate the national anti malaria programme's four main arm indicators in terms of input, process, output and impact. From each block we interviewed medical officer, laboratory technician, health workers selected randomly. From the register of each health worker we took a list of persons who had fever in the last 2 weeks and after taking consent for participation assessed them.

Indicators used:

Input indicators: The input indicators for early diagnosis and prompt treatment are percentage of Medical officer, Lab. Technician, Health workers, supervisors in position, Percentage of health facility able to utilize 95% of fund, Number of sub centre functioning with respect to requirement and Established FTD in village of district. For vector control the input indicators are % of spray gang engaged to work, % of health facility having adequate stock of insecticide, number of hatchery constructed. For personal protection we have % of house-hold having at least one bed net, % population ITBN supply to BPL family. For IEC activities we took Percentage of health facility have IEC materials for malaria as input indicators.

Process indicators: for EDPT we took percentage of patient treated in public sector, of technician examine slide as per target, of house visited by health workers and of house visited by medical officer. For vector control indicators used were percentage of house hold covered, of House hold sprayed among targeted, of hatchery functioning, number of perennial water bodies identified, and percentage of perennial water bodies released with larvivorous fish released. Process indicators for personal protection are percentage of population use bed nets and of house-hold supplied one bed nets among targeted population. For IEC, process indicators were # awareness camp held in the year.

Outcome indicators: these were the percentage of health facilities able to confirm malaria diagnosis, of health facility able to collect blood smear as per target of national policy, of patient cured after treatment, of patient treated with 2nd line drug, of health facilities reporting no disruption of stock of anti-malarial drugs for 1 week, of spray done in quality(G.O) of house

hold covered by spray, of community member able to recognize symptoms of a febrile illness, of population knows bed nets use prevent malaria.

Impact indicators include the case fatality rate and change in various malarial indices namely P. falciparum percentage, slide positivity rate, annual parasite index etc.

Survey

We conducted a survey in all blocks (14) of district Cuttack where the National Anti Malaria Programme was implemented. We calculated the sample size of 422 by using Right size software, assuming the utilization rate of health services at the community level at 50%, an alpha error set at 5%, a precision at 5% and an anticipated proportion of non-response of 10%. We selected 42 clusters three for each block. In each cluster we selected 10 households. In each household we interviewed one adult. We used pre-tested questionnaire in Oriya to collect information from the district, health facilities, microscopic centers, sub centers and the community regarding socio economic status, having of DDT spray in the year, possessing bed nets and knowledge of malaria control and prevention. The principal investigator (FETP scholar) and trained team conducted the interview. We analyzed data using excel and EPI info software.

Result

Description of the programme: The malaria control programme in Cuttack district has the following strategies: (1) Early diagnosis and prompt treatment, (2) Vector control, (3) Personal protection, (4) Chemoprophylaxis and (5) IEC activities.

Early diagnosis and prompt treatment (EDPT): The World Health Organization recommends that anyone suspected of having malaria should receive diagnosis and treatment with an effective drug within 24 hours of the onset of symptoms. The NAMP guidelines have fixed seven days as the maximum allowable time limit between BSC and administration of RT in case of Plasmodium vivax and five days in case of Plasmodium falciparum. When the patient cannot have access to a health care provider within that time period (as is the case for most patients in malaria-endemic areas), home treatment is acceptable. EDPT engages all multi purpose health workers (MPHW), sector level PHCs and Bock PHC as well as Drug Distribution Centers, Fever Treatment Depots and malaria laboratory.

For the diagnosis of malaria DDC/ FTD/MLV and Health workers use syndromic definition while medical officer uses the presumptive definition. Examination of blood smear, RDK or QBC confirms the diagnosis. Rapid diagnostic test (RDT) is preferable in areas affected with *P falciparum* where microscopy is lacking, for emergency use and in early phase of focal epidemics. Confirmed cases receive radical treatment. However in high risk areas of Orissa, all suspected cases receive presumptive radical treatment.

MPHW does both active and passive surveillance. Active surveillance involves fortnightly domiciliary visit to search for fever cases or who had fever in between the visits of MPHW,

collection of blood smears from such cases and administration of appropriate anti-malarial. MPHW should contact all FTDs, DDCs of his/her area at least once a fortnight and collect blood smears for transmission to laboratory. The MPHW should also supervise replenishment of micro slides and / or drugs etc. both sub center and health facilities above sub-center level conduct passive surveillance. Passive case detection should involve all types of health facilities (including Indian Sector Medicine and private sector). It needs to establish malaria clinics in high risk areas to examine blood smears on the same day.

Reporting units below MPHW includes community volunteers viz. DDC (Drug distribution centre), FTD (Fever treatment depot) and MLV (Malaria link volunteer).

Trained DDC holders in each village/hamlet administer presumptive treatment at the community level. He also helps in indoor residual spray, impregnations of bed-nets, promotion of larvivorous fish and community awareness generation. Establishment of FTDs is to avoid delay in detection of cases that would occur in between the visits of the MPHW. In addition to these works FTD holders also collect blood smears, and use RDT (Rapid diagnostic test).

