

## RESEARCH WORK

### (A) CARDIO-VASCULAR DISEASES

#### **Project-1: Study on coronary heart disease and hypertension in Mizoram**

**Investigators** : Dr. N. C. Hazarika, Dr. J. Mahanta, Dr. Bela Shah, Dr. D. Biswas, Dr. K. Narain (RMRC/ICMR) ; Dr. H. C. Kalita (AMC & H, Dibrugarh) : Director (Hospital & Medical Education, Mizoram)

**Duration** : 3 Years (April 2003 – March 2006)

**Funding** : ICMR (EM)

This study estimated the prevalence of hypertension and coronary heart disease (CHD) along with its risk factors in rural and urban Mizo population. The study, covered 12,313 individuals of 18 years and above (Rural 6,460, Urban 5,853), and involved clinical examination, anthropometric measurements, collection of data on socio-demographic, dietary habits, etc along with biochemical investigations in a sub sample of 10% subjects. During the reporting period surveys were completed in the urban population. The study was completed in March 2006.

#### **1.1 Socio-demography of the study population**

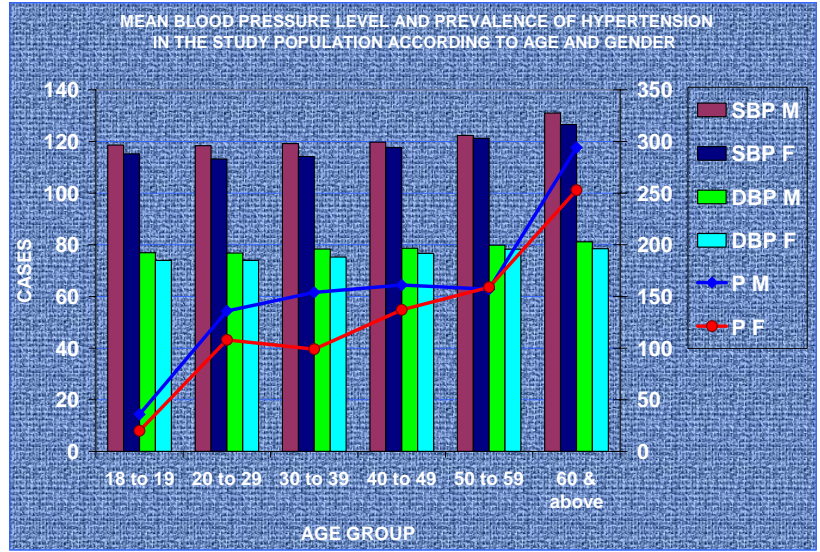
Socio-demographic characteristics of the study population revealed high literacy rate of 97.1% (Males 98.0%, Females 96.3%); 10.1% widow/widower or separated; smokers 38.4% (Urban 42.9%, Rural 57.1%); non-smoking tobacco users 55.8% and alcohol users 10.1%.

#### **1.2 Prevalence of hypertension**

Overall, mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) observed in Mizos was  $119.7 \pm 16.7$  and  $77.3 \pm 10.0$  mmHg respectively. Level of blood pressure was relatively higher in males (SBP  $121.6 \pm 16.3$ , DBP  $78.7 \pm 9.9$ ) over females (SBP  $118.0 \pm 16.7$ , DBP  $76.0 \pm 9.9$ ). Overall prevalence of hypertension was found to be 15.9% with higher prevalence in male subjects (18.2%) than females (13.9%) in all age groups (Fig-1). The prevalence was significantly higher in urban subjects (18.9%) than

