# FIELD PROJECT REPORTS

## By

**Harish Chandra Singh Martolia**

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of

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**Thiruvananthapuram Kerala -695 011**

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

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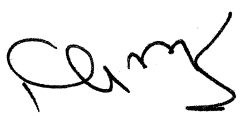
## Certification

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



Date

Director

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Date / / Harish Chandra Singh Martolia

# SECTION: 1
# FIRST FIELD POSTING

# 1. Health Situation Analysis

# Description of the existing health and laboratory facilities in Nainital district, Uttaranchal

## 1. Introduction

FETP scholars are delivering public health services in health department. We conducted this work situation analysis of the existing health facilities and existing laboratory facilities to facilitate fieldwork of state to describing prevailing public health system to become familiar with existing health infrastructure including laboratories networks and the resources of the public health department. In addition it describes the geography, sociocultural structure and belief of the area.

## 2. Objectives

Describe the existing health situation and existing laboratories facilities in Nainital district in context of geographic setting, demographic and socioeconomic characteristics, health care infrastructure and human resources.

## 3. Methodology

### 3.1 Data collection

We collected primary data through interviews and discussions with health officials and field workers and secondary data from official records and registers. We visited the office of chief medical officer and of the deputy chief medical officer Nainital, community health centres, primary health centres and sub centres.

### 3.2. Data analysis

We described the socio-demographic and geographic characteristics of the district, organization of health care infrastructure, available human resources,

health care facilities and laboratory facilities in Nainital district, Uttaranchal state, India-2003.

# 4. Description of existing health system

## 4.1 Background information

### 4.1.1 Uttaranchal state

The state Uttaranchal was a newly created state on 9th November 2000. Previously it was a part of the state of Uttar Pradesh. It was identified as a remote region (a place for punishment) for five decades. Most of the public policies including public health were plains oriented. Vacancies and human resources were lacking.

### 4.1.1. a. Geographical profile

Uttaranchal is located in the north west of Uttar Pradesh. Its boundaries are Himanchal Pradesh to the west, Uttar Pradesh to the south, Tibet to the north and Nepal to the east. This hill state is spread over 53,484 square kilometer area of land. It includes large un-inhabitable areas made of glaciers, snowfields, thick forests, sanctuaries and high rocky mountains. Dehradun is the state capital. Geographically, the state can be divided in the hills (80 %) and the plains (12 %) land area.

### 4.1.1. b. Administrative divisions

Administratively the state has 13 districts and two divisions namely Garhwal division having seven districts having Uttar Kashi, Dehradun, Tehri, Haridwar, Pouri Chamoli and Rudraprayag and Kumaun division containing six districts (Bageshwar, Almora, Udham Singh Nagar, Pithoragarh, Champawat and Nainital.

### 4.1.1. c. Demographic features

The state population was 84, 79,562 were per 2001 census. 22 % of the population lived in urban areas. Literacy rate was 84 % among males and 60 % among females. The sex ratio (964 women to 1,000 men) was not favorable to women lowest value in Haridwar district (plains) and a higher in hills. Life expectancy at birth of the state was 63 years. The sex ratio among children aged 0 to 6 years was 948 in census 1091 to 906 in census in 2001. If the same trend continues, the composition of the population will be changed. This requires investigation to identify the reasons and plan public health action accordingly.

### 4.1.1. d. Socio-cultural factors

Persons from all castes and religions live together in Uttaranchal. The majority of the population is Hindu followed by Muslims, Sikhs, Christians, Buddhists and others. Castes present in Uttaranchal include schedule tribes, schedule castes as well as backwards and general castes. There are sub castes within individual castes for example among schedule tribes there are higher and lower states.

### 4.1.1. e. Socio-economic status

The 2001 census indicated that 37 % of the population was constituted of workers. Of the workers 50 % are skilled, 8 % agricultural laborers, 2 % household industries and 40 % were in other works.

### 4.1.2. Background information: Nainital district

### 4.1.2. a. Geographical profile

The Nainital district of the state of Uttaranchal is divided in hills and plains. The hilly part of the district is about 2,400 meters above the sea level, with an average rainfall of 2,840 mm each year and its main river is Kosi. Nainital city is situated at an elevation of 1,938 meters. In the centre of the city, the scenic lake Naini occupies 132 acres of land. The lake attracts national and international tourists because of its beautiful scene and geographic features. In

addition to Naini Lake, there are a number of lakes named Bhimtal, Naukuchiatal, Sat Tal, Khurpatal, Harish Tal etc. Zim Corbet National Park is another place of touristic importance. It is located in the lower Himalayan region and covers a total area of 526 square kilometers. There are many beautiful peaks are in the district with elevations ranging from 1,633 meters to 2,691 meters.

### 4.1.2. b. Administration divisions

There are 1,121 villages, 450 village panchayats, 44 revenue villages, four town areas and one town committee in the district. The rural area of the district is divided into eight blocks. For administrative and revenue reasons the district is divided into four subdivisions, these are Nainital, Kosyakutoli, Dhari and Haldwani

### 4.1.2. c. Transportation

According to statistics department (economic evaluation 2001-02), till 2000 total length of pucca motor able road in the district was 2,324 kilometers, total railway line in the district was 32 kilometers, total telephone connections were 32,837, of which 809 were public telephones, 6,277 in rural and 26,560 connections were in the urban areas.

### 4.1.2. d. Demographic profile

Population of the Nainital district according to census 2001 was 7, 62,912 , of which 35 % resides in the urban area. Population density of the district was 472 per squire kilometer; highest being in Haldwani block (589 per sq. kilometer) and least in Okhalkanda block (225 per sq. kilometer). Male literacy rate is 87 %, female literacy rate was 61 %.

### 4.1.2. e. Socio-cultural features

Majority of the population in the Nainital district are Hindus (76%) followed by Muslim (15%) and Sikh (8 %), Christians (.4 %). Hindi is the main language spoken in the district.

## 5. Description of existing health facilities in Nainital district

### 5.1. Organizational infrastructure

The sub center is the smallest health unit that functions at the village level. A female health workers works at this level. State allopathic/ ayurvedic dispensaries are the lowest health unit where a medical officer is posted. At the block, there is primary health centre and district hospital at the district level. Directorate General, Health & Family Welfare is the departmental head.

### 5.2. Human resources

The sanctioned posts at the primary health centre level is two medical officers, a pharmacist, a ward boy, a laboratory technician, an optometrist, a driver, a sweeper, a peon, a health education officer, a malaria inspector, a computer operator, a male health supervisor, a female supervisor and two female health workers for head quarter sub centre. At the additional primary health centre following posts are sanctioned-a medical officer (allopathic), a medical officer community health (ayurvedic), a pharmacist, a ward boy, a sweeper, one male supervisor, one female supervisor and a female health worker. Human resources at state allopathic dispensary level are a medical officer, a pharmacist, a ward boy and a sweeper. Female health worker is the only staff posted at sub centre.

### 5.3. Health infrastructure in Nainital district

Health sub centre is the lowest level of health care facility. Sub centre provides preventive and curative services to the people. Additional primary health centre and state allopathic/Ayurvedic dispensaries are the sub block

level hospitals. At the block, there are primary health centres or community health centres. There is one district hospital in each district. A base hospital and a medical college are located in Haldwani.

## 5.4. Health care services in Nainital district

### 5.4.1. Rural area

Nainital district is divided in eight developmental blocks. There are five primary health centres in each of the five blocks (Bhimtal, Ramgarh, Motahaldu, Okhalkanda and Belparao) and three community health centres (Betalghat, Padampuri, Ramnagar) in each of the remaining blocks. All the primary health centres have four bedded indoor facility and the community health centres have 30 bedded indoors. In the Bhimtal block area; there is one primary health and a community health centre at Bhowali. There are four homeopathic and 22 Ayurvedic dispensaries, 11 additional primary health centres and 29 allopathic dispensaries in Nainital district. There are 131 sub centres in the district located at village level. All the hospitals additional primary health centre and are providing outdoor and indoor services and emergency services. All the children receive vaccines at sub centres in rural areas and at post partum centres in urban areas.

### 5.4.2. Urban area

There are three urban areas in the district: Nainital, Haldwani and Ramnagar. In Nainital there is one post partum centre (6 bedded), one ayurvedic hospital (4 bedded), one state homeopathic dispensary, one district hospital female (59 bedded) and one district hospital male (63 bedded). In urban area Haldwani there is one post partum centre (6 bedded), one two state allopathic dispensary (each 4 bedded), state ayurvedic dispensary 94 bedded), one state homeopathic hospital, one base hospital (200 bedded), one female hospital (30 bedded), one district tuberculosis centre and a medical college. Ramnagar had one post partum centre (4 bedded), one forest hospital (4 bedded) and a combined hospital (30 bedded).

### 5.4.3. Job responsibilities at various levels

Sub centre that functions at the community level is responsible for data collection and reporting, primary health centre compiles analyses and transmits the information to the district and circulates feedback to the peripheral level. In the district, the reports are compiled, analyzed, information is transmitted to the state and feedback is sent to the peripheral level. It also provides funds to the peripheral unit whenever needed. District is divided in three zones first, second and third. For each zone there is a Deputy Chief Medical Officer. For the national programmers in the district there are individual heads as district immunization officer for immunization activities, district leprosy officer for leprosy, district tuberculosis officer for tuberculosis and HIV/AIDS. At the state the responsibilities are to compile the reports from the whole state, analyze, circulate feedback and change policy if needed.

### 5.4.4. Private hospitals in the district

There is no list available of the private hospitals in the district. Almost all the private hospitals are located in the two urban cities of the district-Haldwani and Ramnagar. Both the cities are in the plain area. In Nainital, city there is no private hospital/nursing home except few private clinics.

### 5.4.5. Non governmental organization providing health services

There is one clinic run by a mission school in Bhimtal. It has no doctors. Trained nurses give treatment for minor ailments and provide antenatal care and delivery service. Chirag is another NGO having one hospital at Shitala and a clinic at Mukteshwar. It has trained lab technicians, paramedical staff and a doctor. Shitala and Mukteshwar are located in Ramgarh block. Chirag is providing services in immunization, maternal care and other health campaigns like Pulse Polio. A Mission leprosy hospital Motinagar, Haldwani is providing service for leprosy. It is the only hospital providing indoor and rehabilitation facilities for the leprosy patients in the district.

### 5.5. Health statistics

Status of health statistics is better in some aspects in Nainital district than in the state of Uttaranchal, with respect to children with complete immunization, proportion of girls marrying before the age of 18 years, prevalence of safe deliveries. I contrast; it is below the state with respect to the proportion of institutional deliveries, the knowledge of female on HIV/AIDS and prevalence of mother's birth order. Some important indicators are not available, including as crude death/birthrate, maternal mortality rate, infant mortality rate and life expectancy at birth.

Table 1: Health statistics Nainital district and Uttaranchal, 2003

| Indicators | Nainital | Uttaranchal |
|---|---|---|
| Crude Birth Rate | Not available | 20 |
| Crude Death Rate | Not available | 7 |
| Infant Mortality Rate | Not available | 52 |
| Maternal Mortality Rate | Not available | 4 |
| Couple Protection Rate | 40.50 | 48 |
| % of children with complete immunization | 82 | 65 |
| % of children with no immunization | 7 | 9 |
| % of girls marrying below 18 years of age | 9.5 | 15 |
| % of mother's birth order ≥3 | 51 | 49 |
| Safe Deliveries | 56 | 51 |
| Institutional Deliveries | 19 | 39 |
| Females with reproductive tract infection | Not available | 25 |
| Males with reproductive tract infection | 67 | 12 |
| Knowledge of females on HIV/ AIDS | 50 | 67 |
| Knowledge of males on HIV/ AIDS | Not available | 63 |
| Life Expectancy at birth | Not available | 62 |

# 6. Laboratory facilities in Nainital district

## 6.1 Introduction

Today the public health systems are facing the challenge of emerging and reemerging infectious diseases, because of globalization and means of quick transportation. SARS is an example of a disease that has spread to more than thirty countries with in few months. Thus there is an urgent need to develop surveillance capacities: focusing on training, improvement in methods of specimen collection, updating of laboratory facilities and rapid communication. The management of disease outbreak warrants the diagnosis, which requires microbiologic analysis. Preventive and control measures of an outbreak can be planned only after the causative agents of the disease is identified based on laboratory results.

## 6.2 Existing laboratories facilities in Nainital district

### 6.2.1 Village level

New primary health centers, state allopathic dispensaries, ayurvedic dispensaries, homeopathic dispensaries and sub centers are the health care facilities are available at this level. None have laboratory facility; although male and female workers at this level are trained in preparing peripheral blood smears for malaria. These blood slides are sent to block primary health centre for examination.

### 6.2.2 Block level

Block primary health centers and community health centers are the first level where laboratory facilities are available and laboratory technician is posted. This technician conducts simple routine investigations (is supposed to do minor investigations e.g. examine peripheral blood slides for malaria, hemoglobin estimation, total leukocyte count and differential leukocyte count).

### 6.2.3 District level

District and base hospitals are referral centers for primary health centers and community health centers. A well-established laboratory department is available at this level with a pathologist and supporting staff (Figure 1).

### 6.2.4 Referral laboratories

For outbreak investigations referral centers are identified where specimen are sent for laboratory investigation. These referral centers include the Himalayan Institute of Medical Sciences, Dehradun, the State Public Health Laboratory, Haridwar, the King George Medical College, Lucknow, Uttar Pradesh, the National Institute of Infectious and Communicable Diseases, New Delhi, the Sanjai Gandhi, Post Graduate Institute, Lucknow, Uttar Pradesh and the Bharat Heavy Electronicals Limited, Pollution Control Research Institute, Ranipur, Haridwar, Uttaranchal.

### 6.3 Lacunae in existing laboratory network

Laboratory infrastructure is developed up to block primary health center level. But lack of human resources (laboratory technician trained in specimen collection and transportation) and logistics (test tubes for specific samples and thermacol boxes for transportation) is there. Pathologists are patient oriented not community oriented. They are working in the district level where clinicians are advising for an investigation and pathologist has to investigate and the result is provided to the individual patient. A pathologist has not any individual role in the investigations. The results are not analyzed. Pathologists and laboratory technicians are not trained in specimen collection and transportation.

## 7. Discussion

A well organizational health infrastructure is existing in Uttaranchal state and Nainital district from the community to the state. Trained health personnel are available. The need is to adopt community-based approach. At sub center level

workload is more. Sub centre areas are not distributed evenly. There is wide variation in the population of the sub-centers ranging from five hundred to ten thousands; which needs redistribution of the sub-centers.

Sub centres are located at village level and covers 3- 4 villages which are scattered over a large area because the population is scattered specially in the hills. A data entry operator is posted at the primary health centre, though there is no computer available at this level. Health services are provided to the remote villages through health sub centres. A female health worker is posted at the sub centre level. Job responsibilities at all the level are fixed. In the rural areas, people depend of government hospitals for their health care services because most of the private hospitals are located in the urban areas.
There is inadequate laboratory networking in the district at various levels as referral laboratories are not known to the peripheral health institutions. There is lack of human resources trained in laboratory work e.g. posts of laboratory technicians in all the four hilly block level primary health centres were vacant.

Appropriate laboratory network, and regular training programme (refresher courses) of the related experts (laboratory technicians and microbiologists) and availability of logistics at various levels (block, district and state) is an urgent need to tackle the challenges of emerging and reemerging infectious diseases. Coordination (identification of laboratories for specific diseases to be investigated, their address, telephone/ fax, e-mail id) of laboratories at various levels (between block up to the national level laboratories) is necessary. The up gradation of the laboratories in stages by strengthening state level laboratories with trained personnel and necessary logistics. Second, district and block laboratories. In the third stage ensure the availability of laboratory facilities at sub block level hospitals.

## 8. Recommendations

Fill up the vacant posts in the health units. Redistribute sub-center areas for field workers. During redistribution of sub centre are the geography should be given priority. Strengthen the already existing health care facilities by sanctioning one post of male health worker in each sub centre. Opt the policy of seven years compulsory service in the rural hill area. Hence while postings; candidates from the local areas might be preferred. There may be rotation of posting in this cadre. Initiate analysis of information at primary health centre and all the health statistics related to it should be available there as maternal mortality rate, infant mortality rate, birth rate, immunization coverage etc. In slums of urban areas, assessment of vaccination coverage is needed because health workers are not posted there. We have proposed various recommendations on the basis of the analysis of available laboratory facilities (Table 2).