Vector control: it aims to reduce contacts between mosquitoes and humans.
(i) Chemical Control by use of Indoor Residual Spray (IRS) with insecticides

(ii) Biological Control by use of larvivorous fish

(iii) Personal Prophylactic Measures by use of bed-nets, mosquito repellent creams, liquids, coils, mats etc.

Chemoprophylaxis: It targets the vulnerable groups like pregnant women and provides intermittent preventive treatment (IPT) with anti-malarial drugs during the second and third trimesters of pregnancy.

Information education and communication: this is the health education to inform the community what they can do to prevent and treat malaria. Sustained and effective communication through IEC and BCC (Behaviour Change Communication) achieves the objectives of awareness generation, demand generation, behaviour change, and community participation.

Logistics include provision of equipment and supplies (e.g., microscopes, drugs, bed nets) to allow the health workers and the communities to carry out the interventions. Quality control and assurance involves training, standardization, periodic review and monitoring, supportive supervision, documentation.

NAMP

NAMP is a category II centrally sponsored scheme on cost sharing basis between Centre and States. The National AntiMalaria Program (NAMP) that was integrated into the National Vector-borne Diseases Control Program (NVBDCP) in 2003-2004, has been in existence in Cuttack district since its launch at the national level.

To combat the drug resistant in malaria, the National Drug Policy on Malaria recommends the use of combination therapy i.e Artesunate plus Sulfadoxine Pyrimethamine for treatment of *P.falcipuram* cases in chloroquine resistant areas, surrounding cluster of Blocks and 117 high endemic districts of 12 states including Orissa.[10]

Evaluation of the programme

Input indicators

In health facilities, there are sub centers were 310 of required 509 (62%) were in position, 200 of 221 medical officers (90%), all 18 laboratory technicians (100%) and 245 of 259 (95%) Multi-Purpose Health Worker (male) 387 of 397 (97%) MPHW (female), 35 of 76 (46%) Multi-Purpose Health Supervisor (male) and 54 of 56 (96%) MPHS (female) were in position compared to sanctioned post in 2007. Of the staff in position- medical officers 171 of 200 (86%), all the laboratory technicians (100%) and 209 of 259 (81%) MPHW (male) and all MPHW female) were trained in malaria. 1764 of 1856 villages had Fever Treatment Depot (95%). Of the 14 blocks, 12 health facilities (86%) utilized 95% of the received malaria funds during the financial year 2006-07. Of 336 gangs enlisted for spray operation and all of them were engaged to spray work. There are hatcheries for gambusia fishes constructed in district head quarter and all the 14 blocks. There is supply of IEC material to all the health facilities.

Process indicator

In the outdoor and indoor of the hospital all laboratory technician examine blood slide on the same day. In the field however, there was a time lag of 1 to 7 days (median 3 days) between onset of fever and blood slide collection. Only in 47% cases the MPHW informs the result to the patient within 7 days of blood collection. However in other cases it is delayed up to 10 days or even more. Most of the field staff (76%) reported that due to this delay in obtaining report the people are reluctant to give blood for smear examination and go for immediate result from private RDK testing. All fever cases in high risk area and only diagnosed cases in low risk area get radical treatment within 12 days. In the external quality control program, we observed a 100% participation of the government laboratories with 100% positive concordance and 98 to 100% negative concordance. Out of the fever cases in the outpatient door only 61 to 85% are going to check blood smear in the government hospital. All others are going for private testing, the result of which is not reported for surveillance.

According to the report all malaria cases are treated with appropriate anti-malarial drugs. Of the 310 sub-centers only 192 were visited once a year by district officials and 155 were visited once a quarter by PHC medical officers. MPH supervisors should give monthly supervision but are most irregular.

Out of MPHWs only 60% have achieved the target of blood slide collection. During community assessment in high risk area we observed that the 93% field staffs make sincere efforts in collecting blood slides. Multi Purpose Health Workers (MPHWs) claim 100% presumptive radical treatment. However 24% of the people defy the statement as they get only chloroquin but

no primaquin. In the low risk area however only 34% MPHWs are regular in their field visits. The households visited every fortnightly by an MPHW vary from 21% in low risk area to 84% in high risk area. Most of the health workers (95%) have requisite skills in drawing and staining peripheral blood smears for malaria. The supervisors are not regular in visit to house holds to follow up presumptive treatment of the patient neither in slide positive nor in slide negative cases.Insecticidal Residual Spray (IRS) was in operation in 6 out of 14 blocks selected on the basis of API > 5. 96% households knew the location of the drug distribution center (DDC). Household ownership of at least one net (community bed-net) varied widely from 17% in some villages to 89% in other (average 53%). We found relatively higher rate of bed-net use is in high risk area. Many people not using bed-nets resort to some alternative methods like insect repellants (coil 23% and liquid 11%). Rests of the people don't adopt any method due to negligence or poverty. However we found only 4 hatcheries properly maintained with fishes alive. In different blocks 300 perennial water bodies have been identified in 75% of which *Gambusia* fishes have been released.