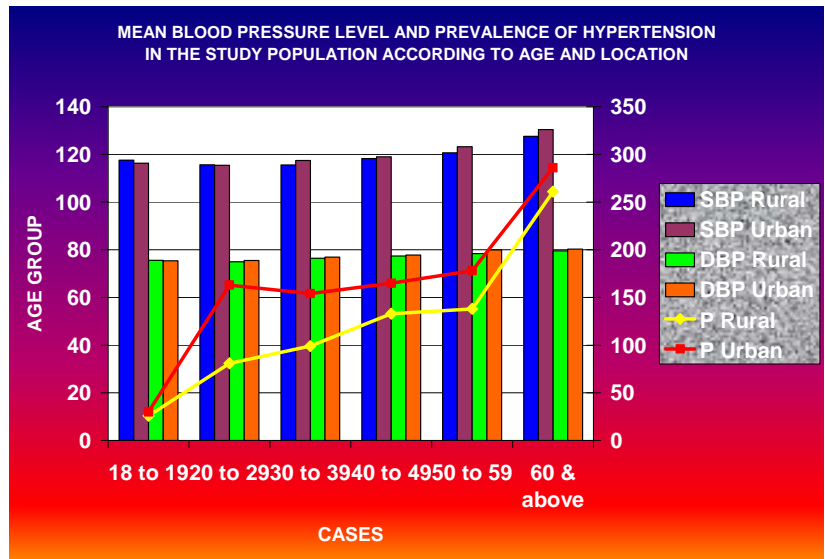


**Laboratory biochemical investigations in progress**



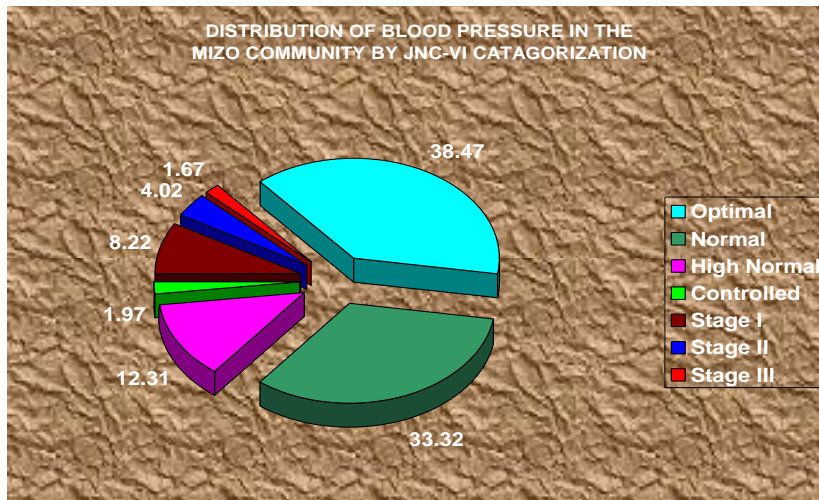
**Fig-1**

rural people (13.2%) across all age groups (Fig-2). Categorization by JNC-VI criteria reveals that 38.5% participants had optimum, 33.3% normal and 12.3% high normal of



**Fig-2**

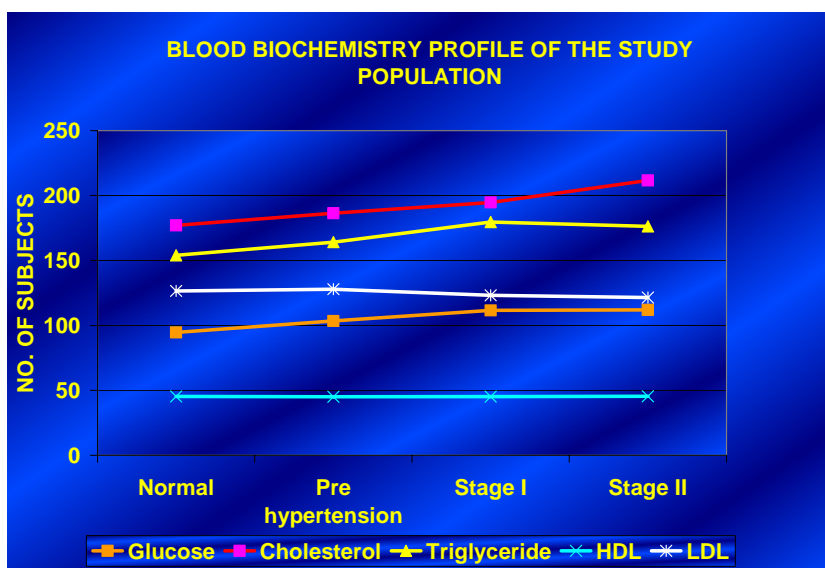
blood pressure. Among the hypertensives, 1.97% were in controlled group, 8.2% in Stage I, 4.02 in Stage II and 1.67% in Stage III (Fig-3).