## Figure 2: Proposed laboratory functions at various levels

| Level in health system | Tests performed | | |
|---|---|---|---|
| | Biochemistry | Microbiology | Hematology |
| Sub center | Nil | 1. Blood slide collection<br>2. Urine examination<br>3. Pregnancy tests | 1. Hemoglobin estimation |
| Primary health center | Nil | 1. Sputum for acid fast bacilli<br>2. Urine examination<br>3. Stool examination<br>4. Pregnancy test<br>5. Specimen collection for referral: blood culture, serum and blood sample for virology, throat swabs for culture | 1. Hemoglobin<br>2. Blood grouping<br>3. Total leukocyte count<br>4. Differential leukocyte count |
| Community health center | Nil | 1. Sputum for acid fast bacilli<br>2. Urine examination<br>3. Stool examination<br>4. Pregnancy test<br>5. Specimen collection for referral: blood culture, serum and blood sample for virology, throat swabs for culture | 1. Hemoglobin<br>2. Blood grouping<br>3. Total leukocyte count<br>4. Differential leukocyte count<br>5. Erythrocyte sedimentation rate (observed & corrected) |
| District/ base hospital | 1. Blood sugar 2. Blood urea 3. Serum creatinine 4. Serum cholesterol 5. Serum bilirubin (direct, indirect, total) 6. Serum uric acid 7. Total protein 8. SGOT 9. SGPT 10. Serum triglicerides 11. Serum amylase 12. ASO titer 13. RA Factor) 14. Lipid profile 15. Widal test<br>1. Sputum for acid fast bacilli<br>2. Urine examination<br>3. Stool examination | 4. Pregnancy test<br>5. Specimen collection for referral: blood culture, serum and blood sample for virology, throat swabs for culture<br>6. Culture sensitivity 7. Histopathology 8. Thyroid function tests 9. Throat swabs for diphtheria and streptococci staining | 1. Erythrocyte sedimentation rate (observed & corrected)<br>2. Bleeding time, clotting time<br>3. Platelet count<br>VDRL/RPR test |
| | Analysis of water and food, training, networking with national and international laboratories, complete bacteriology and virology | | |

# 2. Secondary Data Analysis

# Secondary data analysis, Nainital district, Uttaranchal

## 1. Introduction

Uttaranchal is a newly created state. It is situated in the northern part of the country. It makes an international border to Nepal and China. Geographically it consists plain and steep hilly area. Population shift from hill to the plain is also a big problem before the state. One of the resources of income of the state is tourism. Uttaranchal is prone for earthquake, road accidents and landslides. Thus Uttaranchal is a state that needs to be prepared to combat the emerging and reemerging diseases and at the same time for the natural and unnatural disasters. There is no reliable data on communicable and non-communicable diseases and nor on natural disasters and road accidents that took place in the state during the past. Though collection of primary data is expensive, time consuming and also cumbersome so the most feasible, inexpensive and quick method for me is to analyze the available secondary data on diseases to assess the disease burden to generate hypothesis for further research on the disease problems and prioritize health planning, keeping in view the availability of resources in Uttaranchal state.

## 2. Objective

The objective of secondary data analysis in the course of FETP-MAE is: Accessing the disease trends of public health importance, identifying diseases of epidemic potential and study the epidemic preparedness in the district.

## 3. Methods

### 3.1. Study area

Nainital district, Uttaranchal

### 3.2. Study period

We did this secondary data analysis during April 2003 to November 2003 in Nainital district.

### 3.3. Data source

We visited several hospitals and health officials. We observed records and registers at various health institutions and offices. This report is based on the secondary data we got from the Chief Medical Officer's Office, Nainital, the District Tuberculosis Officer's Office, Haldwani, the District Leprosy Officer's Office, Nainital, the District Malaria Officer's Office, Nainital etc. and interviewed concerned personnel of the various related offices.

### 3.4. Data collection

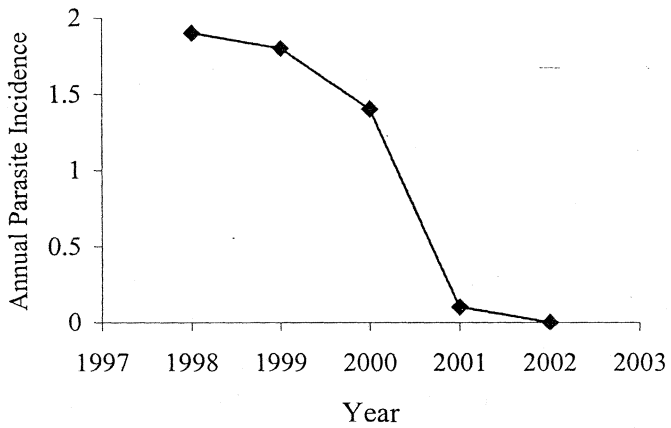
We collected information from the compiling offices of Chief Medical Officer, Deputy Chief Medical Officer, District Malaria Officer, District Tuberculosis Officer, various primary health centres, District statistic department, NIC etc. and interviewed personnel of the various related offices.

# 4. Data analysis

## 4.1. Malaria

### 4.1.1. Annual parasite incidence (API) in Nainital district (1997 to 2003)

**Figure 1**



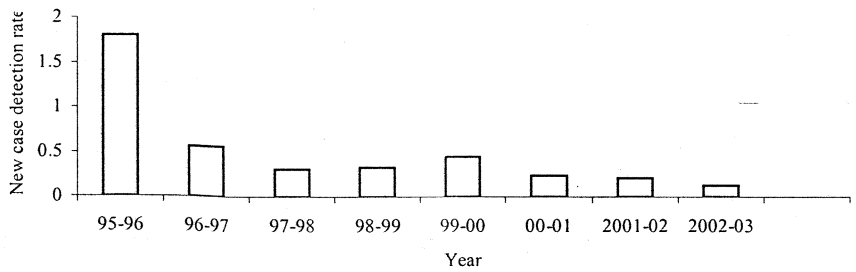

Annual Parasite Incidence is based on intensive active and passive surveillance, and cases are confirmed by blood examination. Annual Parasite Incidence is given by the formula:

$$API = \frac{\text{Confirmed Cases during one year}}{\text{Population under surveillance}} \times 1000$$

## 4.2. Leprosy

### 4.2.1. Leprosy in Nainital district showing new case detection rate (1995 to 2003)

Figure 2




The prevalence of cases under treatment that are completing the course regularly is expressed as regular treatment rate. Since 1995-96, more than 80 % patients are taking treatment regularly except during 2000-01 when it was below 80%.

## 4.3. HIV/AIDS

### 4.3.1. HIV/AIDS in Nainital district, 2003

Table 1

| Age group (years) | No. Of Persons Undergoing HIV Testing | No. Sero Positive | Prevalence (%) |
|---|---|---|---|
| <14 | 9 | 2 | 22 |
| 15-19 | 16 | 0 | 0.0 |
| 20-24 | 44 | 5 | 11.0 |
| 25-29 | 82 | 7 | 9.0 |
| 30-39 | 72 | 5 | 7.0 |
| 40-49 | 28 | 2 | 7.0 |
| 50+ | 14 | 0 | 0.0 |
| Total | 265 | 21 | 7.9 |
| Male | 140 | 11 | 8.0 |
| Female | 125 | 8 | 6.0 |

## 4.4. Communicable diseases

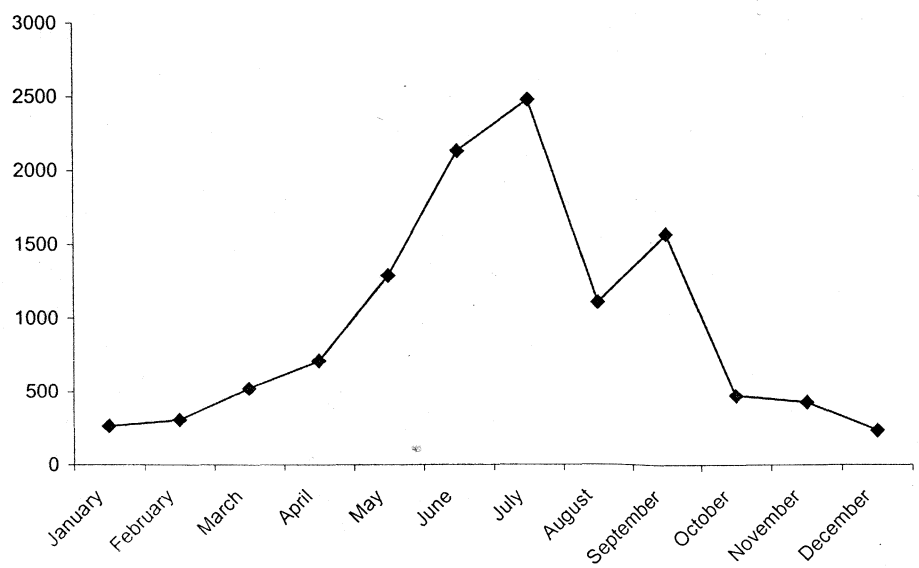
### 4.4.1. Institutional cases and deaths of communicable diseases, Nainital district, 2003

During 2003 a total of 5, 81,905 patients attended the outpatient department in Nainital district. Patients due to communicable diseases contributed about 6 % (32,645) of the total outpatient department. During the same time period communicable diseases contributed about 18 % (8,194 out of 46,886) of the total hospital indoors and 17 % (94 out of 557) of the total hospital deaths in the district.

## 4.5. Communicable diseases year 2003

### 4.5.1. Diarrhoeal diseases in out patient department during 2003 showing a seasonal trend

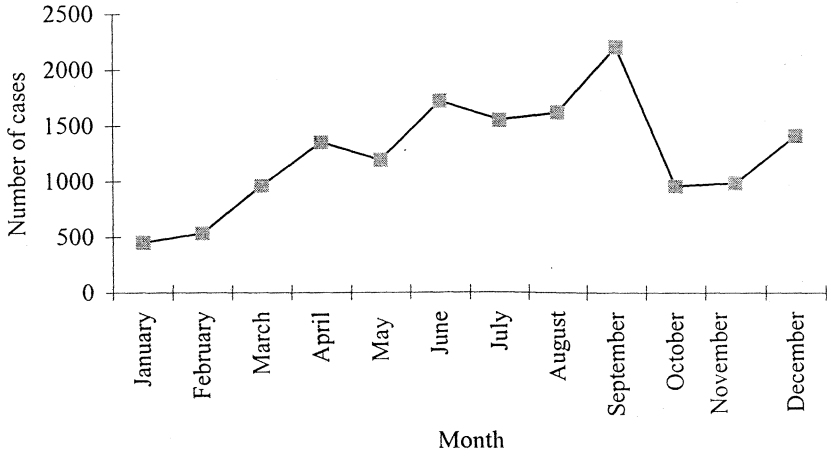
**Figure 3**




During summer diarrhoea cases are increasing but sudden rise during May to July shows an outbreak in the district. There may be an outbreak during this period. It remains up to September.

## 4.5.2. Seasonal variation of cases of acute respiratory tract infection in outpatient department in Nainital district, Uttaranchal, during 2003

Figure 4




## 4.5.3. Number of pulmonary tuberculosis cases in outpatient department by sex in Nainital district during 2003

Figure 7

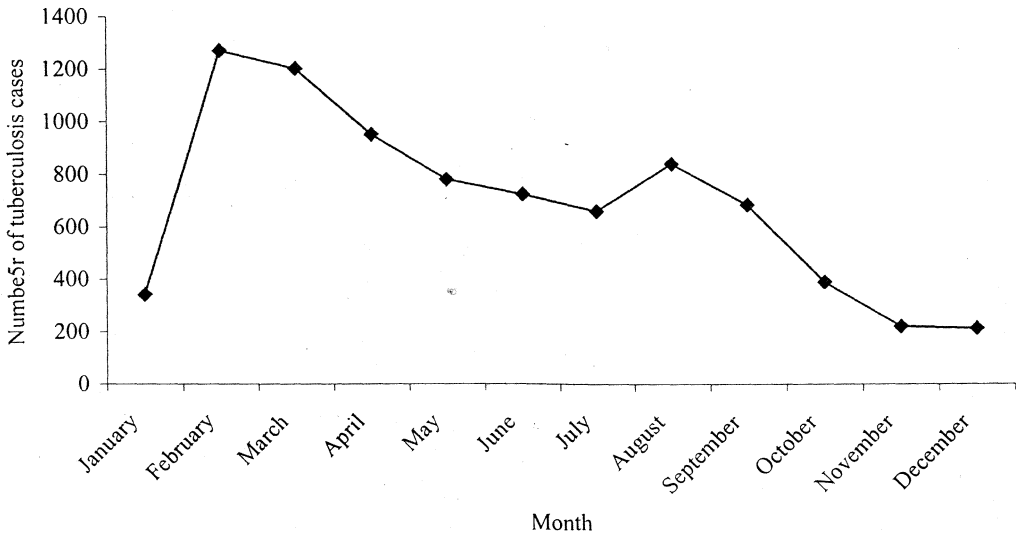
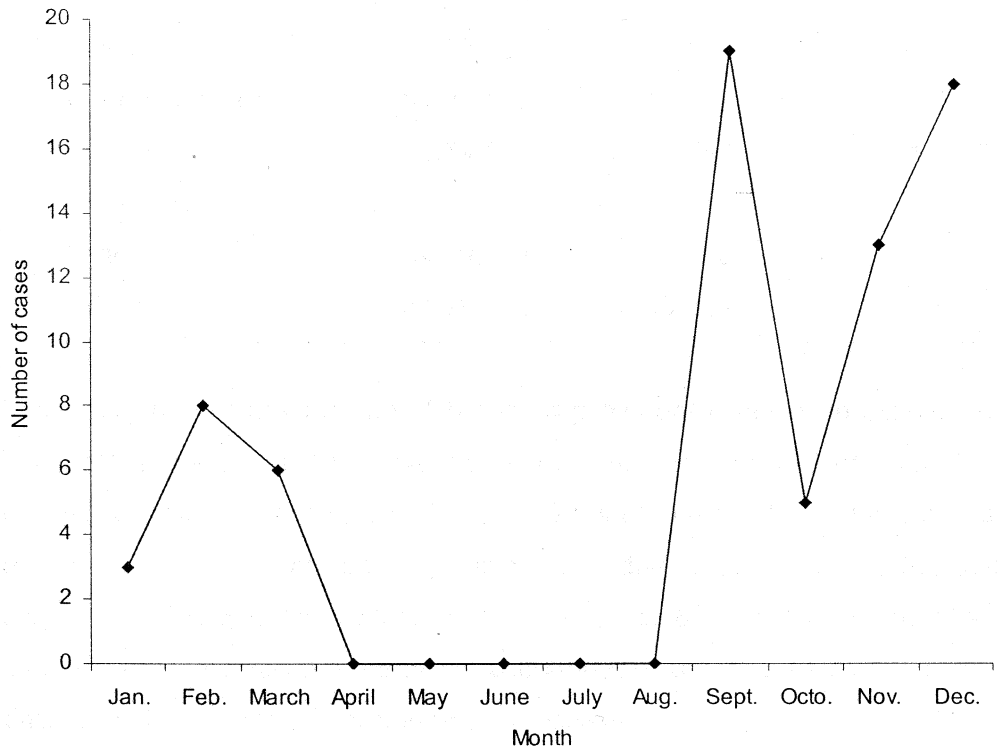


Figure 8: Seasonal variation of enteric fever, Nainital district, 2003

Figure 8




Total out patients of enteric fever are 72 out of a total 32,645 out patients of communicable diseases which < 0.2 %. A total of 35 patients are admitted due enteric fever during the year 2003. There are no deaths due to enteric fever during the year. There is no institutional death due to enteric fever during 2003 in Nainital district. The graph is showing a seasonal trend. There are no cases from April to August. In later half of April it starts and remains up to March.

## 5. Disease burden

Table 2

| Disease | Population | Cases | AR (Per 1000) |
|---|---|---|---|
| Diarrhoeal | 84,79,562 | 13,815 | 1.6 |
| Acute respiratory | 84,79,562 | 14,942 | 1.8 |
| Pulmonary tuberculosis | 84,79,562 | 11,949 | 1.4 |
| Enteric fever | 84,79,562 | 108 | 0.01 |
| Total | 84,79,562 | 40,814 | 4.9 |

Pulmonary tuberculosis is one of the most prevalent diseases in Uttaranchal. The data above are institutional cases from Government sectors; cases from private sectors are not involved. About 99 % of total out patient cases and deaths (indoor) of communicable diseases is due to acute diarrhoea, acute respiratory diseases and pulmonary tuberculosis. 69 % of the deaths due to communicable diseases is just due to pulmonary tuberculosis. No secondary data is available on non-communicable diseases.

## 6. Conclusions

Annual Parasite Incidence declined since 1998. It abruptly falls after 2000 and came to zero during 2002. Regular treatment ratio for leprosy was above 80 % the need is to raise it up to 100%. There is no significant difference in prevalence of HIV/AIDS among both the sex. During summer diarrhea diseases are increasing but sudden rise during May to July shows an outbreak somewhere in the district. It remains up to September. Cases of acute respiratory diseases slightly increase during the summer and rainy season otherwise it is reported throughout the year. 66 % of the cases of acute respiratory diseases are males.

## 7. Discussion

Leprosy cases are declining in Nainital district. Regular treatment ratio of leprosy is 80 %, the need is to achieve up to 100 %. Communicable diseases are the major burden in the hospitals. During 2003 cases of pulmonary tuberculosis cases raised abruptly in February and it slowly declined up to December. 75 % of the tuberculosis cases were male. This is a research question to find out the reasons of higher prevalence of tuberculosis among male. The number of cases of enteric fever increases during the autumn and winter. There was no case reported during April to August.

## 8. Recommendations

We propose a number of recommendations on the basis of secondary data analysis: One, posting of laboratory technicians at all the primary health centers to identify cases. Two, increase the follow up of leprosy cases under treatment to ensure 100 % treatment rate. Three, initiate awareness campaigns on HIV/AIDS. Four, improve surveillance of communicable diseases. Five, involve private sectors in the disease surveillance system that includes communicable and non-communicable diseases. Six, monitor the reporting units for regular reporting. Seven, analyze the secondary and identify the reasons for higher prevalence of acute respiratory infection and pulmonary tuberculosis among males and modify the strategy based on the result.

# 3. Outbreak investigations

# A measles outbreak in a remote village of Uttaranchal state, India, 2004

## 1. Introduction

Measles is a contagious disease that impacts millions of children globally. Although a safe vaccine is available since 1993, it remains a leading cause of childhood preventable death and disability. Measles is an important health problem in India and the country is in the late measles control phase and initial measles outbreak prevention phase. To enter the measles elimination phase where the objective is to completely interrupt transmission requires intensive case based surveillance to detect, investigate and confirm each and every case of measles suspected in the community. India needs a high quality of supervisory staff for routine immunization including measles. While number of trained staff are available and they could be used more efficiently for measles control.

On April 2004, a local daily newspaper, reported that measles affected 46 children in Lugar village of Okhalkanda block, Nainital district, Uttaranchal state. A response team that consisted a Mater of Applied Epidemiology scholar, National Institute of Epidemiology, Chennai traveled to investigate the outbreak. The village is one of the most remote areas of district Nainital. It is situated in the primary health centre area of Okhalkanda that is 65 kilometers from district headquarter and about 120 kilometers from the block primary health centre headquarter by motor road. The sub centre is 13 kilometers on foot away from the affected village and is constituted by cluster of small hamlets (Figure 5 and Figure 6).