Outcome indicators

Of the 509 sub-centers required only 310 sanctioned and all are functioning. They have no microscopic facilities; they can use RDK for the confirmation of malaria diagnosis. However, 45% of them reported scarcity of RDKs. None of the sub-centers reported a week or longer period stock-outs of anti-malarial drugs. Of the households 76% sought health care from Government health service providers, 7% from pharmacy shop and the rest 17% from the local private practitioners.

The awareness about malaria is good as 93% household heads could say that malaria is caused by mosquito bite and use of mosquito nets can prevent it. However 30 % of them feel that malaria is also transmitted through other routes e.g. using dirty water. Of the household heads 54% can tell the symptoms of malaria and know that it untreated it may lead to death. However they get this information mostly (91%) from the television and sometimes (9%) from news paper and other sources, there being no IEC activities from health professionals in the villages. Out of them 28% feel that government medicines for malaria are not effective.

Out of 336 spray squads required all (100%) worked. The percentage of household coverage with IRS varies in different blocks (Banki1: 86%, Mahanga: 80%, Badamba: 97%, Banki 2: 95%, Athagarh: 80%, Narasingpur: 91%). There was only one death due to malaria in 2007. This did not involve the NGOs for facilitation of IRS.

We found 59% households have at least one community bed net. Of the community bed nets only 10% was impregnated with insecticide.

Impact indicator

Since the declaration of 6 blocks as high risk area in 2005, there have been sustained intense anti-malarial activities. As consequence, compared to 2006 we have in 2007, ABER increased from 6.3 to 7.5, SPR decreased from 1.7 to 1.3, PF% reduced 62.8% to 56.9%, malaria deaths from 2 to 1.

Discussion

The bottlenecks in implementing malaria control measures mainly relate to the time lag at various stages starting from collection of blood smear of fever cases to the administration of radical treatment to the smear-positive cases. Thus a vicious cycle ensues i.e. due to delay in report, people refuse to give blood smear to health worker and say health worker is not working and health workers do not go to collect the smear taking a plea that targeted BSC fails due patients' refusal.

Except for laboratory technicians (LTs), at all levels of human resources from MPHWs to medical officers there are vacancies; but the magnitude is more at supervisor positions. Supervision is weak from district officials to multipurpose health supervisors. Rapid Diagnostic Kits are supplied for use at PHCs level (in emergency i.e. absence of LT) and sub-center level. However in most LTs also do use it and thus sub-centers do not get adequate supply. In the Primary Health Centers, although there is more than 99% concordance of the government blood smears testing, the doctors often advice the patient to go for private rapid diagnostic kit testing. But this gives a wrong estimate of different malaria indices reported by the hospital and thereby jeopardizes the surveillance of the malaria status in the community.

Insecticide treated bed nets (ITBN) were supplied only for some below poverty level (BPL) house holds. Due to limited stock the ITBNs have been distributed only in certain sub-centers. One of the potential biases of our study was interviewer bias. To minimize the possible interviewer biases, team members were carefully selected to avoid exchange of experience of members between sub centers and community.

Weaknesses of the programme:

There are fewer sub-centers established than required in the district. Health workers were less than sanctioned posts. There is delay in reporting the smear examination result to the fever patient by the health worker. All level supervisory works was poor in the district. There is limited stock of ITBNs. Despite widespread resistance to chloroquin, it is still the first line drug in government facilities.

Positive aspects of the programme:

Laboratory technicians were very efficient. Malaria control programme is tagged with National vector born disease control programme (NVBDCP) in the district. There are sufficient FTDs established in the villages of the district. Increased funding for malaria programme in the district.

Challenges of the programme:

The disease is endemic and prevails in spite of all efforts; deaths due to malaria still occur. Parasite resistance to drugs, unplanned urbanization, migration, poverty etc. are the constraints that impede the programme.

Recommendations

Posting of microscopists at sub-center level is ideal for early detection and prompt treatment but not feasible due to financial constraints. We need to provide rapid diagnostic kits directly to the MPHWs and not through the laboratory technicians. The reporting system may be improved by (1) involving private sector (2) providing telecommunication facilities.

There is need to fill up the vacancy positions especially of the supervisors. Supervisory visits should be conducted with regularity from all levels, with need assessment at local levels to ensure quality and timeliness of reporting.. Role of each level of supervisory staff should be identified and followed accordingly.

There is need to identify the private sectors and private practitioners and involve them in the programme for improved coverage of surveillance activities.

In the government hospitals the blood should ideally be referred for examination by the hospital laboratory technicians. And, when with or without the doctors' referral the patient goes for private blood examination, the doctor should write the findings on the register. This will give a more accurate estimate of the case load for surveillance.

Resistance to chloroquin needs to be investigated and use of Artemisinin based combination therapy (ACT) as the first line therapy for the treatment of malaria in Cuttack district may be considered. Coordination with various government departments and non-government organization (NGO's) should be strengthened, with sharing of relevant information, training, IEC activities and feedback.