**Fig-3**

### 1.3 Biochemical investigations

Glucose, cholesterol, triglycerides, homosysteine and serum albumin were estimated in a subsample. The levels showed a gradual elevation with the increase in blood pressure level; though the values were within normal limits. Mean HDL values in all categories of blood pressure were within normal range. About 75.1% Mizos had normal HDL level while 24.9% people had less than the cut off value (Fig-4).



**Fig-4**

### 1.4 ECG examination

Out of 12,232 ECGs analyzed, 1482 were found abnormal. Left ventricular hypertrophy, the major abnormal ECG findings, was recorded in 3.6% subjects (Urban 2.43%, Rural 4.69%). Ischaemic heart diseases was present in 2.44% cases (Urban 3.03%, Rural 1.91%) and myocardial infarction in 0.2% individuals. The overall prevalence of CHD, based on positive angina by WHO-Rose questionnaires with or without ECG changes and ECG changes only was 2.6% (Urban 3.13%, Rural 2.11%).

## 1.5 Risk factors for hypertension and CHD

Determinants of hypertension in Mizo community were age, gender, sedentary and less active job, overweight and obesity, extra salt intake, alcohol consumption and tobacco chewing. Highly significant risk factors for coronary heart disease were hypertension, sedentary work and smoking.

### Project- 2: Study of some genetic aspects of essential hypertension in north-east region

**Investigators** : Dr. J. Mahanta, Dr. N. C. Hazarika (RMRC, Dibrugarh) ; Dr. D. Mohanty, Dr. K. Ghosh, Dr. Shrimati Shetty (IIH, Mumbai)  
**Duration** : 3 Years (Oct 2003 – Sept 2006)  
**Funding** : ICMR (EM)

This study is investigating the genetic basis of hypertension in Mizo, indigenous Assamese and tea garden populations of Assam using 3 genetic markers *viz.* ACE polymorphism, SNPs in hypertensive families, and Angiotensin receptor polymorphism. During the reporting period, surveys were carried out in the tea garden and Mizoram. In tea garden community, a total of 32 hypertensive individuals were found in 17 families- 3 or more hypertensive members in 5 families, 2 hypertensive members in 2 families and 1 hypertensive member in 10 families. In Mizoram, a total of 41 hypertensive individuals were found in 20 families- 3 or more hypertensive members in 6 families, 2 hypertensive members in 7 families and 1 hypertensive member in 7 families.

A total of 345 blood samples were collected from Mizoram, 138 from Tea garden community and 185 from Assamese community for blood biochemistry and lipid profile analysis. A total of 499 blood and DNA samples were sent to IIH, Mumbai for further molecular studies as per the protocol. Blood samples analysis for estimation of different biochemical parameters is in progress. PCR protocol for ACE gene polymorphism study has been standardized and PCR work is on going.

### Project- 3: Salt sensitivity and gene polymorphisms in essential hypertension in tribal population of Mizoram, Tea Garden community of Assam and indigenous Assamese population

**Investigators** : Dr. N. C. Hazarika, Dr. J. Mahanta, Dr. P. K. Borah (RMRC, Dibrugarh); Dr. Meenakshi Sharma (ICMR Hqts, New Delhi); Dr. Q. Pasha (IGIB, New Delhi)  
**Duration** : 3 Years (May 2005 – April 2008)  
**Funding** : ICMR (EM)

This is a collaborative study with Indian Council of Medical Research Hqts, New Delhi and Institute of Genomics and Integrative Biology (IGIB), New Delhi. The objectives of this study are (i) To phenotype essential hypertension subjects into salt sensitive (SS) and salt resistant (SR) category (ii) To determine the prevalence of salt sensitive BP in hypertensive and normotensive subjects in the three selected study

populations (iii) To determine the polymorphisms in candidate genes associated with hypertension and (iv) To define genetic variants associated with development of salt sensitive hypertension in the selected populations.