## 2. Objectives:

We investigated the outbreak with the objectives of confirming the outbreak, assessing the severity of outbreak, initiating control measures, assessing the

vaccination coverage, educating the community regarding the importance of vaccination and recommending preventive measures based on the result of the investigation.

## 3. Methodology

### 3.1 Case definition and data collection

We defined a case as any person suffering from fever followed by rash within Lugar village since 6 March, 2004. The team visited all houses in the village to determine how many people met the case definition, which was stated as

### 3.2 Analysis.

We calculated age and sex specific attack rate and immunization coverage.

## 4. Results

We identified total of 37 suspected cases that met the case definition. First case developed a rash on 8 March 2004 and the outbreak peaked in first week of April 2004 (Figure 7). The cases were clinically diagnosed as measles. All the case patients had fever and rash, 16 (43 %) developed cough, 13 (15 %) conjunctivitis, 4 (11 %), and 8(21%) developed pneumonia (Table 3).

The attack rate was highest among the children 2-4 years 12 out of 20 (60 %) followed by 1-2 years (45 %), 5-9 years (38 %), <1 year (18 %) and least affected group was >10 years (14 %). Females were affected more (36 %) than male (30%) (Table 4)

**Immunization status**

Immunization status of the case patients was low. Two percent of the mothers stated that her child was immunized for measles, 41 % mothers stated that the child was not vaccinated and 32 % were not sure and 25 % did not know (Figure 4).

## 5. Conclusion

An outbreak of febrile rashes occurred in Lugar village, an isolated and remote area of Okhalkanda block, Uttaranchal, India, 2004. Measles virus is the probable agent of the outbreak. Measles vaccination coverage is low in the area, and traditional beliefs about measles do not foster healthy behaviors.

# 6. Discussion

Vaccination coverage of measles in the affected area was low. Most of the people were from low socioeconomic status and the literacy rate was low. People have knowledge about measles but also have many traditional beliefs about this infection as: One, medicines suppress the rashes, which is harmful. So medicines are avoided. Two, *Dadura* (local name of measles) occurs once in the life of every person, thus preventive measure are avoided. Three, measles in the early age is considered safer. So they try to infect all the children in the family when there is a measles case of measles by encouraging healthy children to sleep and play with the sick child. Acceptance of the immunization is poor in the community; immunization programme in the area is not functioning optimally.

## 6.1. Limitations

We were not able to obtain laboratory confirmation of measles because no facilities were available for specimen collection and processing. Vaccination status could not be verified from immunization cards/sub centre records and it based on statement of parents during field survey.

## 7. Recommendation

On the basis of the result of the investigation we were able make the following recommendations: strengthen surveillance so that outbreaks can be identified by the public health system rather than by the media. Facilitate access to specimen collection and processing for laboratory confirmation. Increase measles vaccination coverage. Educate to address false beliefs in the population. Modify of the immunization programme based on its geographical situation.

Figure 1: Location of the affected village Lugar, febrile rash outbreak, Uttaranchal, India, 2004

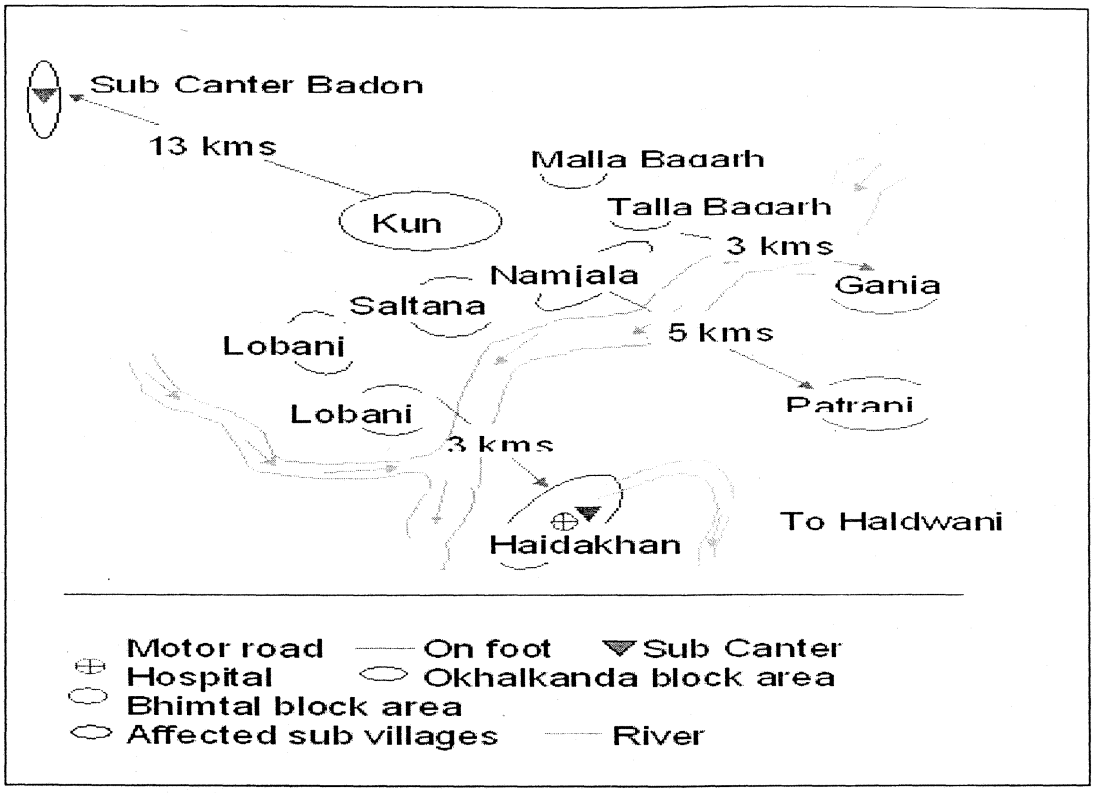


Figure 2: Affected houses in the Lugar village, during outbreak of fever with rash, Uttaranchal, India 2004

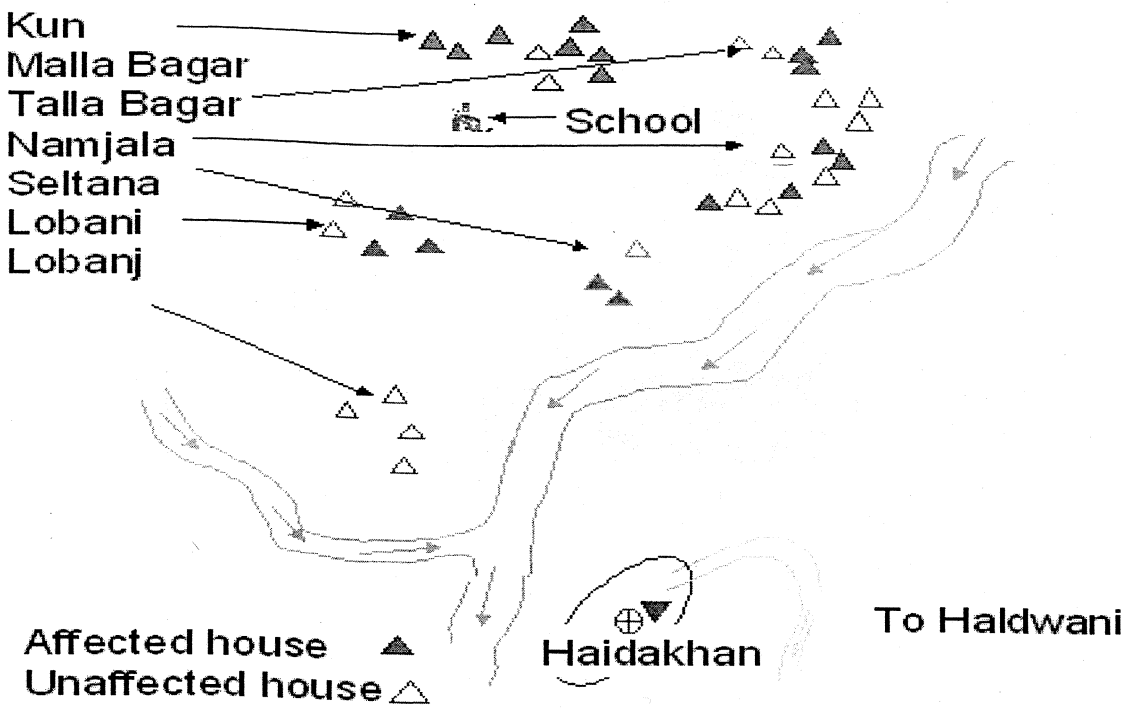


Figure 3: Cases of fever with rash in outbreak in Lugar, Uttaranchal state, India, 2004

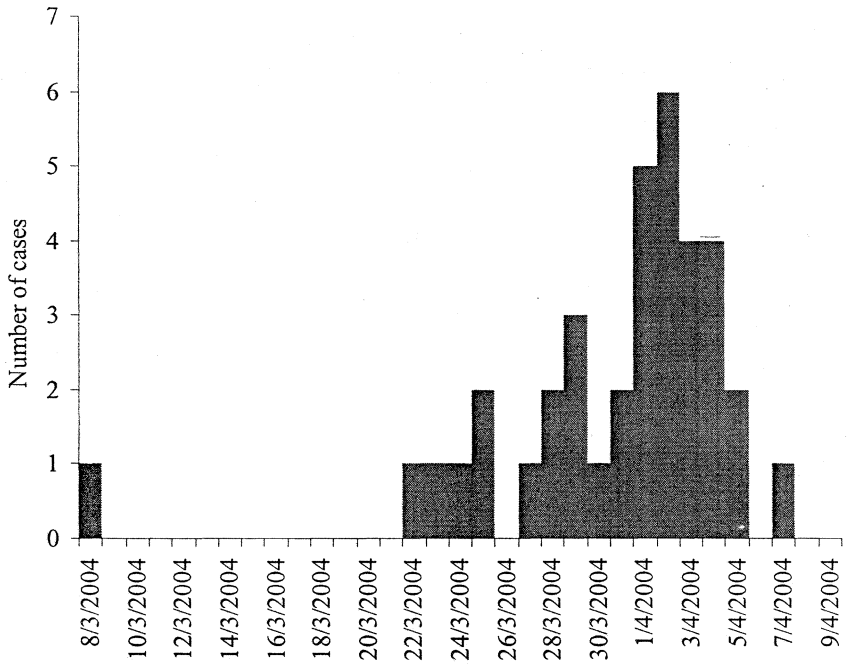


Table 1: Symptomatology of cases (n= 37 cases) during outbreak of fever with rash, Lugar, Uttaranchal, India, 2004

| Signs & Symptoms | Number of cases | Percentage |
|---|---|---|
| Fever | 37 | 100 |
| Rash | 37 | 100 |
| Cough | 16 | 43 |
| Conjunctivitis | 13 | 35 |
| Loose motions | 04 | 11 |
| Pneumonia | 08 | 21 |

Figure 4: Status of measles immunization of cases of fever with rash, Lugar village, India, 2004

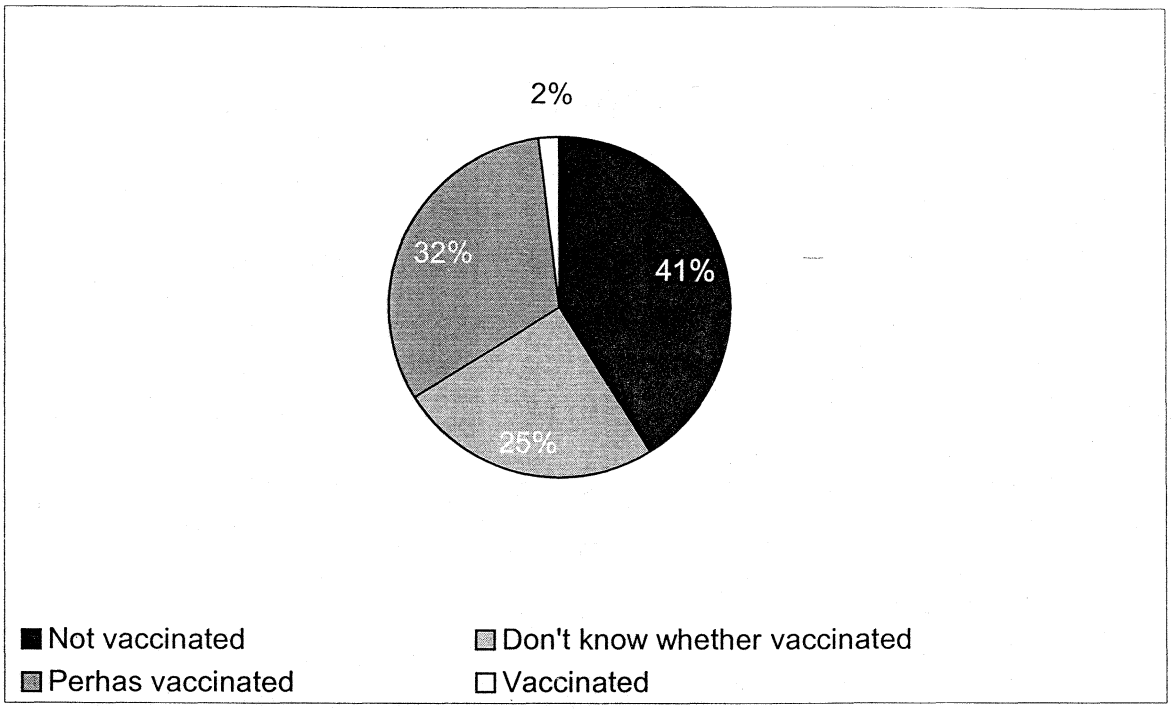


Table 2: Age and sex specific attack rates, outbreak of fever with rash, Okhalkanda block, Uttaranchal, India, 2004

| Age group | Cases/Total | Attack rate (%) |
|---|---|---|
| < 12 months | 2 / 11 | 18 |
| 13- 24 months | 4 / 9 | 45 |
| 2- 4 years | 12 / 20 | 60 |
| 5- 9 years | 14 / 37 | 38 |
| 10 - 14 years | 5 / 36 | 14 |
| Male | 20 / 66 | 30 |
| Female | 17 / 47 | 36 |
| Total | 37 / 113 | 33 |

# An investigation of an outbreak of hepatitis in Mehragaon village, rural Uttaranchal, India-2005

## 1. Introduction

Viral Hepatitis can be caused by different types of viruses, such as hepatitis A, B, C, D and E virus. Hepatitis E (HEV) a single stranded RNA virus was not recognized as a distinct human disease until 1980. The average incubation is 40 days and ranges from 15 to 60 days. HEV is transmitted by the fecal oral route. Hepatitis E is a water borne disease and contaminated water or food supplies have been implicated in major outbreaks. Consumption of fecally contaminated drinking water has given rise to outbreaks. Person to person transmission is uncommon and there is no evidence for sexual or blood borne transmission. Generally, HEV infection is a self limiting disease. Fulminant hepatitis occurs more frequently among pregnant women. The case fatality among which rises up to 20 % during the 3$^{rd}$ trimester.

Outbreak of E occurred over a large geographic area, primarily in developing countries, predominantly in the developing countries with inadequate environmental sanitation. HEV transmission is associated with poor sanitation in large part of the world.

On 26 July 2005, a community leader reported that in the village of Mehragaon people were suffering from jaundice. Mehragaon is a village in Bhimtal block, a hilly area in Nainital district, Uttaranchal state, India. The village is about 7 kilometers from lock primary health center and about 20 kilometers away from district headquarter. We verified the information and confirmed that 50 cases of acute hepatitis had been seen in the health care facility over the last month. This contrasted with a usual number of one to two cases of acute hepatitis each month in the previous months. Most of the cases were from one of the three villages: Mehragaon, Dov and Chauriagaon. Mehragaon was most

affected. Scattered cases of viral hepatitis were not uncommon in the area. We initiated an investigation with the following objectives: Assessing the magnitude of the outbreak, identify the source of infection, initiate control and preventive measures, establish interdepartmental (Water supply and Health) coordination to control/prevent such health events and identifying gaps in disease surveillance activity and recommend filling up the gaps identified.

## 2. Methods

### 2.1. Descriptive epidemiology

We defined a case of hepatitis as acute jaundice, dark urine, anorexia/malaise, fatigue and abdominal pain in a person from one of the three villages (Mehragaon, Chauriagaon, and Dov) since the 1st May 2005. We searched house to house to identify cases and collected information on person, place and time. We also collected information on water source for drinking and any major gathering of the people during summer months and water supply to the area. We calculated incidences by age and sex, drew an epidemic curve and a map representing the incidence by village indicating the source of water.

### 2.2. Analytical epidemiology

We conducted a retrospective cohort study in Mehragaon, the village with the largest attack rate. We collected information on water supply at the family level. Families were classified based on the water supply to the family. First, we considered the families using water from Majhanidhara (main water supply to the village which supplied through water supply department, Uttaranchal). Second, we considered families partly using water from Majhanidhara. Third, we considered the families that are not using water from Majhanidhara. We calculated the attack rate of acute hepatitis among the residents of the village according to the source of water used. (Table: 1)

## 2.3. Laboratory investigation

We tested a subset of case-patients for IgM to the HEV at the National Institute of Virology, Pune, India. A total of 23 blood samples were sent for serology.

## 2.4. Environmental investigation

We reviewed the source of water supply for drinking purposes and mode of its quality control measures for safe water supply. The water supply department of the state supplies major population in the village, though some families have their own water supply and some families are using water from separate spring.