References

1. WHO Global Malaria Programme- World Malaria Report. 2008. Available at http://malaria.who.int/wmr2008/

2. WHO Global Malaria Programme- World Malaria Report. 2008. Available at http://malaria.who.int/wmr2008/malaria2008.pdf

3. WHO Global Malaria Programme- ; 2008. Available at http://malaria.who.int/wmr2008/MAL2008-CountryProfiles/MAL2008-India-EN.pdf

4. http://ww w.nvbdcp.gov.in/Doc/Malaria1.pdf

5. http://www.searo.who.int/en/Section10/Section21/Section1979_13869.htm

6. Nanda Prashant K. Chloroquine not working in Orissa, to be phased out. Nerve WS of India; December 2007. Available at http://www.nerve.in/news:253500119083

7. http://www.ias.ac.in/currsci/may252006/1323.pdf

10. National Vector Borne Disease Control Programme. Malaria Drug resistance, Status of drug resistance in India. Available at http://www.nvbdcp.gov.in/DRUG.html

Figure-I: Logical frame indicating input, process, output and impact indicators to different strategies of National Anti Malarial Programme (NAMP), Cuttack district, Orissa, India, 2008.

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

Table1. Some selected indicators of anti malaria programme in Cuttack district, Orissa, India, In comparison of the year 2007.

	Indicator	Result
Input	MPHW male	245/259
	MPHW female	387/397
	MPHW male trained in malaria	209 /259
	MPHW female trained in malaria	397/397
	Microscopic centers established / required	18/77
	laboratory technician in position / sanctioned	18/18
	laboratory technician in trained	18
	medical officer in position	200/221
	MPH supervisor male	35/76
	MPH supervisor female	54/56
	medical officer trained for malaria programme	171/221
	spray gang engaged to spray in district	336/336
	Sanctioned malaria fund to blocks as per demand	Mostly to 6 high risk district Not sufficient
	Health facilities utilized 95% of received funds	12/14
	SC functioning in the district out of requirement	Nil
	FTD established / required	
	Supply of material on IEC in blocks	100%
	% household with at least one community bed net	59%
Process	Sub center visited by district official once in a year	192
	Sub center visited by medical officer once in a quarter	155
	severe malaria patient treated with correct anti malarial drugs	100%
	IEC- meeting held in the year	7
	health workers collected blood slide as per target	60%
	use of 95% malaria funds by blocks	12/14
	Blood slides examined by lab. technician as per target	100%
	discrepancy of test results of slides of the microscopic centre	< 1%
	the median interval in days between blood collection and examination	1 -7 (4) in field and same day in PHC
	SC having stock-out of anti malarial drug for more than one week	NIL
	severe malaria patient cured after treatment	100%
	blood slides examined by malaria technicians without having backlog	100%
Outcome	annual blood slide examination rate (ABER)	7.5
	Annual parasite incidence(API)	0.99
	Plasmodium falciparum percentage (PF %)	0.75
	SPR	1.33
	Total number of deaths	1

SECTION 3
OUTBREAK INVESTIGATION

An outbreak of measles in Nunguthani village, Joda block, Kendujhar district, Orissa, India, 2007

1. Introduction

Globally measles remains a leading cause of death among young children. More than 20 million people are affected by measles each year of these 197000 lead to death in 2007, mostly children under the age of five.[1] Targeted vaccination campaigns have had a major impact on reducing measles deaths. From 2000 to 2007 about 576 million children who live in high risk countries were vaccinated against the disease. Measles deaths in the world, decreased by 74% during this period. In 2007, about 82% of the world's children received one dose of measles vaccine by their first birthday through routine health services, up from 72% in 2000.

Combining measles immunization with other health interventions is a contribution to the achievement of Millennium Development Goal Number 4: a two-thirds reduction in child deaths between 1990 and 2015.

WHO and UNICEF are collaborating to reduce global measles death by 90% by 2010. The strategy includes: (1) strong routine immunization for children by their first birth day. (2) A second opportunity for measles immunization through mass vaccination campaign to ensure that all children receive at least one dose. (3) Effective surveillance in all countries to quickly recognize and respond measles outbreaks. (4) Better treatment of measles cases, to include vitamin A supplements, antibiotics if needed, and supportive care that prevents complications.

In 2007, South East Asia region contributed about 69% of global burden of measles death despite the vaccine coverage of 73%.[2] From 2000 to 2007 the decrease in measles cases in SEAR is lowest (12%) and deaths were only 99000 (42%). The reduction in the South-East Asian Region was substantially smaller because India, which alone accounts for 67% of the region's population, has not yet begun large-scale measles Supplementary Immunization Activities. India, thus contributes substantially to the global burden of measles.