### 3.1 Pilot study in the tea garden community

#### 3.1.1 Phenotyping of study subjects

The pilot study was undertaken in a tea garden community of Dibrugarh district 'Control' and 'Proband' from each age group were identified. Low salt and high salt intervention was done and blood pressure was recorded following SOP. Mean arterial blood pressure (MABP) was calculated and study subjects were categorized as salt sensitive, salt resistant or indeterminate (Table 1 & 2).

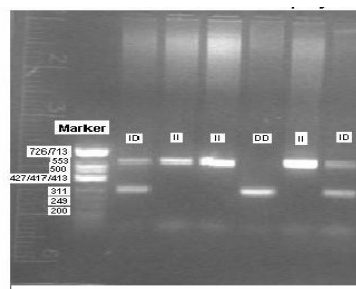
**Table-1: Phenotyping of the controls (Tea garden community)**

Age group in years (n)	Phenotype		
	Salt sensitive	Salt resistant	Indeterminate
20-34 (n=14)	-	9 (64.3%)	5 (35.7%)
35-49 (n=10)	2 (20.0%)	7 (70.0%)	1 (10.0%)
50-65 (n=10)	3 (30.0%)	4 (40.0%)	3 (30.0%)

**Table-2: Phenotyping of the probands (Tea garden community)**

Age group in years (n)	Phenotype		
	Salt sensitive	Salt resistant	Indeterminate
20-34 (n=11)	2 (18.2%)	8 (72.7%)	1 (9.1%)
35-49 (n=10)	2 (20.0%)	6 (60.0%)	2 (20.0%)
50-65 (n=11)	3 (27.3%)	5 (45.5%)	3 (27.3%)

**3.1.2 Polymorphism of ACE gene:** The protocol was standardized for DNA extraction and PCR for Angiotensin Converting Enzyme gene (ACE gene). A total of 26 DNA samples (proband=15 and control=11) from the pilot study were run for ACE gene polymorphism. Among the 15 probands, 8 (53.3%) showed II type of polymorphism and 7 (46.7%) showed ID type of polymorphism. Out of 11 controls, 9 (81.8%) showed II type of polymorphism and 2(18.2%) showed ID type of polymorphism.



**ACE Insertion Deletion gene polymorphism**

### 3.2 Study in the Mizo community

A total of 62 study subjects (Proband=31, Control=31) were identified. Analysis of biochemical investigation and DNA extraction is in the process. Of the 31 proband, 11 (35.5%) were found to be salt sensitive and 13(41.9%) was found to be resistant after low salt intervention. However, after high salt intervention, 11 (35.5%) study subjects showed salt sensitivity and 19(61.3%) were found to be salt resistant. Among 31 controls, 2(6.5%) and 16(51.6%) were found salt sensitive and resistant after low salt intervention. After high salt intervention, 6(19.4%) showed salt sensitivity and 21(67.7%) showed salt resistant.

### Project-4: Development of sentinel health monitoring centres in India: Risk factor surveillance of non-communicable diseases (STEP 3)

**Investigators** : Dr. J. Mahanta, Dr. G. K. Medhi, Dr. P. K. Borah  
**Duration** : 1 Year (Jan 2005 – Dec 2005)  
**Funding** : WHO