# 3. Result

## 3.1. Descriptive epidemiology

We identified a total of 205 cases of hepatitis that met the case definition. Overall, the attack rate in the three villages was 16 % (205/1238). There were no deaths. The attack rate was highest among persons 15 to 44 years of age (19%) followed by the 10 to 14 years of age (17 %) and by those 45 years of age or older (14 %). The lowest attack rate was found among children less than nine years of age. Female were slightly more affected than males (female: 17 %, male: 16%). The first case in the area developed the illness during the first week of May. The outbreak peaked during the fourth week of July 2005 when the investigated started and the number of cases began decreasing during the early part of the month of August 2005. The shape of the curve suggested a common source outbreak. There were few initial cases before the investigation, which could be considered as index cases. Age ranges from 11 months to 77 years and median age was 26 years.

## 3.2. Analytical epidemiology

We conducted a case control study in Mehragaon. Highest attack rate (28.7 %, relative risk 3.4 ) was among the people using exclusively suspected spring water, followed by attack rate ( 13.8 %, relative risk 1.6) among those partially

using the suspected spring water and least attack rate ( 9.2 %) were among those who never used suspected spring water .

### 3.3. Laboratory investigation

Of 23 serum samples from acute hepatitis case patients tested for IgM anti-HEV, 21 (91 %) were positive from National Institute of Virology, Pune, India. The samples were negative for HAV and HBV infection.

### 3.4. Environmental investigation

The suspected spring was located at the lowest point of the affected village. The majority of the population resided above the level of spring. The source of the spring was uncovered. Untreated (non-chlorinated) water was supplied during summer. One of the index case patients lived close to the spring and defecated in the area of water collection.

## 4. Discussion

In Nainital district acute hepatitis was not uncommon. Usually in the primary health centre Bhimtal 1-2 cases of acute hepatitis were reported each month. Here, during the month of July a total of 50 cases were seen in the health care facilities. The villages: Mehragaon, Chauriagaon and Dov are neighboring villages. The suspected spring that is situated in Mehragaon supplies to Chauriagaon also. The water source (Majhanidhara) that was the cause of outbreak was located below the level of the main village. The water source was uncovered and untreated water was supplied during summer. In Mehragaon more than one water sources were being used for drinking purposes though majority of the population used water from suspected spring.

## 6. Recommendations

On the basis of investigation we proposed a number of recommendations: One, strengthen hepatitis surveillance through the upcoming Integrated Disease Surveillance Programme (IDSP). Two, strengthen surveillance for outbreaks so that they are discovered through surveillance rather than community leaders. Three, enforce treatment standards for spring water used as source of water supply: protect catchments areas, cover springs, ensure proper sand filtration, chlorinate supply before distribution. Four, promote adequate sanitation in the areas located next to springs used as water supply. Five, conduct information education and communication (IEC) activities on water born diseases and/or water contamination.

## 6. Recommendations

On the basis of investigation we proposed a number of recommendations: One, strengthen hepatitis surveillance through the upcoming Integrated Disease Surveillance Programme (IDSP). Two, strengthen surveillance for outbreaks so that they are discovered through surveillance rather than community leaders. Three, enforce treatment standards for spring water used as source of water supply: protect catchments areas, cover springs, ensure proper sand filtration, chlorinate supply before distribution. Four, promote adequate sanitation in the areas located next to springs used as water supply. Five, conduct information education and communication (IEC) activities on water born diseases and/or water contamination.

**Figure 1: Number of cases of acute viral hepatitis by week of onset, Mehragaon, Uttaranchal, India, 2005**

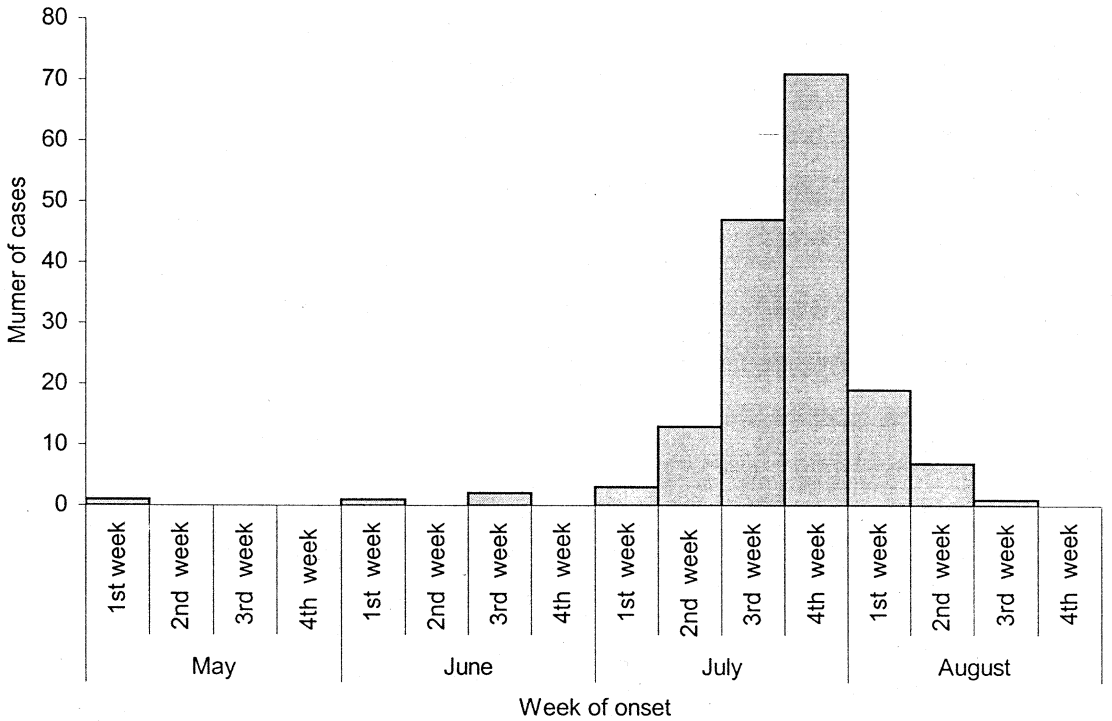


Table 1: Attack rate by age and sex by village, Bhimtal block, Uttaranchal, India, 2005

| | | Population | Cases | Attack rate |
|---|---|---|---|---|
| Age | 0-4 | 105 | 2 | 2% |
| (Years) | 5-9 | 110 | 4 | 4% |
| | 10-14 | 134 | 23 | 17% |
| | 15-44 | 729 | 139 | 19% |
| | 45+ | 261 | 37 | 14% |
| Sex | Male | 724 | 115 | 16% |
| | Female | 514 | 90 | 17% |
| Total | | 1238 | 205 | 16% |

**Table 2: Incidence of acute hepatitis by village, Bhimtal, Uttaranchal, India, 2005**

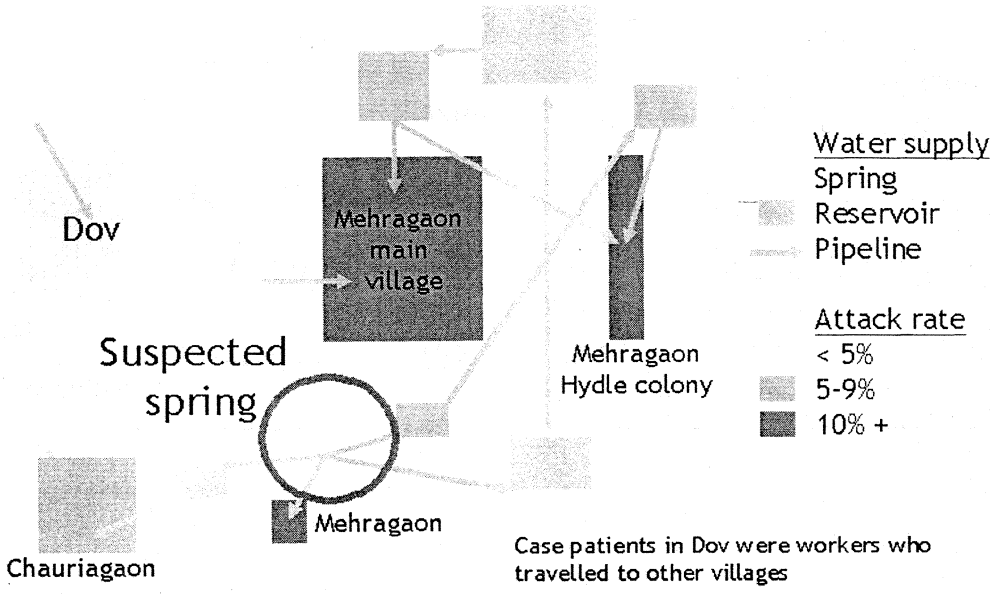


Table 2: Risk of acute hepatitis by source of water supply, Mehragaon village, Uttaranchal, India, 2005

| | | Cases | Total | Incidence | Relative risk (95% C. I.) |
|---|---|---|---|---|---|
| Use of water from suspected spring to drink | No | 12 | 143 | 9.2% | Reference |
| | Partially | 13 | 94 | 13.8% | 1.6 (0.8-3.4) |
| | Exclusively | 152 | 529 | 28.7% | 3.4 (2.0-6.0) |

# An investigation of an outbreak of measles in Nai village, rural Uttaranchal, India-2004

## 1. Introduction

The global immunization coverage increases increased from less than 20 % in 1983 to 80 % in 1990. The number of reported cases measles declined from over 4 million per year to 0.7 million in 1997. The vaccine coverage ranges from less than 50 % to more than 90 % and case fatality ratio ranges from 0.1 to 10-30 % in outbreaks among high-risk population in various countries. The WHO objectives for measles control targets the initial 80 % immunization coverage. Despite the availability of an effective vaccine and the inclusion of measles immunization in India under Universal Immunization Programme, measles continues to be one of the leading causes of childhood morbidity and mortality in India.

On 29 November 2004, a local daily newspaper reported an outbreak of measles with two deaths in Nai, a remote village of Okhalkanda block, Uttaranchal, India. The village is located in the most remote area of the district. It is five hours away from the district headquarter and four hours away from the block head quarter. The outbreak started in the first week of October and it was ongoing when the investigation started (30 November 2004). An MAE scholar from National Institute of Epidemiology, Chennai investigated the outbreak on 30 November 2004 after the call the from the district health authority Nainital district, Uttaranchal. We investigated the outbreak with the objectives of confirming the existence of the outbreak, confirming the diagnosis through laboratory investigation, characterize the population at risk, estimate measles immunization coverage among cases, initiate appropriate measures to reduce

morbidity and mortality and formulate recommendations on the basis of the results of present outbreak investigation.

## 3. Methodology

### 3.1. Case definition and identification of cases

We defined a case as the occurrence of a febrile rash with or without cough, coryza and conjunctivitis in a resident of the village of Nai village since October 2004.

### 3.2. Laboratory confirmation of the case patients

We collected blood samples and throat swabs and sent them to the National Institute of Virology, Pune, India for laboratory investigation.

### 3.3. Data collection and descriptive Epidemiology

We initiated active case search by visiting house to house to identify the cases that meet the case definition, line listing of cases (age, sex, symptomatology and date of onset of illness), immunization status of case patients, any deaths in the family during last two months. Vaccination status is based on the mother's statements.

### 3.4. Analysis

We analyzed the results by age and sex specific attack rates, case fatality rate and immunization coverage for measles.

## 4. Result and discussion

We identified a total of 86 cases that meet our case definition. Of the 86 case patients, two deaths were reported (2.3 %). Two case patients were admitted in base hospital Haldwani, one for pneumonia and one for Diarrhoea. The Nai area includes three hamlets Nai, Chak Dalarh and Bhoomka. Of which Nai and Chak Dalarh area were affected. The total population of the affected area was

490. Houses were scattered and usually found in small clusters of two to four units (Figure 1). These clusters belonged to the same family and /or the same caste. The first case identified in the area was reported on 8 October 2004. There was a history of going outside the village 40 kilometers away to have occurred. The outbreak peaked on 29 November 2004 (Figure 2). The number of cases declined during first week of December 2004. Median age of the case patients is 6 years and the range is 9 months to 23 years. The attack rate was highest among the age group 2-9 years (61%). There was no significant difference in attack rate among male and female (male 48 %, female 45 %) (Table 1). Typically a pregnant woman of 23 years had measles and she had abortion on the third day of onset of rash. Rest all the cases are below 14 years.

Among the 86 cases patients 16 (19 %) were immunized and 70 (81 %) were unimmunized. 69 (80 %) of the case patients had no written documentation of measles vaccination (Figure 4). These findings of the investigation suggest that the outbreak was probably due to low coverage of vaccination (19%).

There was no laboratory support for virology in Uttaranchal. The samples were sent to National Institute of Virology, Pune for laboratory investigation. At present there was no fixed rapid response team in function. There was lack of trained persons in specimen collection and transportation. Logistics for specimen collection is not available. No vehicle fixed for management of such a situation. The present outbreak was first reported in local newspaper and was not detected by existing surveillance system.

## 5. Conclusions

An outbreak of measles struck the village of Nai, Uttaranchal, India, 2004. The low immunization coverage among cases suggests that the outbreak was caused

by a failure to vaccinate. Identification of the outbreak through the media suggests that measles surveillance is weak.

## 6. Recommendations

On the basis of investigation we proposed a number of recommendations: One, strengthen measles surveillance through the upcoming Integrated Disease Surveillance Programme (IDSP). Two, identify outreach strategies to cover remote villages in Uttaranchal. Three, conduct Information Education and Communication (IEC) activities on immunization: Provide information regarding fixed day and time schedule for immunization session, encourage the population to increase the acceptance of immunization. Four, document immunization coverage using personal cards. Five, establish a time rapid response team consisting of an epidemiologist, pediatrician, microbiologist, two field supervisors, a computer operator, two laboratory technicians trained in specimen collection and transportation and a vehicle with driver. Six, ensure availability of logistics for specimen collection and transportation as test tubes for specific sample and thermacol boxes for transportation. Seven, provide budget for contingency and fuel for the vehicle.

Figure 8: Distribution of the suspected measles cases, Nai village, Uttaranchal, India, 2004

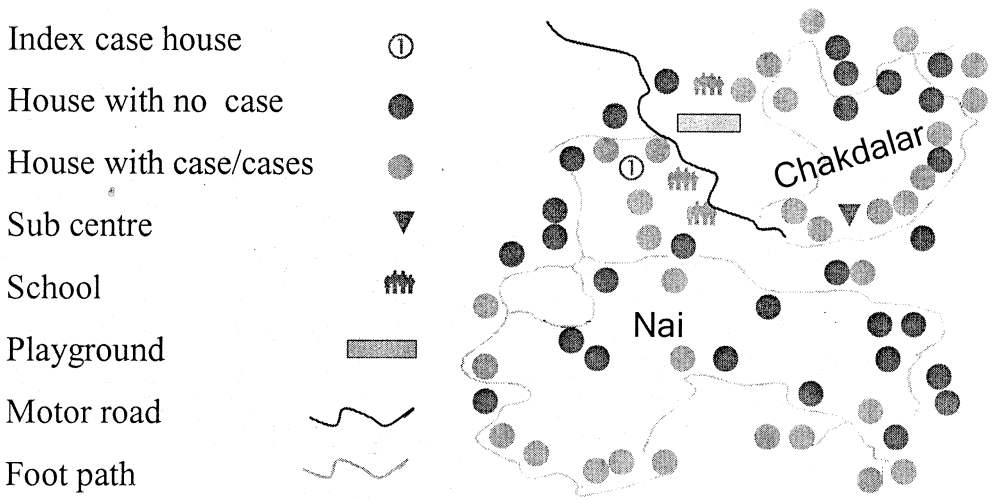


Figure 9: Number of suspected measles cases (n=86) by date of onset, Nai village, Uttaranchal, India, 2004

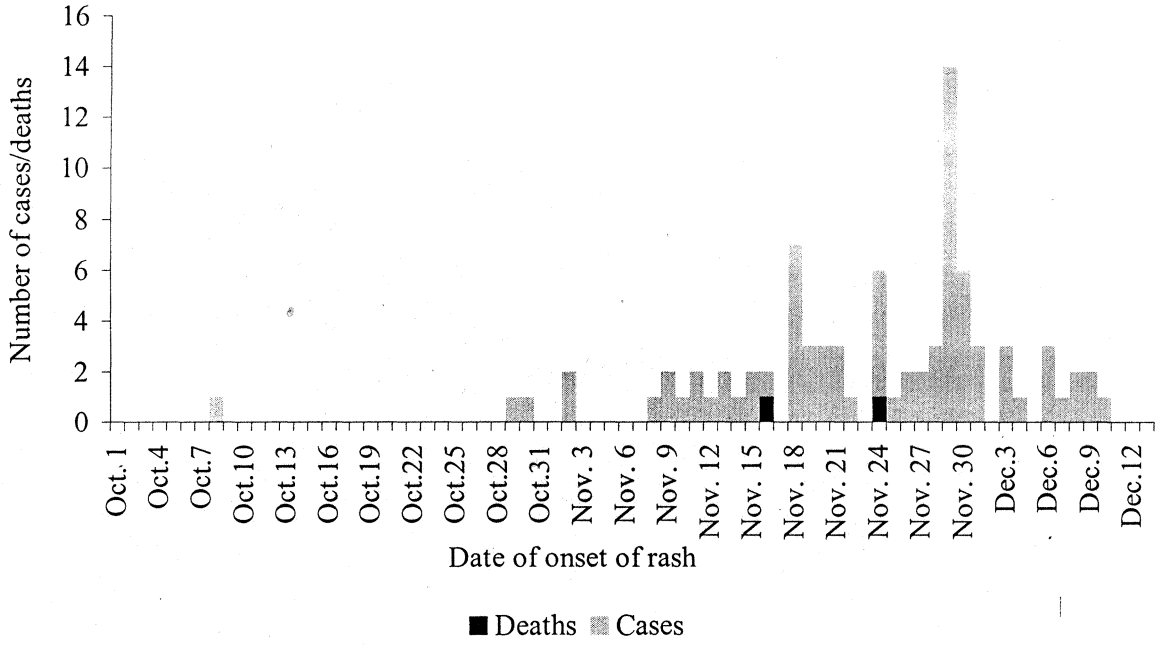



Figure10: Symptomatology (n=8) in % in measles outbreak in Nai village, Uttaranchal, India, 2004