In 2007, Orissa reported 789 measles cases[3] and the immunization coverage during 2008 was 81% among children of 12 -23 months of age.[4] In block Joda of Kendujhar district of Orissa, village Nunguthani is a difficult to access plateau, without proper way in having a 100% tribal population of 312 about 20 km away from Joda in Kendujhar district. On 10th June 2007, the medical officer in charge of primary health center Basudevpur reported clustering of measles cases in a tribal village Nunguthani in Joda block of Kendujhar district. On 15th June 2005, the Field Epidemiology Training Programme scholar of National Institute of Epidemiology, Chennai initiated an outbreak investigation with objectives to (1) estimate the magnitude of the outbreak (2) identify the risk factors (3) propose recommendations for control

2. Methods

Descriptive epidemiology

We reviewed the surveillance data of the of the local health facility. We conducted door-to-door active case-search. We used the WHO case definition for measles. We defined a case as occurrence of fever and maculo-papular non-vesicular rash with at least one of cough, coryza (runny nose) or conjunctivitis (red eyes) in neighborhood of Nunguthani village, during the

period 16th May to 15th August, 2007. We collected information on age, sex, residence, symptoms, sign, date of onset, vaccination status, 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 plotted an epi-curve to study the dynamic of the outbreak, drew a map of the village by location of households to show the distribution of measles cases by residence and calculated the age- and sex-specific attack rate of measles. We traced an initial patient with date of onset preceding that of all others. We inquired all family members to find epidemiologic link and if this patient could be a source of infection for the community.

Laboratory investigations

For laboratory confirmation of the suspected case of measles we sent serum sample to National Institute of Epidemiology, Chennai.

Analytic epidemiology

We conducted a retrospective cohort study. Our study population was the children between the age group 0 to 10 years (as no case had age beyond this range in line list) of village Nunguthani of Kendujhar district. 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 9 months of age which was the lowest cut off month for measles vaccination in India.

3. Results

Descriptive epidemiology

The surveillance data for the district and the village between 2005 and 2007 confirmed the unusual increase of incidence. The incidence in the primary health centre area in June and July 2007 was higher than in the rest of the district and higher than in the same area during the previous years. Further investigations ruled out recent population influx or any change in the reporting system. Thus, this episode was considered an outbreak.

We identified 62 cases in a population of 86 children from 0 to 10 years of age (attack rate: 72%, Table 1). Nine deaths occurred (case fatality: 16%). The attack rate was highest among children in 2 to 5 years of age [15/17 (88%)]. Cough and/or coryza (running nose) and conjunctivitis (red eyes) was reported by 97% and 93% measles cases respectively. Almost 98% children had some complications. The most common complications were respiratory tract infection 97%, followed by diarrhoea 23% and apthus ulcer 13%. Of the 62 case patients, 20 (31%) had been vaccinated with measles vaccine. Block health administration conducted supplemental measles immunization in village Nunguthani and all other nearby localities of Joda block. We supplemented the patients with one dose of vitamin A. The overall attack rate was 74% (total children 84, measles affected 64). (Table-1). Of the children affected 93% had developed red eye, 63% had underweight, 23% had diarrhea and 13% had apthus ulcer (table 2). Of the 34 under five children, 29 had measles (attack rate: 85%). The case fatality according to the nutritional status was 20% among well nourished and

37% among undernourished. Case fatality was 1.9 times higher among undernourished.

The epidemic curve points out occurrence of all the cases between 4.06.07 to 31.07.07. While the first case (index) took place on 4.06.07, maximum number of cases between 17.06.07 and 20.06.07 the last case was on 31.07.07. The curve was propagative in nature . The spot map (Fig1) showed distribution of cases in almost all households uniformly throughout the village.

Data on historic trends of measles were not reliable. The total vaccination coverage (i.e. inclusive of measles vaccine) in the overall block was less than 50% in last 5 years which lead to accumulation of susceptible children by years. In village Nunguthani only 34 (40%) of 86 children from 0 to 10 years of age were vaccinated.

Cohort study

Attack rates of measles by age and vaccination status indicated 42 case patients of 50 non-immunized (84%) compared to 20 case patients of 34 immunized (59%) children; those below 9 months being excluded as measles vaccine is administered after that age. The calculation of vaccine efficacy among those to expose to the vaccine yielded an estimate of 30% (CI 4.9%-48.4%) (children under 9 months of age were excluded).

4. Discussion

The measles outbreak occurred in village Nunguthani of Joda block in kendujhar district during June and July of 2007. Subsequently it also affected two adjoining villages. All these villages were located on hill-top (plateau) and had 100% tribal population belonging to the tribe "munda". The munda tribes are known for being illiterate and ignorant. They have poor

knowledge of immunization. Other nearby villages having mixed population were free from the outbreak. In the affected villages both the attack rate and case fatality rate were very high. Sparing of villages in the vicinity with mixed population indicates herd immunity due to better immunization there. In the latter villages more literate people are there to demand immunization.

The measles vaccine coverage was low. Most of the children were underweight and attack was more among them. The attack rate was more in the age group 2 to 5. So there was no age shifting to older children reflecting poor vaccination. Vaccine efficacy was low. The low vaccine efficacy may be due to failure to maintain the cold chain while transporting the vaccine to these remote hill top villages. Alternatively, there may be vaccination with a reconstituted vaccine stored in refrigerator for long or may be a problem with the original vaccine efficiency. Although the measles vaccine is safe and effective yet there is both under-coverage and low-efficacy of vaccine in our study area which leads to such high attack rate of this vaccine preventable disease.