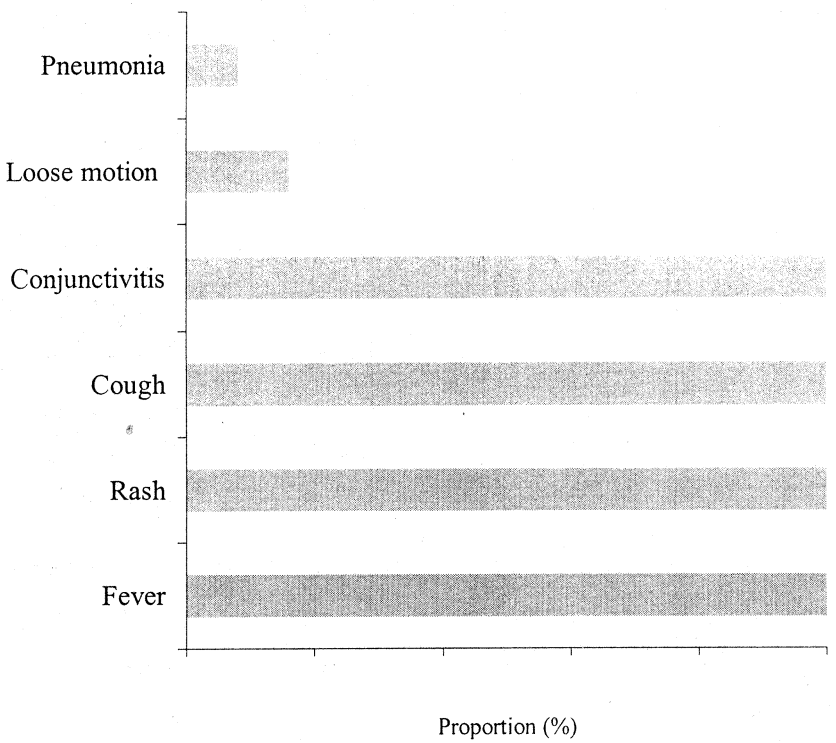
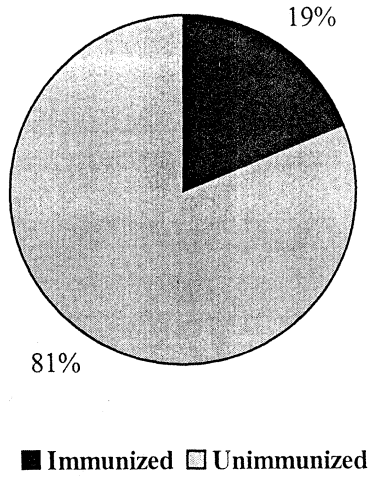

Pneumonia
Loose motion
Conjunctivitis
Cough
Rash
Fever
Proportion (%)

Table 5: Age and sex specific attack rates of measles cases in Nai village, Nainital district, December 2004

| | Age group | Cases/Total | Attack Rate (%) |
|---|---|---|---|
| Age | < 1 year | 03/19 | 16 |
| | 2-4 years | 25/41 | 61 |
| | 5-9 years | 47/75 | 63 |
| | 10-14 years | 10/50 | 20 |
| | > *14 years | 01/30 | 0.3 |
| Sex | Male | 38/80 | 48 |
| | Female | 48/105 | 45 |

*All the cases are below 14 years by age except a pregnant woman. She had pregnancy of 7 months. She had fever on 2nd December and developed rash on 4th December with cough, sneezing and redness in eyes. On 6th she had spontaneous abortion. There is no history of measles and no cards. She is serologically positive for measles.

Figure 4: Immunization status of cases (n=86) in measles outbreak in Nai village, Uttaranchal 2004



# 4. Critical evaluation of published research

# Critical Review of a Prospective Study on the Effect of Home-based Neonatal Care management of Sepsis on Neonatal Mortality

## 1. Introduction

This article "A prospective study on the effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India" was published in the journal "The Lancet, December 1999". Abhay T. Bang, Rani A. Bang, Sanjay B. Baitule, M. Hamini Reddi and Mahesh D. Deshmukh had done a study on the effect of home based neonatal care and management of sepsis on neonatal mortality in the Ghatchiroli district in Maharashtra, India. It was a case control study.

## 2. Objective

Review the article "Effect of home based neonatal care and management of sepsis on neonatal mortality".

## 3. Critical review

### 3.1. Description of evidences

#### 3.1.1. Exposure

The authors collected baseline data from April 1993 to March 1995 through trained village workers from 100 villages of Ghatchiroli district in Maharashtra, India, about live birth, neonatal death, infant death and stillbirth. This baseline data was compared with the reports after the intervention study to find the result. The male and female health workers were trained to take the history of pregnant women, neonatal care, case management of pneumonia and neonatal sepsis before the intervention.

In the study, exposure or intervention was a package of home-based neonatal care applied to the neonates of 39 intervention villagers of Gadchiroli district

in Maharashtra in a phased manner over a period of 3 years (April, 1995 to 1998).

In the first year (1995-96), village health workers listed pregnant women in the village, collected data by home visits in the third trimester, observed labor and neonates at birth, visited the home on days 1, 2, 3, 5, 7, 21, 28 and on any other day if the family called, to take history and examine mother and child, weighed the child each week, and managed minor illnesses and pneumonia in the neonates. They followed up the neonates for 28 days after birth, until the mother left the village, or until the neonates died, whichever was earlier.
In the second year (1996-97), after a survey of 280 parents, the village health workers were trained in home-based management of neonatal illnesses. They used to diagnose sepsis on the basis of certain laid down criteria described in the paper and offered at home after written consent injection Gentamycin twice daily in doses according to the body weight for 7 to 10 days and Syrup cotrimoxazole twice daily for 7 days. They gave such care from April 1996 and managed neonatal sepsis from September 1996, in addition to earlier tasks.
In the third year (1997-98) health education of mothers and grandmothers about care of pregnant women and of neonates was added to the program.

### 3.1.2. Outcome

The outcome indicators for this study were neonatal, infant and perinatal mortality rate in the intervention and the control villages. 93% of neonates received home-based neonatal care. After the intervention the outcome was neonatal mortality rate, infant mortality rate and perinatal mortality rates in the intervention area (net percentage reduction) compared with the control area were 25.5 (62.2%), 38.8 (45.7%) and 47.8 (71%) respectively ($p<0.001$). Case fatality in neonatal sepsis declined from 16.6% (163 cases) before treatment, to 2.8% (71 cases) after treatment ($p<0.01$). In 1997-1998 this home based neonatal care averted one death (fetal or neonatal) per 18 neonates cared for.

### 3.1.3. Design

It was a non-randomized controlled community field trial.

### 3.1.4. Study population

Neonates of 39 intervention and 47 control villages of Gadchiroli district in Maharashtra during April 1995 to March 1998 were the study population.

### 3.1.5. Result

The basic descriptive tables did not show causes of death in the control area, so it could not be compared with deaths in the control area, so it could not be compared with that of the intervention area.

## 4. Internal validity

### 4.1. Non-causal explanations

#### 4.1.1. Observation bias

It was nonrandomized control trial done with the help of a non governmental organization, Society for Education, Action and Research in Community Health (SEARCH). The criteria of selection of the control area were not mentioned. Randomization would have got reduced the possibility of selection bias. Inclusion and exclusion criteria were not explained. It was not stated whether the intervention group had the benefit of Integrated Child Development Scheme programme, 14 villages were not taken in study and its criteria acceptable. Baseline data from all 100 villages did not show any appreciable difference in any of the character is has. Impacts of drop up cases were described too short. Though the health workers were trained from April 1994 to March 1995 to record all findings and to detect and manage diseases of neonates. There could be a variation in the analysis of collected data. The possibility of further observation bias could be reduced by defining live births, neonatal deaths and infant's deaths according to international classification of diseases. However, there is possibility measurement bias as information collected by village women of 5-10 years school education. Educational level of the subjects might have affected the quality data collection and due to this

inter-observer variation, health workers missed some cases of sepsis, which might have increased the death rate due to sepsis.

### 4.1.2. Confounding

Cultural differences, gravida, education and sex of the baby were the possible confounders. There were no change in the base line characteristics during the 3-year. However information in the issue was not provided. Gradual increases in birth rate during the three years period may be due to decreased neonatal mortality rate. It was not known whether the general health status of the mother health, education, gravida status was taken into consideration.

The probable confounders might be characteristics related to socio-economic conditions, access to existing health facilities, birth weight and period of gestation. Other possible confounders could be cultural differences as educational status of mother, gravida status before delivery, and history of previous stillbirth or loss of a baby etc. Though the socioeconomic characteristics during base line survey was similar in both control and intervention are but it was unlikely that these characteristics remained same during the period of 3 years that it influenced the mortality rates. However, no information in this issue had been furnished.

There is no information whether there was any ongoing program of awareness generation activity on Maternal and child health (MCH) care by the general health system in the study area and weather there was any barriers between the dissemination of such messages between intervention and control area. These factors could have reduced the mortality rates.

It was also observed that during the 3 year of study number of neonates below 1500 grams were more or less same; where as % change in CF in this group during the same period was significantly lowered by 63.9 % ($p=0.45$). In the birth weight group of 1500-1999 grams, the number of neonates reduced considerably from 1$^{st}$ year (61 in 1$^{st}$ year, 47 in 2$^{nd}$ year and 3$^{rd}$ years). It can be applied to the subsequent groups. So, it can be concluded that during these 3

years, proportion of LBW babies had not change significantly, where as case fatality of LBW babies had changed significantly at least up to 2000 grams of birth weight. In this contest, it is unlikely to act as confounders in those weight groups.

However, the number of neonates with normal birth weight increased a good deal in the least year (54.6% in 1st year, 53.3%in 2nd year and 62.9% in 3rd year). It may influence the NMR in a positive way confounding the role of home based neonatal care.

So far as period of gestation is concerned, the absolute numbers of neonates born under 34 weeks of gestation in the study period were not widely different and % change in CF was also not statically significant. In 35-37 weeks group, absolute number of neonates had increased every year and % change in CF was also statically significant. The proportion of neonates born after 37 weeks of gestation varied between 87% and 89% from 1st year to 3rd year. The change in CF was not statistically significant. In this context, it may be concluded that period of gestation is unlikely to be a confounder in the study.

Data on other possible confounders e.g. cultural differences, educational status and gravida status of mother before delivery, H/O of previous stillbirth or loss of baby etc. most possibly had not been collected and so their effects could not be assessed.

## 4.2. Positive features of causation

### 4.2.1. Time relationship

The exists relationship between intervention and outcome because during the study period the status of neonatal mortality rate and infant mortality rate in intervention villages decreased considerably in comparison to the control villages.

### 4.2.2. Strength

Percentage changes in NMR, IMR and PNR in the intervention villages in comparison to the control village were significant. Though, it looks hypothetical that intervention would reduce neonatal mortality rate by 25 % to 50%. It was also noticed that the study highlights only effect of home-based neonatal care.

### 4.2.3. Dose response

The intervention was done in a phased manner in the action area as described earlier. It was observed that with the increases in the level of intervention in successive years, the neonatal mortality rate (51.2, 36.1, and 25.5), infant mortality rate (74, 38, and 38) and perinatal mortality rate (63.8, 64.8 and 47.8) declined steadily and continuously in the intervention villages.

### 4.2.4. Consistency

There was a considerable decrease in case fatality with control of sepsis with treatment from expected 25% to 50%. This supported the view that the study has adequate consistency in relation to internal and external validity.

### 4.2.5. Specificity

Though intervention was in done in phases and socio-economic factors were more or less similar in both intervention and control villages, but there was no mention whether any parallel health instructions on cleanliness, diet, specific neonatal care were given. These are factors that could have caused changes, but had not been fully established in this study.

### Summary of internal validity

The features of causation showed that the interventions in this field trial had a causal relation in reduction of neonatal mortality rate; however it had certain possibility of confounding by education of mother and other factors and this lacked specificity.

## 5. External validity:

### 5.1. Eligible population

The coverage by the interventions was 75.1% in the 1st year, 85.2% in the 2nd year and 93.3% in the 3rd year with very few losses to follow up. However, the dropout subjects were not discussed properly. Still the study indicated that it had considerable validity among the eligible population.

### 5.2. Source population

The source population, that is the neonates during the study period and the result can not be generalized because study took into consideration a particular strata of people whether outcome could be the same in other strata's is not known. Ethical aspects of the study- ethical aspects were not mentioned in detail. As it is a non-randomized can not trial this should have been described in detail.

### 5.3. Consistency

There are not adequate studies that could show the consistency of such a study results. However, the available limited studies showed results consistent with the findings of the present study.

### 5.4. Plausibility

Neonatal sepsis is one of the major causes of neonatal death in India. The management of the neonatal sepsis in the study was scientific. Active management of sepsis since 2nd year, intervention in the 1st year by close monitoring, taking weight of the neonates and in the 3rd year by imparting health education to mothers and grand mothers have a rational basis in the process of reduction neonatal mortality. It can be concluded that the outcome due to interventions as done in this field trial had adequate biological plausibility.

## 5.5. Coherence

The major effect of the use of home based management of neonatal sepsis was decreased infant mortality rate. This is coherent with the distribution of exposure and the outcome except the normal birth weight babies. The normal birth weight babies are the major stratum in the community. So the result is incoherent with the distribution of exposure and the outcome.

**Summery of external validity**

As the result of study showed that it had a high validity among the neonates hailing particularly from the lower socio-economics group, it is likely to apply to the neonates of the general population having the same socio-economics characteristics.

## 6. Conclusion

The aspect of diagnosis neonatal illnesses by health workers of secondary educational level and treatment in field condition with antibiotics need to be considered with almost care before full implementation. Rational use of drugs, safety, side effects especially in neonates have to be questioned. Since the intervention is cost effective the authors feel that it can be used as the standard in developing countries. This is yet to be observed before further evaluation.

# SECTION: 2
# SECOND FIELD POSTING

# 5. Description and evaluation of the public health surveillance system

# Description and evaluation of the public health surveillance system in Nainital district, Uttaranchal, India, 2003

## Introduction

Public health surveillance is defined as the ongoing, systematic collection, analysis, interpretation and dissemination of data about health-related events for use in public health action to reduce morbidity and mortality and to improve health. A surveillance system is usually established as an integral part of a health care system to monitor priority health events.

Uttaranchal is a newly created state in the North of India. As in most of the rest of the country, there are three types of surveillance systems in place in the state. First, health care facilities report epidemic-prone diseases on a weekly basis. Second, hospitals report communicable diseases on a monthly basis. Third, national public health programmes (e.g., polio, leprosy) conduct surveillance activities on their own for the management of their prevention efforts (Table 6)

The Nainital district of the state of Uttaranchal is located in the foothills of the Himalayas. It has two types of environments: The hills and the plains. In the hill areas, the population is scattered in hamlets that are far away from each other. Motor roads do not reach most health care facilities. In rural areas, the population depends mostly on the public health care system and on few untrained private practitioners for their care. We reviewed the public health surveillance system in the district of Nainital to (1) describe the existing disease surveillance, (2) identify its strengths and weaknesses, (3) identify gaps and underlying factors contributing to the gaps and (4) recommend appropriate measures to narrow down existing gaps.

## Methods

### Description of the surveillance system

There were no reference documents to review that specified the guidelines to be used for surveillance. We held in-depth discussions with all health care workers involved in the surveillance system from the sub-centre level to the district headquarters (Figure 1). We visited all health care facilities to review infrastructure, equipment and supplies available. We reviewed official documents describing the number of staff positions filled and vacant at all levels. We examined the forms used to report cases.

### Evaluation of the surveillance system

There are eight block primary health centres in Nainital district. We selected the block primary health centre of Bhimtal for the evaluation because of feasibility and logistical constraints.

### Study design

In 2003, we conducted a cross sectional survey to interview medical officers and field workers in all the health care facilities of the primary health centre area of Bhimtal.

### Data collection

We interviewed of health care workers using semi-structured questionnaires to collect information about surveillance procedures. In addition, we visited the unit where the data were compiled at the district headquarters and interviewed medical officers, health care workers as well as the data compiler. We reviewed registers and records in sub centres, primary health centres and at the district headquarters.

### Data analysis

We analyzed the data manually to calculate proportions and other relevant indicators. We evaluated the surveillance system using the CDC attributes of surveillance systems.

## Results

### Population under surveillance

The total population of the block of Bhimtal was 60,154 in 2003 according to survey done by the health workers. The block is located in a rural, hilly area that has 18 sub-centres. In each sub-centre, a female health worker is responsible for all health related activities in her sub-centre area.

### Description of the surveillance system

### Weekly surveillance for epidemic-prone diseases

The weekly surveillance for epidemic-prone diseases originated in health care facilities under the block level. Health care facilities under the block level included sub centres, additional primary health centres and state allopathic dispensaries. Health care workers in these facilities collected data regarding seven epidemic-prone diseases during their field visit and during clinic hours. No case definitions were made available to them. Epidemic-prone diseases under surveillance in the weekly system included cholera, gastroenteritis, polio, kala-azar, meningococcal meningitis, Japanese encephalitis and Guinea worm (Figure 3). Health care workers reported this information manually (There were no printed forms available at the sub centre level) every week to the block primary health centre and block primary health centre compiled the reports to send them to the district manually using a universal form (Figure 3). The reporting form for weekly epidemic prone diseases contained one page that had two separate parts. One summarized the weekly and cumulative number of the individual diseases under surveillance. The other provided information on the actions taken for chlorination of water and oral rehydration powder distributed (Figure 3). However, printed forms, paper and registers were commonly missing in health care facilities. Field workers usually transmitted the information manually or sent information using their personal telephone. Information provided on the phone had to be confirmed in writing, although this usually did not happen. At the primary health centre, health education officer / data entry operator compiled these forms and transmitted them to the district. Data compilation at the primary health centre was difficult as many of the forms originating from the sub centres were filled

manually and difficult to read. A data entry operator (epidemic cell) at the district compiled the information and transmitted it to the state. The community health centre, the district hospital and base hospitals also participated in the weekly surveillance system for epidemic-prone diseases. However, they reported directly to the state while they sent a copy of their report to the district office.