The people mainly work in mines as labourers and in many cases both parents go out during day time. According to health workers and the anganwadi workers, by the time they climb the hills and reach the village to vaccinate the children many of the parents are not there leading to under-vaccination. High case fatality rates in developing countries are due to a young age at infection, crowding, underlying immune deficiency disorders, vitamin A deficiency, and lack of access to medical care.

The main limitation of the study was that we could not get the samples processed for measles specific IgM. We could not get the samples tested due to difficulties of transporting the specimens to relevant laboratory. Hence, in view of the clinical confirmation in such difficult to reach setting, we believe that our conclusions are not limited by the absence of laboratory confirmation.

For immediate action we recommend (1) treatment of the complications of the affected children (2) supply of nutrition and vitamin A to all children (3) immunization of the unaffected children in the village and nearby villages.

To prevent occurrence of such outbreaks in future we need to conduct the supplementary immunization in the premises of house as well as mines area. We have to review the cold chain system and investigate the immunization programme to rule out any discrepancy.

So even in absence of measles vitamin A supplementation should be given. There is need to evaluate undernutrition and the factors associated with it in tribal population of the area and to take necessary steps to reduce it.

References

1. World Health Organization. Measles. Fact sheets revised on December 2008. Available at http://www.who.int/mediacentre/factsheets/fs286/en/

2. CDC. Progress in Global Measles Control and Mortality Reduction, 2000 -2007 table 1. Weekly. December 5, 2008. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5748a3.htm

3. National Health Profile 2007, Government of India, Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, New Delhi

4. District Level Household and Facility Survey under Reproductive and Child Health Project (DLHS – 3), District Fact Sheet, Orissa, 2007 – 08, Ministry of Health and Family Welfare, Government of India, 2007 – 08

Fig1: Distribution of measles cases by households, Nunguthani, Joda, Kendujhar, Orissa, India, 2007