**Monthly hospital-based surveillance of communicable diseases**

The monthly hospital-based surveillance of communicable diseases originated from 65 inpatients and outpatients facilities in the district. These included the district hospital (n=1), the base hospital (n=1), community health centers (n=5), block primary health centers (n=5), female hospital (n=2), the forest hospital (n=1), state ayurvedic dispensaries (n=20) and state allopathic as well as additional primary health centers (n=30). Pharmacists in these facilities collected data regarding 18 communicable diseases (including deaths) from inpatients and outpatients. Standardized case definitions were supposed to be used. However, they were available in the district epidemic cell but not in the reporting units. Additional primary health centres (n=11), state allopathic dispensaries (n=30) and state ayurvedic dispensaries (n=20) reported each month to the block primary health centre sent the reports to the district (Figure 1). Community health centres and the base hospital reported directly to the district headquarters. The district hospital reported directly to the state headquarters with a copy to the district. All facilities used a standardized form that included two sections for cases and deaths. The form consisted in the monthly total number of cases attended in outpatient department and the number of cases admitted in the indoor department and deaths (Figure 4). This form was not available in the reporting units. The diseases under surveillance in the monthly system included acute diarrheal diseases, diphtheria, acute poliomyelitis, neonatal tetanus, other cases of tetanus, pertussis, acute respiratory infection, pneumonia, enteric fever, viral hepatitis, Japanese encephalitis, measles, meningococcal infection, rabies, syphilis, gonococcus infection, pulmonary tuberculosis and other infectious diseases Figure 4.

Pharmacists were the key persons responsible for the collection and transmission of the data. In each reporting institutions, they collected communicable diseases reports, sorted out the number of cases from outpatient departments as well as from inpatient departments. They then passed consolidated data either to the block primary health centre (in the case of Additional Primary Health Centres) or directly to the district health authority (for District hospital, Base hospital and Community Health Centres).

**Surveillance through national programmes**

A number of national programmes generated surveillance data in the district. These were the revised national tuberculosis control programme, the national anti malaria control programme, the universal immunization programme (that is a component of the reproductive and child health programme), the national leprosy elimination programme and the national AIDS control programme.

**Surveillance through the revised national tuberculosis control programme:** In 2003, Uttaranchal was under the traditional national tuberculosis control programme. The revised national tuberculosis control programme based upon directly observed therapy was launched in 2004. The tuberculosis programme reported monitoring and evaluation indicators monthly and quarterly. In addition, recent special surveys, the reproductive and child health survey and the national family health survey -II (NFHS-II) indicated that the prevalence of tuberculosis in the state (1,225 per 100,000 population) was higher than the national average (544 per 100,000 population).

**National anti malaria control programme:** Health care workers prepared peripheral blood slides for febrile patients and sent them to the primary health centre every week. In addition, the hospitals at the village level prepared peripheral blood slides to send them to the block primary health centre every week.

**National leprosy eradication programme:** The national leprosy control programme was launched in 1955. In 1993, the programme was redesigned as

the national leprosy eradication programme. The information on leprosy was collected by active surveillance during field visits by the surveillance and passive during clinics. In 2003, the programme conducted leprosy eradication campaign in urban areas and special operation programme for the elimination of leprosy in rural areas. Field workers trained for identification of leprosy cases visited the entire sub centre area and sent data on suspected cases to the fixed camp for confirmation by medical officers. The block primary health centre sent the report manually to the district in printed form. Then, the district sent its report to the state usually by post or occasionally by messenger or by fax.

**National AIDS control programme:** The State AIDS Control Organization (SACO) was established in April 2001, after Uttaranchal was established as a state. The second national AIDS control programme conducted sentinel surveillance for HIV/AIDS in six sentinel sites in the state. These were operated in four clinics located in Uttarkashi, Tehri, Dehradun and Almora for the management of sexually transmitted infections and two clinics located in Nainital and Pithoragarh that provided antenatal care. In addition to tests conducted specifically for surveillance purposes, there were a number of settings where HIV testing was being conducted. These were reproductive tract infection/ sexually transmitted infection units, two blood testing units, HIV testing centres in 10 districts, two voluntary counseling and testing centres, 16 licensed blood banks (10 of which in the public sector), nine clinics for the management of sexually transmitted infections and one private medical college. District tuberculosis officer sent this information directly to state.

**National polio eradication programme:** The national polio eradication programme conducted surveillance for acute flaccid paralysis. Acute flaccid paralysis was defined as any child less than 15 years of age, with flaccid or floppy paralysis of sudden onset. The report on suspected polio (acute flaccid paralysis) was submitted weekly reports every Saturday. When a case was suspected for polio, the information was transmitted immediately to the district immunization officer and to the surveillance medical officer for polio

without waiting for Saturday. Medical officer of the concerning primary health centre collected two stool samples within 14 days of onset of paralysis at an interval of 24 hours.

### Data analysis

Human resources were available at block primary health centres that could be used as data analysts, as medical officers, health education officers and data entry operators. However, these staff members were not trained in surveillance and they did not have computers. Thus, data analysis was limited to a manual compilation of the data and there was no weekly calculation of incidence rates.

## Rumour register

There was a rumour register in each block primary health centre and additional primary health centre. All the information about outbreaks was documented in this register. The information could originate from a health worker, a public person or from a newspaper. The information was verified and action taken accordingly.

## Feedback

Staffs at sub center level obtained feedback from their respective supervisors during monthly review meetings at the primary health centre. The district level provided feedback to the block level every month during district review meetings. Of 18 health care workers in the primary health centre area, 10 (56%) said that they received feedback on the information that they reported. However, during the visit to the sub centres, we were not able to observe any form of written feedback available to the staff.

**Action taken on the basis of surveillance data**

**Training in outbreak investigation and management:** Of the 18 health workers and 18 medical officers interviewed, none had received any training in outbreak investigation and management.

Block primary health centre response team: At the block primary health centre level, the medical officer lead a response team that consisted in a medical officer, a health education officer, a health visitor, a male health worker and a female health worker. This response team was activated only between April and September, as the summer season was prone to outbreaks. It was not fully operational.

**Surveillance committee at the district headquarters:** There was a surveillance committee at the district headquarters ensuring inter-departmental coordination in the case of outbreaks. However, there were no regular meetings and little interaction between the members. There was no action plans for outbreaks prepared at the district level. Rapid response teams had also been constituted at the district level to respond to outbreaks. However, this team did not respond to any outbreak in 2002-2003. In practice, the medical officer of the relevant primary health centre investigated the outbreak with little assistance from the laboratory.

**Resources available to support public health surveillance**

**Laboratory network:** While there were a number of clinical laboratories in the district, there was no network of public health laboratories. Thus, public health surveillance was conducted with insufficient laboratory support. 28 out of 69 sanctioned posts (41 %) of laboratory technicians were vacant in the district (Table 8) and the district level hospitals had no facility to culture microorganisms. As a consequence, outbreaks were investigated in the absence of laboratory confirmation.

**Non Government Organizations:** There is no participation of non governmental organizations in disease surveillance. They worked at their own and they did not report any information to the public health department on the diseases under surveillance.

**Private sector:** Most of the private hospitals were located in the urban areas. The rural area depended on government hospitals for their health care. Private hospitals did not report any information on the diseases treated in their hospital.

Medical colleges: The medical college was not reporting any information on the diseases that were treated in its facility.

**Evaluation of surveillance system**

**Simplicity:** Under the surveillance system the reporting units were identified, the frequency of reporting was fixed and the reporting personnel was identified as field worker at the sub centre and pharmacist in other reporting units. The flow of information was simple between the sub centre, the primary health centre and other institutional levels. All the field workers and medical officers considered the system simple. However, reporting systems were multiple and did overlap (Table 1). The various reporting forms of the multiple systems also caused confusion. In the absence of electronic connectivity at the primary health care level, cases detected were recorded and transmitted manually. Sometimes the information was transmitted over telephone and followed by a written document. Thus, lack of communication facilities lead to complication, loss of time and loss of money.

Acceptability: All the respondents agreed that the surveillance system was acceptable. However, they mentioned that availability of standard case definitions in all reporting units would further facilitate their participation. In addition, health care workers mentioned that the number of programmes they had to manage at the same time affected the way they could participate in all of them and affected their participation in surveillance activities.

**Sensitivity:** While we could not estimate the proportion of cases captured by the surveillance system, the proportion of reporting units that submitted a report for the monthly system varied between 63% and 89% throughout 2003 (Figure 2). Most of the areas in the hills being covered with jungles, active search for female health worker was difficult. Thus, in some cases, fake or manipulated reporting might have occurred. Similarly, irregular and incomplete data from peripheral level might have lead to manipulated reporting at the level of the primary health care.

**Positive predictive value:** There was no pre-service or in-service training programme available to make health care workers aware of the need of case definitions or to familiarize themselves with case definitions. In addition, case definitions were not available in any of the health care facilities at any level. Of 18 health care workers interviewed, four (22 %) were aware of the case definitions in use and none (0%) could state the surveillance case definition of cholera. In the absence of a well-established case definition system, health care workers reported cases on the basis of their clinical judgment and reporting criteria may not have been used uniformly: In the case of the weekly system for epidemic-prone diseases that was based upon health care workers who were working in sub-centres and who had a lower level of qualification, the reliability of clinical judgment was unclear. In contrast, in the case of the monthly system of communicable diseases that was based upon the assessment by medical officers, the clinical diagnosis was based upon a higher level of expertise. Finally, the poor laboratory infrastructure limited the capacity to confirm outbreak.

Timeliness: The timeliness (reporting before 7$^{th}$ day of the month) of reporting by the reporting units during 2003 varied from 63 % to 89 %. The Compiler at the district stated that many of the reporting units reported incomplete reports, although he was unable to show those reports.

**Representativeness:** Data from the weekly system was collected at the community level, but only in the public health care system. Most of the private

hospitals are concentrated in the urban areas and people in the rural areas are dependent on government hospital for their health care. Thus, in urban area it may not be it may not be representative of the whole population. Data for the passive monthly communicable disease surveillance system was collected at the hospital level. The data thus does not represent the entire district/primary health centre area though it can provide information regarding the disease burden on the health unit, warning signals, trends and clustering of cases. Any clustering of cases may also point to unusual health event occurring in that area.

**Flexibility:** The system could be expanded to include other communicable diseases as well as risk factors for non-communicable diseases.

**Usefulness:** The surveillance system was useful to plan, mobilize resource mobilization, detect outbreaks early as well as to monitor and evaluate disease prevention and control programmes. However, the usefulness of the system was limited with respect to preparedness for outbreak. Most of the information regarding outbreak was coming through the media or community leaders (e.g., First information regarding an outbreak of measles in Nai village in 2004 was given by a daily news paper).

## Discussion

The surveillance system had a number of strengths. First, the network existed already and the reporting channels were well defined. Second, most health care facilities at the block level and above were linked with a communication system, allowing for reporting by phone. Third, motivated and experienced medical officers and paramedical staff members were available. Fourth, training centers were available to further build the capacity of the medical officers and paramedical staff. Fifth, administrative staff and computer operators were available who could potentially analyze the data at block, district and state level.

The surveillance system also had a number of weaknesses. First, the various surveillance systems in place overlapped one another. Second, health care workers were not familiar with case definitions and surveillance procedures. Third, reports from the health care facilities were compiled manually in the absence of dedicated staff and computer hardware. Fourth, reporting forms differed causing overburden, delays and confusion. Fifth, the reporting from the periphery to the block was irregular and incomplete. Sixth, the laboratory network suffered from a number of gaps in the area of sample collection, transport and processing leading to delay in diagnosis and control measures. Seventh, health care facilities under the block level had no access to telephones, particularly in the hills, which limited the possibility of reporting by phone. Eighth, the involvement of non-governmental organization in public health was limited by a lack of coordination between the public health department and relevant organizations. Ninth, the involvement of private health care facilities in disease surveillance was minimal. Tenth, the surveillance system did not provide documented, written, quantified feedback to its users in terms of data. Finally, the surveillance system worked in isolation and was not connected with local medical colleges.

## Recommendations

### A. Recommendations to be implemented at all levels

**Management:** An overall manual describing all procedures and guidelines must be made available at all levels to provide a reference for surveillance procedures.

**Case definitions:** Standard case definition must be clarified, harmonized across all health care workers (e.g., among field workers, doctors, specialists, public health managers and policy makers) and disseminated in all reporting units. These definitions must be simple so that the paramedical workers can understand them and use them correctly.

**Training:** Health care workers participating in the surveillance system require training with respect to case definition, data analysis, information interpretation, outbreak response and epidemic preparedness.

**Logistical support:** Supply of consumables needed for surveillance, including data collection instruments, patient registers and surveillance manuals must be provided in sufficient quantities and regularly. In addition, general logistical support, including mobility support and contingency fund is needed from the district to the peripheral health institutions. Also, given the poor accessibility of the area, there must a vehicle dedicated exclusively to outbreak investigation and management.

**Communication:** Provision of additional communication facilities including (1) telephone, electronic networks, computers with internet access facility at the primary health centre and (2) facsimile in community health centres would simplify and optimize the reporting and feedback procedure.

**Laboratory support:** Laboratory manuals must be made available in health care facilities where medical officers and laboratory technicians are posted. Trained personal (e.g., laboratory technicians trained in specimen collection,

processing and transportation) must be appointed in non-functional laboratories to ensure basic services. Knowledge must be updated through networks with national and international laboratories. Logistics for specimen collection and processing must be available.

Inter departmental coordination: Outbreak management and response usually require collaboration between different departments (e.g., water supply in case of waterborne outbreak, veterinary hospitals in case of zoonoses). Thus, inter departmental coordination is an important component of an effective surveillance system. To facilitate this coordination, the role of each department must be defined. This inter departmental coordination could take the form of review meetings held regularly.

**B. Recommendations to be implemented at the community level**

Involvement of community leaders in the surveillance system would lead to an increased awareness. Use of workers of the integrated child development scheme as key informants for health care workers would increase the sensitivity of the surveillance system as these workers are closely in touch with the population.

**C. Recommendations to be implemented in sub centres**

We propose four recommendations to be implemented at the sub centre level. First, training of health workers for laboratory specimen collection would strengthen the laboratory support to the surveillance activities. Specific topics could include sputum collection for acid-fast bacilli and peripheral blood slide for malaria. In addition, a joint training on specimen collection for hemoglobin estimation would yield benefit in the area of the maternal and child health programme. Second, a specific training in disease surveillance and response, including case detection using standardized case definition and outbreak management would enable health workers to participate more effectively in the surveillance system. Finally, the shortage of human resources (female and male health workers) at the sub-centre level jeopardizes a number of essential

public health functions, including surveillance and outbreak response and should be addressed.

**Recommendations to be implemented at the primary health care**

We propose a number of recommendations to be implemented at the primary health centre level. Data must be analyzed to identify early warning signals. Weekly, monthly and quarterly disease surveillance reports must be completed regularly and completely. Rapid diagnostic kits could be made available in the primary health centre for some of the epidemic-prone diseases (e.g., measles, enteric fever, viral hepatitis). Medical officers, supervisors and field workers must be trained in disease surveillance. Administrators who could manage the data must be trained in data analysis and provided with appropriate software. Finally, the primary health centre must send regular written feedback to the peripheral level.

**Recommendations to be implemented at the district headquarters**

We propose a number of recommendations to be implemented at the district headquarters. The already established district surveillance committee needs to be activated to become operational in practice. Laboratory technicians must be trained in the collection and transportation of specimen to reference laboratories. Data compilers at the district level must analyze data regularly to detect early warning signals. Ideally, recruitment of trained data entry operators and statisticians would allow appropriate analysis and interpretation. All the diseases under surveillance including diseases under national programmed must be compiled in one table and transmitted to the individual programme manager. The district must prepare complete and timely reports and ensure data quality. The surveillance unit must send regular feedback to the reporting units. An involvement of the private sector would provide a more representative picture, particularly (1) in urban areas where a high proportion of the population use it for health care delivery and (2) in the case of health care facilities managed by non governmental organization. The district headquarters must make the established rapid response team operational in practice so that it can respond to outbreaks effectively. Members of the rapid

response team should be volunteers. They should readily available for rapid response all the time and could also be in charge of road traffic accidents and natural disasters. The surveillance system must develop networks with state medical colleges as well as with national and international research laboratories. Finally, monitoring and supervision of the reporting units and of health care workers in charge of data collection, transmission and analysis will result in a more operational surveillance system.

We recommend to include the following noncommunicable diseases in surveillance-hypertension, diabetes, malignancies (all types because to analyze which one is more prevalent, if it is). In context of the state Uttaranchal being larger hilly land area (80 %) the road accidents can also be kept under surveillance

**Conclusion**

The surveillance system in the district of Nainital is a good reflection of the overall status of surveillance activities in the state of Uttaranchal. While there is a framework and human resources in place, standard procedures, training, communication tools and laboratory infrastructure are missing to turn the system into a real tool to generate information that is analyzed in a timely way for action in partnership with all stakeholders. The upcoming implementation of the integrated disease surveillance programme (IDSP) in 2005 the state should address these gaps and lead to substantial public health benefit.

Tables and figure

Figure 1: Existing flow of information for the weekly and monthly surveillance system, Uttaranchal, India 2003

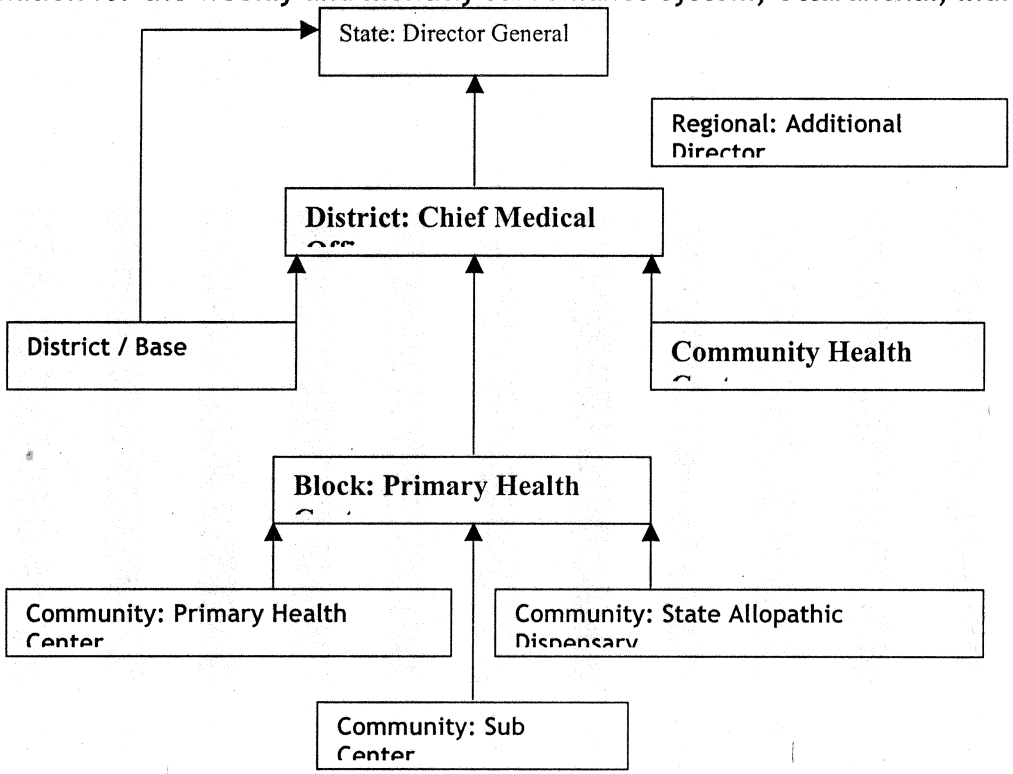
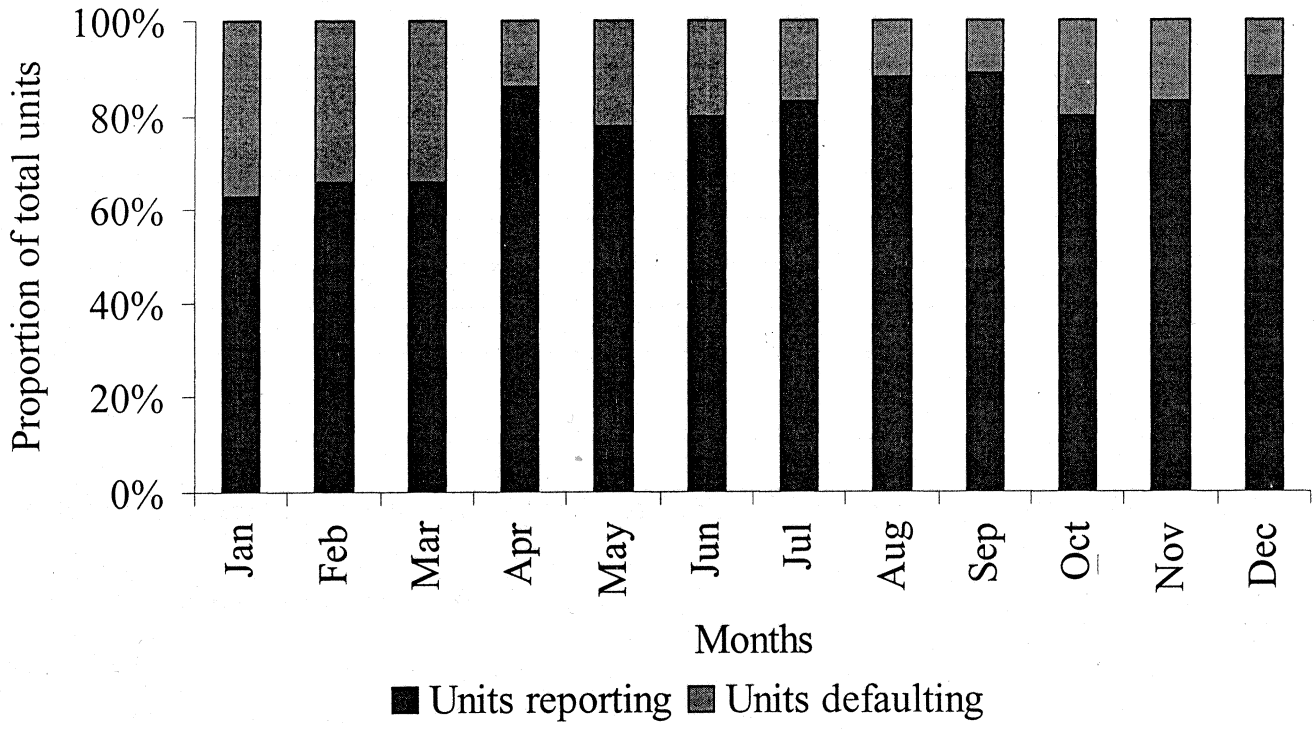


Figure 2: Reporting and defaulting among health care units, monthly surveillance system, Nainital district, Uttaranchal, India, 2003



## Table 7: Summary of the surveillance systems in place, Uttaranchal, India, 2003

| Surveillance systems | Diseases under surveillance | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diarrhea[1] | Polio | Kala-azar | Meningitis | Japanese encephalitis | Guinea worm | Diphtheria | Neonatal tetanus and tetanus | TB[2] | Pertussis | ARI[3] | Enteric fever | Measles | Rabies | STDs[4] | Hepatitis | Specific diseases |
| Weekly | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | |
| Monthly | ✓ | ✓ | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| TB [2] | | | | | | | | | ✓ | | | | | | | | |
| EPI [5 6] | | ✓ | | | | | ✓ | ✓ | ✓[7] | ✓ | | | ✓ | | | | |
| Polio | | ✓ | | | | | | | | | | | | | | | |
| Malaria | | | | | | | | | | | | | | | | | Malaria |
| Leprosy | | | | | | | | | | | | | | | | | Leprosy |
| HIV/AIDS | | | | | | | | | | | | | | | | | HIV/ AIDS |

## Table 8: Availability of laboratory in health care facilities of Nainital district, Uttaranchal, India, 2003

[1] Includes cholera and gastro-enteritis (weekly system) and acute diarrheal diseases (monthly system)
[2] Tuberculosis.
[3] Acute respiratory infections
[4] Includes syphilis and gonorrhea
[5] Expanded programme on immunization
[6] Surveillance for vaccine preventable diseases is part of the information collection of the reproductive and child health programme.
[7] Tuberculosis among children only

| Institution | Total number of facilities in the district | Number of facilities equipped with a laboratory | Human resources available | Investigations relevant to surveillance |
|---|---|---|---|---|
| District hospital | 1 | 1 | Laboratory technician (2), pathologist(1) | ▪ Malaria blood slide<br>▪ Sputum |
| Base hospital | 1 | 1 | Laboratory technician (2) and pathologist(1) | ▪ Stool microscopy<br>▪ Vidal<br>▪ Urethral / vaginal discharge<br>▪ VDRL (Syphilis)<br>▪ Cerebrospinal fluids<br>▪ Aminotransferases<br>▪ HIV test |
| Community health center | 3 | 3 | Laboratory technician (1) | ▪ Malaria blood slide |
| Primary health center | 5 | 5 | Nil | ▪ Sputum<br>▪ Stool microscopy |
| Additional primary health centre | 11 | 0 | Nil | |
| State allopathic dispensary | 30 | 0 | Nil | |
| State homeopathic dispensary | 5 | 0 | Nil | ▪ None |
| State ayurvedic dispensary | 20 | 0 | Nil | |
| Health sub centre | 157 | 0 | Nil | |

## Figure 3: Form for weekly reporting of epidemic prone diseases

Weekly description of epidemic prone diseases Week.....

Date.....to.....

| | Cholera | | Gastro. | | Jaundice | | Kala-azar | | M.Meni-ngitis | | J.Encep-halitis | | Gina- worm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | Death | Case | Death | Case | Death | Case | Death | Case | Death | Case | Death | Case | Death |
| A. Weekly | | | | | | | | | | | | | | |
| B. Addenda | | | | | | | | | | | | | | |
| A+B | | | | | | | | | | | | | | |
| Cumulative since Jan. | | | | | | | | | | | | | | |

| | No of disinfected water sources | | | Beneficiaries | No of ORS packet distributed | No of chlorine tab. distributed | O.T. test Positive / Negative |
|---|---|---|---|---|---|---|---|
| | I Round | II Round | III Round | | | | |
| A. Weekly | | | | | | | |
| Addenda | | | | | | | |
| A+B | | | | | | | |
| Cumulative | | | | | | | |

Figure 4: Form for monthly reporting of institutional cases and deaths due to communicable diseases

## Monthly statement showing institutional cases and deaths due to communicable diseases

1. Name of district: Nainital
2. Month: ----------
3. Total number of existing Institutions in the district: ----
4. Total number of Reporting Institutions for the month: ----
5. Total number Defaulting Institutions for the month: ----
6. Reported cases and deaths due to communicable diseases:

| S.N. | Name of disease | Patients treated | | | | | | Deaths | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | OPD | | IPD | | Total | | IPD only | | |
| | | M | F | M | F | M | F | M | F | T |
| 1. | Ac. Diarrhoeal diseases | | | | | | | | | |
| 2. | Diphtheria | | | | | | | | | |
| 3. | Acute Polio Myelitis | | | | | | | | | |
| 4. | Tetanus other than neonatal | | | | | | | | | |
| 5. | Neonatal tetanus | | | | | | | | | |
| 6. | Whooping cough | | | | | | | | | |
| 7. | Measles | | | | | | | | | |
| 8. | Ac. Respiratory Infection | | | | | | | | | |
| 2 | Pneumonia | | | | | | | | | |
| 10 | Enteric Fever | | | | | | | | | |
| 11 | Viral Hepatitis | | | | | | | | | |
| 12 | Japanese Encephalitis | | | | | | | | | |
| 13 | Meningococcal Infection | | | | | | | | | |
| 14 | Rabies | | | | | | | | | |
| 15 | Syphilis | | | | | | | | | |
| 16 | Gonococci Infection | | | | | | | | | |
| 17 | Pulmonary Tuberculosis | | | | | | | | | |
| 18 | All other diseases treated in the institution excluding above diseases | | | | | | | | | |
| | Total | | | | | | | | | |

# 6. Evaluation of maternal health under reproductive and child health programme

# Evaluation of maternal health under reproductive and child health programme, in Bhimtal block, Nainital district, Uttaranchal, May-October 2003

## 1. Introduction

India was the first country in the world to launch a family planning programme in 1952. Later the government realized that this strategy alone was not sufficient. Maternal and child health care services, immunization and medical termination of pregnancy were added to family planning programme in 1978 to constitute the Family Welfare Programme. Subsequently oral rehydration therapy, control of acute respiratory infection, iron folic acid and vitamin A prophylaxis were added to family welfare programme that became the Child Survival and Safe Motherhood programme (CSSM). In 1992 iron folic acid prophylaxis and vitamin-A prophylaxis became also a part of CSSM programme. In 1994, the international conference on population and development held in Cairo recommended that participant countries implement unified programme for reproductive and child health aiming at achieving a status in which (1) people have the ability to reproduce and regulate their fertility, (2) women are able to go through pregnancy and child birth safely with the successful outcome of pregnancies in terms of maternal and infant survival and (3) with couples able to have sexual relations in the absence of the fear of pregnancy and without contracting diseases. The reproductive and child health programme was launched throughout India on 15 October 1997.

Uttaranchal is a newly created state in north India in the year 2000. Reproductive and child health programme started before the state came in existence (1997). The National Family Health Survey -2 conducted in 1998-99 indicated that infant mortality rate of Uttaranchal was 19.2 per 1000 live births, 35.6 % of women in the state had heard of HIV/AIDS, 45.6 % of women and 89.6 % children between 12 and 23 months of age were anemic. Antenatal

iron folic acid coverage among the pregnant women was 66 %. Antenatal tetanus toxoid coverage was 54 % and 7.1 % pregnant women received home antenatal visits. 76.8 % deliveries were conducted at home. Traditional birth attendant conducted 45.8% of the deliveries and doctors assisted only 24.8 % of the deliveries (Table 1 and 2)

The objective of this evaluation was to review the reproductive and child health (RCH) programme in the primary health centre Bhimtal, Nainital district in Uttaranchal state. We aimed at assessing the achievement of the objectives of the programme with particular reference to maternal health issues using a system approach, identifying existing gaps in the programme and suggesting measures to remedy the gaps identified.

## 2. Methods

### 2.1. Design

We conducted a cross sectional survey in 2003 to interview female health workers, medical officers in primary health centre Bhimtal area. We also interviewed the participant mothers.

### 2.2. Area

The Bhimtal primary health center is located hilly terrain. The population of primary health centre Bhimtal is 60,154 in 2003 as per female health workers survey report. There are 18 sub centres in the Bhimtal block. We selected the Bhimtal block purposively to meet the availability of time and financial support.

### 2.3. Participants

We selected (1) mothers who delivered baby between April 2002 and March 2003 (2) baby is under one year of age (3) service providers (including female health workers and medical officers) in the area of the primary health Bhimtal

for interviews. We interviewed mothers from all the sub centre area. We also interviewed 17 female health workers from 14 sub centre and five medical officers.

## 2.4. Indicators under evaluation

**2.4.1. Input indicators:** We evaluated the organizational structure of the programme, available human resources, buildings, vehicles, cold chain equipments and availability of vaccines under input indicators.

**2.4.2. Process indicators:** We evaluated the way of identification of clients (women taking care under Reproductive and Child Health programme at the sub centre), recording and reporting, training, supervision, continuity of supply and information education and communication activities under process indicators.

**2.4.3. Outcome indicators:** We evaluated maternal mortality rate and infant mortality rate.

## 2.5. Data collection

### 2.5.1. Input and process indicators

We used both primary and secondary data for the evaluation. We collected information on the structure and process indicators through interview with structured questionnaires. We collected primary data through direct interview of stakeholders at the local health institutions. We visited sub centers, additional primary health centers, block primary health center, community health center and reproductive and child health cell in the district and verified records, registers and observations to collect secondary data.

### 2.5.2. Outcome indicators

We visited the sub centres on the clinic days and interviewed all women who delivered baby during the last year and whose baby was under one year of age.

We interviewed a total of 150 women at the sub centre in the area of primary health centre during the period.

### 2.5.3. Data analysis

We analyzed the data to calculate the proportions and relevant indicators.

## 3. Results

### 3.1. Input indicators

#### 3.1.1. Human resources

Except for one post of health education officer and laboratory technician, all the sanctioned posts in the primary health centre was filled.

#### 3.1.2. Building of sub centre

Of 18 sub centers, 10 (56%) had own building, 28% were under construction, 11% were running in adjoining hospital buildings and 33% were running in rented buildings. Of 18 sub centers 39 % had their own water supply and 50% had electricity supply. Primary health Bhimtal and additional primary health centre at Jyolikot has their own building with water and electricity supply.

#### 3.1.3. Equipments-cold chain equipments

All the three vaccine distribution centers in primary health centre viz. community health center Bhowali, additional primary health center Jyolikot and primary health center Bhimtal had one ice lined refrigerator and one deep freezer each. Ice lined refrigerator and deep freezers in three distribution centres were in working condition. There were 140 vaccine carriers in the primary health center. All the vaccine carriers were with four icepacks.

#### 3.1.4. Vaccine supply

We visited to all the vaccine distribution centers in the primary health centre of Bhimtal, in the community health center Bhowali and in the additional primary health center Jyolikot, the vaccine stock available was sufficient. The health visitor or the female health worker was filling logbook and was responsible for vaccine distribution and cold chain maintenance. All the female workers in the primary health centre were satisfied with the availability of

vaccine. The female health worker received vaccine from the nearest vaccine distribution centre either on the same day or one day before the immunization day.

### 3.1.5. Vehicle

One vehicle was available at block primary health centre and one at community health center. These were used as an ambulance in general and for reproductive and child health (RCH) programme as well.

### 3.1.6. Logistics

There were no printed forms at sub centre level for reporting. A specimen of printed formats was available at block primary health centre and reported in its Xerox copy.

### 3.1.7. Drugs and equipment kits

We assessed seven health sub centers out of 18 (39%).

#### 3.1.7.1. Drug kit A and B

The kits are provided by the central government and the kit contains medicines as paracetamol, corimoxazole, dicyclomine, mebendazole, iron and folic acid tablets etc. Drug kit A and B were available in all the 7 sub centres. The drugs in the kits were available in the entire health sub centre.

#### 3.1.7.2. Midwifery kits

Midwifery kits are provided under reproductory and child health programme for each sub centres. We evaluated seven (39%) health sub centre. Midwifery kits were available in all the health sub centers. 5 (71%) sub centre had no thermometer in functioning condition, there were no sphygmomanometer in functioning condition and two (29%) sub centre had sterilizer instrument out of use.

### 3.1.7.3. Sub centre equipment kit

We could check seven health sub centres. Three out of seven (42%) health sub centres had no sub centre equipment kits. The health worker was not able to recognize many of the instruments at the sub center. The kit was issued a long time back and many of the equipments are either missing or of no use.