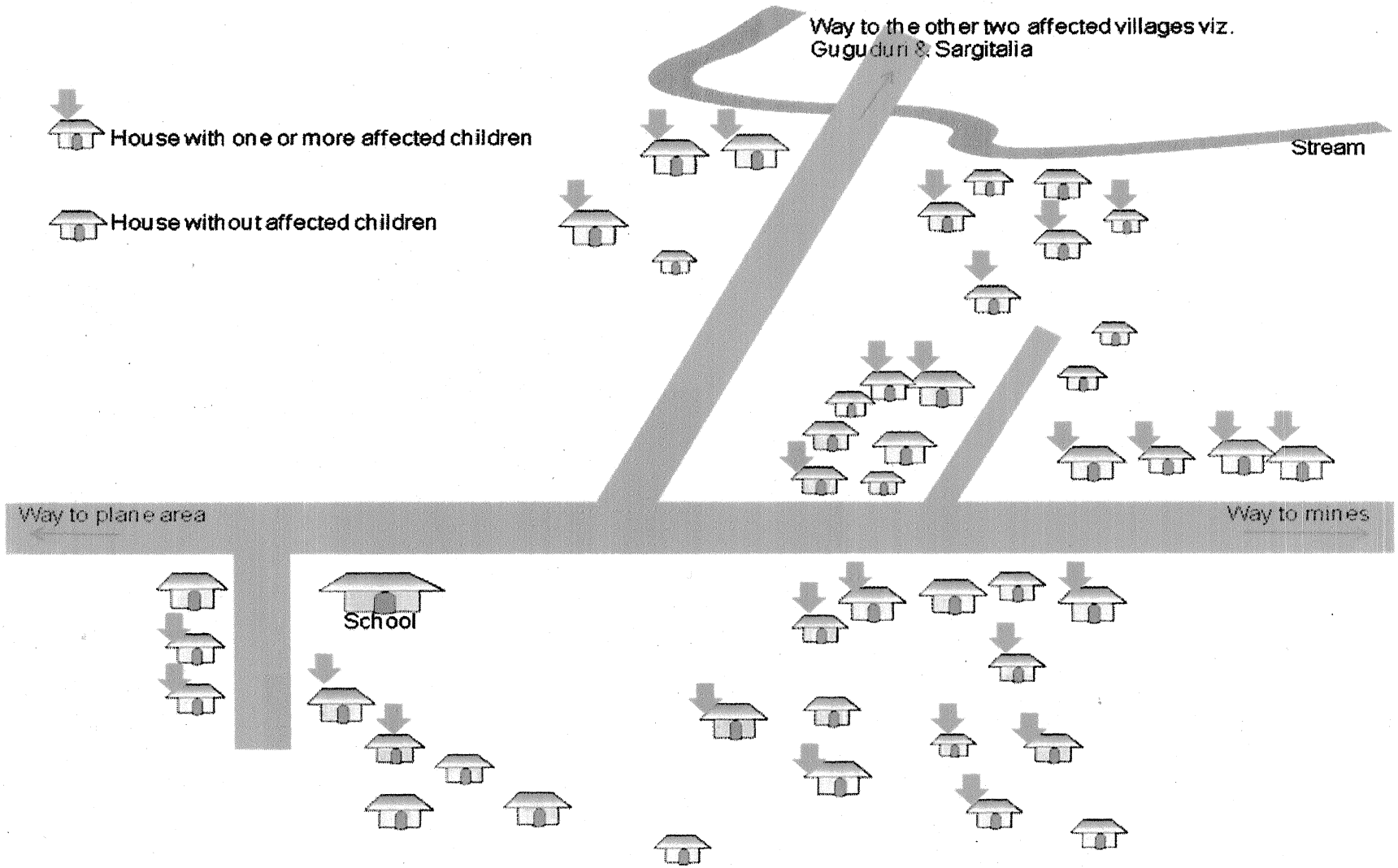


Fig2. Distribution of measles cases by date of onset of rash, Nunguthani, Joda, Kendujhar, Orissa, India. 2007

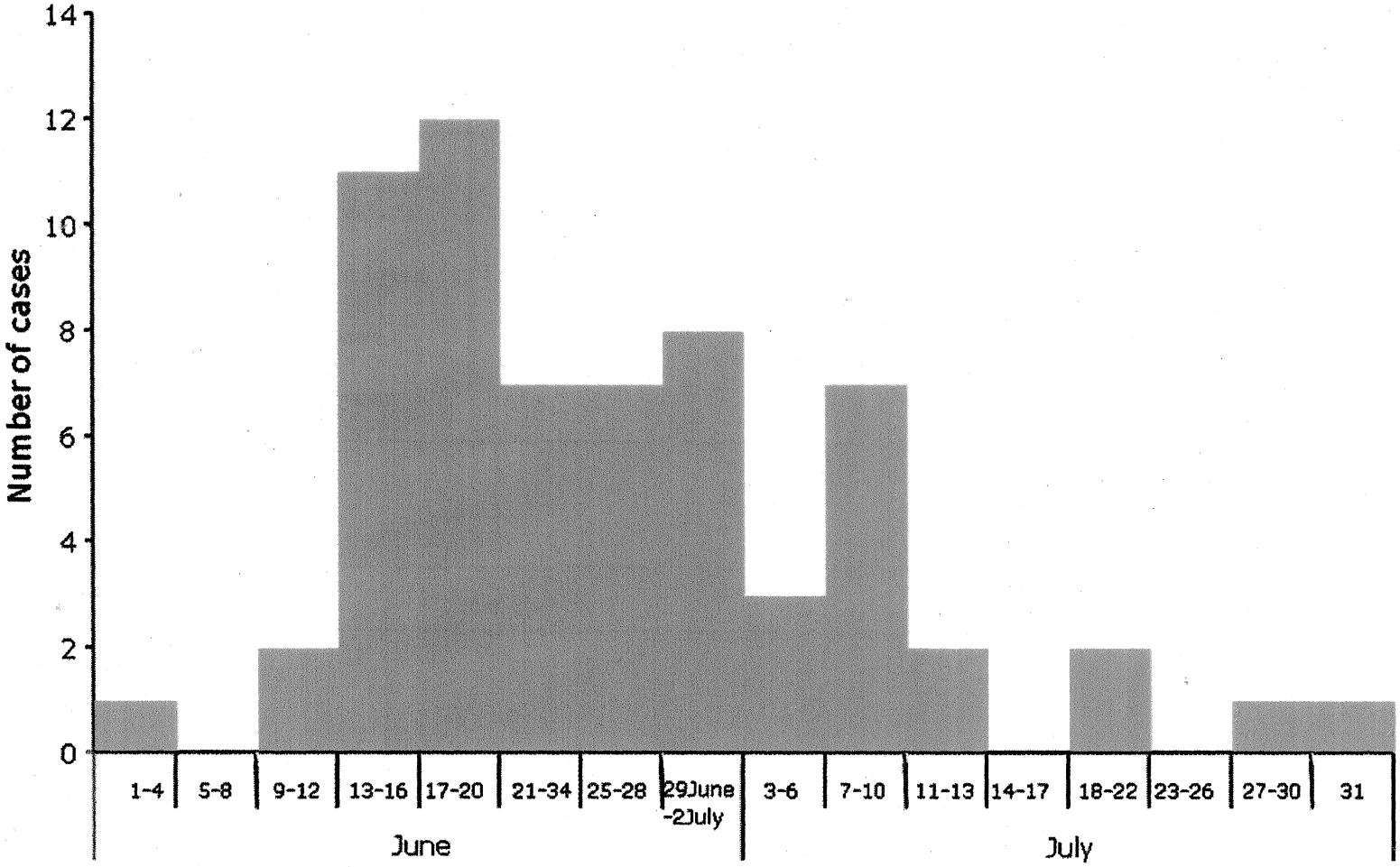


Table1. Incidence of Measles by age and sex, village Nunguthani, District Kendujhar, Orissa, India, 2007, (n=62)

		#	Population	Attack rate%
Age group	0 to 9 months	2	9	22
	> 9 to 12 months	4	6	67
	> 1 year to 2 years	11	14	79
	> 2 to 5 years	15	17	88
	> 5 to 10 years	30	40	75
Sex	Male	33	45	73
	Female	29	41	71
	Total	62	86	72

Table2. Clinical features of measles cases, village Nunguthani, District Kendujhar, Orissa, India, 2007, (n=62)

Signs / symptoms / complication	No of cases	%
Fever & rash	62	100%
Cough / coryza	60	97%
Red eye (conjunctivitis)	58	93%
Underweight	39	63%
Diarrhea	14	23%
apthus ulcer	8	13%

SECTION 4
SCIENTIFIC STUDY CRITIQUE

SCIENTIFIC STUDY CRITIQUE

Scientific study critique

General information

Title of the paper: *Cassia occidentalis* poisoning as the probable cause of hepatomyoencephalopathy in children in western Uttar Pradesh

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

References:

1. Vashishtha VM, Nayak NC, John TJ, Kumar A. Recurrent annual outbreaks of a hepato-myo-encephalopathy syndrome in children in western Uttar Pradesh, India. Indian J Med Res 125, 2007(4); 125: 523-533

2. Vashishtha VM, Kumar A, John TJ, Nayak NC. Cassia occidentalis Poisoning Causes Fatal Coma in Children in Western Uttar Pradesh.Indian Pediatrics 2007; 44:522-525

Reviewer: **Debasis Jethy**

General narrative comments

This outbreak investigation on acute hepatomyeloencephalopathy among children addresses a problem of public health importance and is good attempt to identify the cause for the outbreak. In the present and previous study in the same area by the author, the systematic approach for outbreak investigation was not followed. The outbreak was not described in terms of time, place and person. Results of analytical case control study were well presented. Limitations were not clearly presented. The writing was simple and easy to understand, however few paragraphs lack sequence.

Area	Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
		1	2	3	4	5	
Overall assessment of the paper	The background provides a description of the public issue at the global and local levels and logically introduces the need to answer a specific research question.			√			In the introduction, description of local health problem is mentioned clearly, but, the global and regional situation is not mentioned.
	The methods section provides sufficient information on the methods used, including the type of study, the sampling strategy, the case definitions, the data collection and the data analysis.			√			The type of study, case definition, inclusion criteria, sampling procedure, data collection procedure and analysis plan is well described. The description of outbreak in terms of time, place and person is missing in methods section.
	The results reports sound scientific results that meet the study's objective and the research question. They are presented with sufficient details and adequate statistical information (e.g., Confidence Intervals).				√		The results are tabulated with adequate statistical information and the results address the research question.

Area	Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
		1	2	3	4	5	
	The discussion summarizes and interprets the results, discusses the findings in view of what is already known, frames what the results of the study can support, defines the limitation of the work and suggests next steps in terms of (1) intervention and (2) research.				√		The results are well summarized and interpreted. The limitations of the study are not well defined. However, recommendations are specific as per the findings.
Methods	The study design is adequate to meet the objective.					√	Case-control study is appropriate, as the disease is rare one.
	The study population is well defined and relevant to the research question				√		Study population is well defined.
	Definitions are specified, sound and based upon standardized criteria when available.			√			Case definition is designed based on findings of the previous study in the same area.
	Sampling methods are statistically sound and adapted.			√			The method adopted for selecting cases and controls is mentioned.
	The sample size was estimated beforehand appropriately.				√		The procedure for sample size calculation is not described in methods.
	The study is exempt from bias.			√			There may be recall bias
	The data that were collected are well described and relevant.				√		Data were well described and relevant.
	The data was collected was of sufficient quality.			√			Procedure for quality control measures during data collection is not mentioned.

Area	Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
		1	2	3	4	5	
	The analysis is thought beforehand and appropriate.			√			Descriptive study in terms of time, place and person is not done how ever, analytical study is done to find the cause of death.
	The indicators generated are appropriate and well calculated.			√			The indicators are well calculated and appropriate.
	The statistical tests used are appropriate and well computed.			√			The statistical tests are well computed.
	Appropriate attention has been given to human subject protection issues.	√					A human subject protection issue is not mentioned in methods.
Writing	The content is well distributed by chapters and sections.			√			Yes ,the content is well distributed
	The language is simple and clear. The word count is < 3000.				√		Though the language is simple and clear, some statistical words are used. The word count is less than 3000 words.
	The writing is sequential, going from one point to the next.			√			The writing is not sequential.
	The active voice is used throughout.		√				Active voice has not been used throughout.
	The vocabulary is precise, consistent and standardized.			√			The vocabulary is not precise and inconsistent

Area	Checklist items	Grading from 1 (strongly disagree) to 5 (strongly agree)					Explanations
		1	2	3	4	5	
Tables and figures	There are no more than five tables and or figures. All are needed.			√			The number of tables and/or figures is less than five. All are needed.
	The choice of graph or table to display information is judicious.			√			Additional table, graphs and spot map could have been given for the descriptive analysis
	The tables are clear, exact and the totals add up.			√			Tables are exact and clear. But some zeros are not rounded up to nearest value
	The graphs are effective, appropriate and understandable.			√			No graph is presented, only the photograph of the toxic plant is given