### 3.1.7.4. Primary health centre equipment

Primary health centre kit was not available at additional primary health centre and primary health centre.

### 3.1.7.5. Essential obstetric care drugs

Essential obstetric care drugs were not available in additional primary health centre. The drugs were available only at block primary health centre.

### 3.1.7.6. Newborn care equipment

Newborn care equipment was not available at primary health centre, additional primary health centre and community health centre.

## 3.2. Process indicators

### 3.2.1. Functioning of the system in Nainital district

Female health workers registered antenatal mothers during the field visits and clinics at the sub center. The female health workers gave antenatal tetanus during the ante natal mother's visit to the sub centre as well as during home visits. Maternal care provided under RCH Programme included antenatal care (antenatal checkups, tetanus injections and distribution of iron and folic acid tablets), intranatal care (safe delivery) and postnatal care (post natal check ups). The health worker submitted the reporting forms to the primary health centre monthly. The compiled report from block primary health centre was transmitted to the district.

### 3.2.2. Clients

All the pregnant mothers were considered to be clients irrespective of their trimester or parity.

### 3.2.3. Supervision

The work of health workers at sub centers is supervised by block level supervisors including supervisors and medical officers and district level supervisors including deputy chief medical officers and chief medical officers. Block level supervisors are expected to visit sub centres at least once in each sub centre in a month. Of 17 sub centers, 7 (41 %) of the sub centers had received no supervisory visits by the block level supervisors and 13 (76 %) of the sub centres had no visits by the district level supervisors.

### 3.2.4. Feedback

10 of 16 field workers (62 %) stated that they were getting feedback from the higher officers on RCH related activities.

### 3.2.5. Maintenance of vaccine supply and cold chain

The block primary health centre receives the vaccines from the head quarter and distributes them to the vaccine distribution centers in the area. The female health workers took vaccine from the nearest vaccine distribution centre one day before the immunization day. The supply of vaccines was regular.

### 3.2.8. Training of field workers and medical officers in RCH

We interviewed a total of 17 (87.5 %) female health workers. All the female health workers were trained in RCH. Two female health workers who were working on contract basis were not trained in RCH. There was no reorientation training and the entire health workers agreed that such training was needed. Of the five medical officers, two (40%) had RCH training and none had undergone refresher training.

### 3.2.9. Information education and communication

Information education and communication as part of the programme included personal contacts during field visits, group discussions and use of audiovisual aids.

### 3.2.10. Indicators

#### 3.2.10.1. Antenatal care

Of 150 mothers, 134 (89%) were registered after they were pregnant for more than 12 weeks and 16 (11%) were registered before 12 weeks of pregnancy. 30 % of the mothers had received no antenatal visits during their entire pregnancy. Overall 70 % mothers had received at least one visit during their pregnancy. 94 % of the mothers were immunized for tetanus and all the mothers had received iron folic acid during their pregnancy (Table 4).

#### 3.2.10.2. Intranatal care

Overall 109 of 150 of the deliveries (73 %) were conducted at home. 4 out of 150 deliveries (2.6 %) were conducted at sub centre and primary health centre. 55 of 150 deliveries (37 %) were conducted by untrained dais. Lady doctor and female health workers assisted 37 of 150 and 54 of 150 of the deliveries (24 %) and (34 %) respectively (Table 4).

#### 3.2.10.3. Postnatal care

96 of 150 deliveries (64 %) of the mothers received at least on postnatal visit (Table 4)

#### 3.2.10.4. Awareness of mother's of reproductive and child health programme, HIV/AIDS and reproductive tract infection

71 % of the mothers had heard of HIV/AIDS. 79 % of mothers had not heard the name reproductive and child health programme. 37 % of the mothers had at least one symptom of burning micturition, white discharge or lower abdominal pain indicative of reproductory tract infection (Table 4).

### 3.3. Outcome indicators

#### 3.3.1. Maternal mortality rate

**Table 1: Maternal mortality rate in primary health centre Bhimtal**

| Year | Number of maternal deaths | Maternal Mortality Rate |
|---|---|---|
| 2001 | 00 | 00/ 1000 live births |
| 2002 | 01 | 0.77/1000 live births |
| 2003 | 00 | 00/1000 live births |

During the year 2001 and 2003 there was no maternal death. In 2002, there was 1 maternal death for 1444 births for a rate of 0.77/1000.

#### 3.3.2. Infant mortality rate

**Table 2: Infant mortality rate in primary health centre Bhimtal**

| Year | Number if infant death | Infant Mortality Rate |
|---|---|---|
| 2001 | 06 | 4.77/1000 live births |
| 2002 | 07 | 5.41/1000 live births |
| 2003 | 10 | 7.77/1000 live births |

Infant mortality rate of the primary health centre Bhimtal ranged between 4 to 8 / 1000 live births during 2001 to 2003).

## 4. Discussion

All the sanctioned posts at the primary health centre were filled except the post of health education officer and a post of laboratory technician which was vacant. Health education officer is the key person for running different health programmes and laboratory technician was conducting various laboratory investigations. These vacant posts affect the programme management at

primary health centre level. Availability of any of the sub centre did not have their own buildings, water and electricity supply.

Coverage of iron folic acid mainly depended on its availability. Pregnant mothers visited to the sub centres for their antenatal check ups and health care worker visited mothers during field visits. As per norms of the RCH programme at least three ante natal visits were necessary, whereas one third of pregnant mothers had not received any visits during their entire pregnancy. Majority of the mother's preferred delivery at home, though higher literacy groups preferred the institutional delivery (Table 5). Antenatal tetanus coverage is 100 % among mothers who were educated high school and above compared to the mothers educated below junior high school (Table 4).

We identified the following gaps in the programme during the evaluation, reporting forms were not available at the sub centre level, anemia among the mothers was diagnosed clinically and field workers were not trained for this, early registration (registration before 12 weeks of pregnancy) was not being practiced, there were no refreshment training in reproductory and child health programme, there were limited supervisory visits conducted by the higher officers, documentary feedback was not provided to the peripheral reporting units.

The awareness and knowledge among medical officers and the health workers on various aspects of the reproductive and child health programme is not stable. Thereby there is need for refreshment courses on the programme (Table7).

There is no refreshment training on reproductive and child health programme since it started in 1997. Of 17 female health workers were not aware of the birth rate. All the health workers know the computation of expected date of delivery. The health worker did not know about the expected high risk pregnancy, anaemic women, live births and expected high risk new born. 53 %

(/17) were able to prepare an annual action plan. 35 % (6/17) knew all the five cleans of delivery. The health workers were not clear about the number of necessary ante natal and post natal check ups.

Among the medical officers there were limited knowledge about the computation of expected pregnancy, high risk pregnancy, anaemic women, live births, high risk new born and infant mortality rate. 40 % (4/5) medical officers were able to prepare an annual action plan.

## 5. Recommendations

### Human resources

We recommend a post of male health worker at each sub centre. He would provide vaccines to the sub center and would return balance vaccines to the vaccine distribution center at the end of the session. He would be responsible for reporting of the diseases under surveillance and outbreak investigation and management. He would also help in record maintenance.

### Training

Provide refreshment training in reproductive and child health programme to all the medical officers and health workers. The emphasis should be given on importance of preparing action plans through house to house survey, early registration of pregnant others, identification of high risk pregnancies and their referral to the referral units. Ensure refreshment training at an interval of three years.

### Logistics

Ensure availability of blood pressure instruments, sticks for pregnancy testing, facility for hemoglobin estimation at the sub centre, iron folic acid tablets, temporary methods of family planning ( oral pills, intrauterine devices and condoms), and printed reporting forms and registers. Availability of a computer with trained operator is needed.

**Involvement of non governmental organizations and community leaders**

Involvement of village panchyat, community leaders and NGOs will be beneficial basically for advocacy of reproductory and child health programme.

**Analysis of the information**

Analyze the information right from the sub centre and provide documented feedback to both the directions (below the health units from where data arises and to the office data is reported). Ensure availability of a computer up to the primary health centre level where a post of data entry operator already exists.

**Supervision and monitoring of the programme**

Every supervisor would provide an action plan of his/her monthly supervisory visits in advance that will be available to all the health officers at the primary health centre and the district. Documentary feedback would be necessary. Each sub centre would get at least one supervisory visit every month. He/She would be provided traveling allowances for the visits. Monitoring of the programme will be done at review meetings at the block and district level.

**Information, education and communication activities**

The activities can be conducted through meetings, personal contacts and posters. The objectives would be to encourage the mother for vaccinating ante natal tetanus toxoid, attend clinics for antenatal checkups, taking iron folic acid tablets, institutional delivery and delivery by trained birth attendants. This activity also consists to educate mothers on immunization of the child, HIV/AIDS reproductory tract infection.

Tables and figures

Table 3: Status of maternal care in Uttaranchal and Nainital district, 2003 [8]

| Indicators | Nainital | Uttaranchal |
|---|---|---|
| Population | 7,62,912 | 84,79,562 |
| Urban % (1991) | 35.36 | 23.10 |
| Sex Ratio (2001) | 881 | 964 |
| Infant Mortality Rate | Not available | 52 |
| Maternal Mortality Rate | Not available | 4.4 |
| Safe Deliveries | 55.70 | 51.20 |
| Institutional Deliveries | 19.3 | 38.9 |
| Females with RTI symptoms | Not available | 25 |
| Knowledge females on HIV/ AIDS | 49.60 | 66.6 |
| Knowledge of males on HIV/ AIDS | Not available | 63.5 |

[8] Source: Chief Medical Office, Nainital.

Table 4: Perinatal care among 150 women with recent deliveries, Bhimtal primary health centre area, Uttaranchal, India, 2003

| | | | Number of mothers | Total | Proportion (%) |
|---|---|---|---|---|---|
| Antenatal care | Antenatal visits | 0 | 45 | 150 | 30 |
| | | 1 | 17 | 150 | 11 |
| | | 2 | 51 | 150 | 34 |
| | | 3 | 37 | 150 | 37 |
| | Tetanus toxoid doses | 0 | 3 | 150 | 2 |
| | | 1 | 6 | 150 | 4 |
| | | 2 | 141 | 150 | 94 |
| | Iron folic acid tablets | 0 | 3 | 150 | 3 |
| | | < 100 | 0 | 150 | 0 |
| | | ≥100 | 147 | 150 | 98 |
| Delivery care | Place of delivery | Home | 109 | 150 | 73 |
| | | Sub centre | 3 | 150 | 2 |
| | | Primary health centre | 3 | 150 | 2 |
| | | Hospital | 35 | 150 | 23 |
| | Birth attendant | Untrained birth attendant | 55 | 150 | 37 |
| | | Trained birth attendant | 7 | 150 | 5 |
| | | Female health worker | 51 | 150 | 34 |
| | | Lady doctor | 37 | 150 | 24 |

| | | | | | |
|---|---|---|---|---|---|
| Post natal | Postnatal visits | 0 | 54 | 150 | 36 |
| care | | 1 | 15 | 150 | 10 |
| | | 2 | 41 | 150 | 27 |
| | | 3 | 40 | 150 | 27 |
| Miscellaneous | Reproduction tract | Symptoms of infection | 55 | 150 | 37 |
| | infection | HIV /AIDS | 106 | 150 | 71 |
| | Awareness | RCH programme | 32 | 150 | 21 |

Table 5: Antenatal care according to literacy status among 150 women who delivered during 2002 and 2003 and not completed the year in Bhimtal primary health centre area, Uttaranchal, India, 2003

| | | | Number with coverage according to standard | Total | Coverage | Relative coverage (95 % confidence interval) |
|---|---|---|---|---|---|---|
| Antenatal visits | Literacy level | Illiterate | 18 | 29 | 62 | Reference |
| | | Literate- junior high | 40 | 56 | 71 | 1.1 (.8-1.5) |
| | | High school- intermediate | 22 | 37 | 59 | .9 (.6-1.4) |
| | | Graduate and above | 19 | 26 | 73 | 1.2 (.8-1.7) |
| Tetanus toxoid | Literacy level | Illiterate | 27 | 29 | 93 | Reference |
| | | Literate- junior high | 57 | 58 | 92 | 1.0 (1.0-1.2) |
| | | High school- intermediate | 37 | 37 | 100 | 1.1 (1.0-1.2) |
| | | Graduate and above | 26 | 26 | 100 | 1.1 (1.0-1.2) |
| Iron and folic acid | Literacy level | Illiterate | 24 | 29 | 82 | Reference |
| | | Literate- junior high | 57 | 58 | 98 | 1.2 (1-1.4) |
| | | High school- intermediate | 36 | 37 | 97 | 1.2 (1.0-1.4) |
| | | Graduate and above | 25 | 26 | 96 | 1.2 (.9-1.4) |
| Full antenatal package | Literacy level | Illiterate | 11 | 29 | 38 | Reference |
| | | Literate- junior high | 16 | 58 | 28 | .7 (.4-1.4) |
| | | High school- intermediate | 15 | 37 | 41 | 1.0 (.6-2.0) |
| | | Graduate and above | 7 | 26 | 27 | .7 (.3-1.6) |

Table 6: Perinatal care according to literacy status among 150 women who delivered during 2002 and 2003 and not completed the year in Bhimtal primary health centre area, Uttaranchal, India, 2003

| | | | Number with coverage according to standard | Total | Coverage (%) | Relative risk (95 % confidence interval) |
|---|---|---|---|---|---|---|
| Place of delivery | Literacy level | Illiterate | 28 | 29 | 97 | Reference |
| | | Literate- junior high | 51 | 58 | 88 | 3.5 (0.6-27.1) |
| | | High school- intermediate | 21 | 37 | 57 | 12.5 (1.8-89.1) |
| | | Graduate and above | 12 | 26 | 46 | 15.6 (2.20-110.7) |
| Birth attendant | Literacy level | Illiterate | 17 | 29 | 59 | Reference |
| | | Literate- junior high | 26 | 58 | 45 | 1.4 (0.8-2.2) |
| | | High school- intermediate | 7 | 37 | 19 | 1.9 (1.5-3.1) |
| | | Graduate and above | 7 | 26 | 27 | 1.9 (1.0-2.9) |
| Postnatal care visits | Literacy level | Illiterate | 11 | 29 | 38 | Reference |
| | | Literate- junior high | 19 | 58 | 33 | 1.0 (0.8-1.5) |
| | | High school- intermediate | 12 | 37 | 32 | 1.0 (0.9-1.5) |
| | | Graduate and above | 12 | 26 | 46 | 1.0 (0.8-1.5) |

Table 7: Knowledge and awareness of reproductive and child health issues among health care workers, Bhimtal primary health care area, Uttaranchal, India, 2003

| Health care worker | Indicator | Number with good knowledge | Total | Proportion (%) |
|---|---|---|---|---|
| Female health workers | Birth rate of the sub centre | 13 | 17 | 76 |
| | Population of the sub centre | 12 | 17 | 71 |
| | Concept of CNA | 14 | 17 | 82 |
| | Computation of expected pregnancy | 00 | 17 | 00 |
| | Computation of expected high risk pregnancy | 00 | 17 | 00 |
| | Computation of expected anaemic women | 00 | 17 | 00 |
| | Computation of expected live births | 00 | 17 | 00 |
| | Computation of expected high risk new born | 00 | 17 | 00 |
| | Annual action plan for RCH activities | 7 | 17 | 41 |
| | Vaccine preventable diseases | 9 | 17 | 53 |
| | Vaccine schedule | 9 | 17 | 53 |
| | Vaccine requirement computation | 5 | 17 | 30 |
| | Normal duration of pregnancy | 14 | 17 | 82 |
| | High risk age for pregnancy | 13 | 17 | 76 |
| | Number of antenatal checkups | 16 | 17 | 94 |
| | Optimum period for first antenatal checkup | 3 | 17 | 18 |

| | | | |
|---|---|---|---|
| Optimum period of second antenatal checkup | 14 | 17 | 82 |
| Optimum period for third antenatal checkup | 9 | 17 | 53 |
| Foetal distress | 4 | 17 | 24 |
| Five cleans of delivery | 6 | 17 | 35 |
| Recommended temperature for vaccine storage | 10 | 17 | 59 |
| High blood presser during third trimester | 8 | 17 | 47 |
| Foetal heart rate | 10 | 17 | 59 |
| Low birth weight baby | 8 | 17 | 47 |
| Number of postnatal checkups | 17 | 17 | 100 |

Table 7: (continued)

| Health care worker | Indicator | Number with good knowledge | Total | Proportion (%) |
|---|---|---|---|---|
| Medical officers | Concept of CAN | 5 | 5 | 100%(5/5) |
| | Computation of expected pregnancy | 1 | 5 | 20 (1/5) |
| | Computation of expected high risk pregnancy | 1 | 5 | 20% (1/5) |
| | Computation of expected anaemic women | 1 | 5 | 20 %(1/5) |
| | Computation of expected live births | 2 | 5 | 40%(2/5) |
| | Computation of expected high risk new born | 2 | 5 | 40 (2/5} |
| | Computation of infant mortality rate | 1 | 5 | 20% (1/5) |
| | Annual action plan for RCH activities | 2 | 5 | 40%(2/5) |
| | Process of supervision | 3 | 5 | 60%(3/5) |
| | Vaccine preventable diseases | 5 | 5 | 100%(5/5) |
| | Vaccine schedule | 4 | 5 | 80%(4/5) |
| | Vaccine requirement computation | 5 | 5 | 100%(5/5) |
| | Recommended temperature for vaccine storage | 4 | 5 | 80%(4/5) |
| | High risk age for pregnancy | 5 | 5 | 100%(5/5) |
| | High blood presser during third trimester | 4 | 5 | 80%(4/5) |
| | Foetal heart rate | 5 | 5 | 100%(5/5) |
| | Low birth weight baby | 2 | 5 | 40 %(2/5) |

Figure 11: Infant mortality rate, Bhimtal primary health centre area, Uttaranchal, India, 2001-2004.