STEP 3 of this WHO/ICMR multicentric study, was undertaken during January-December 2005. Prior to this, STEP 1 (behavioural risk factors) and STEP 2 (risk factors related to physical measurements, blood pressure, and treatment seeking behaviour) of this study were completed in previous years. In STEP 3, data on four biochemical risk factors of non-communicable diseases *viz.* blood glucose, total cholesterol, triglycerides, and HDL cholesterol was collected. Similar to STEP 1 and STEP 2, the STEP 3 part of the study also covered three areas e.g. urban, peri-urban and rural of Dibrugarh district. A total of 1,543 randomly selected individuals (males 772, females 771) from STEP 1 and STEP 2 list in the age group of 15-64 years (urban-502, peri-urban-504 and rural-537; males 772, females 771) were covered taking individual list of STEP 1 & STEP 2 as sampling frame. Quality control back up was provided by the Central laboratory at AIIMS.

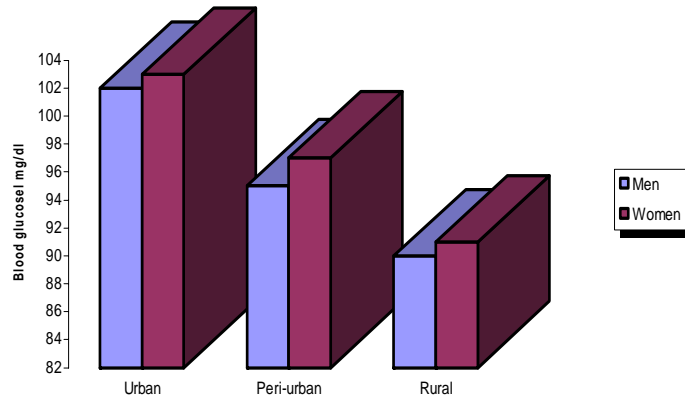
#### 4.1 Summary findings of blood glucose level

The mean level of blood glucose (Fig-5) was 96.36mg/dl (men-97.62 mg/dl, women-95.10 mg/dl). The highest mean level was observed in urban area (men-104.87 mg/dl, women-99.74 mg/dl) followed by peri-urban (men-97.42 mg/dl, women-95.01 mg/dl) and rural area (men-91.09 mg/dl, women-90.83 mg/dl). In 15.7% men and 12.9% women blood glucose level was equal or higher than 115 mg/dl (the cut off for high risk category of blood glucose). There were more individuals in the high risk category (blood glucose  $\geq$ 115mg/dl) in urban area (men-21.3%, women-17.1%) than peri-urban (men-15.7%, women-11.7%) followed by rural area (men-10.5%, women-10.4%). In both sexes, there was a gradual increase in the mean value of blood glucose level with the age.

#### 4.2 Summary findings of total cholesterol level

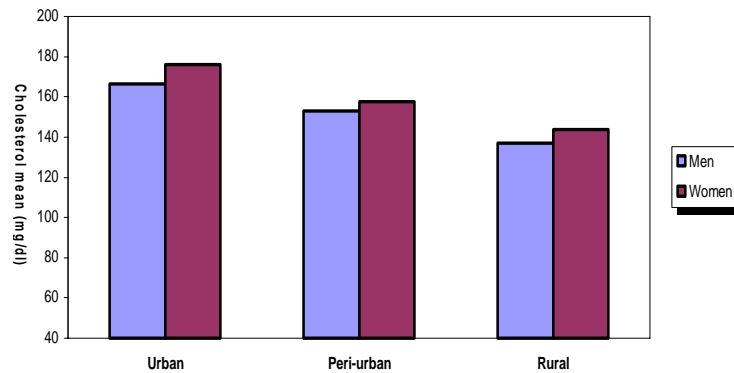
The mean value of total cholesterol (Fig-6) was 155.20 mg/dl (men-151.82 mg/dl, women-158.75 mg/dl). The highest mean level was observed in urban area (men-166.53

mg/dl, women-175.93 mg/dl) followed by peri-urban (men-153.04 mg/dl, women-157.40 mg/dl) and rural area (men-137.00 mg/dl, women-143.85 mg/dl). In 12.9% of men and 15.1% women total cholesterol level was found to be equal or higher than 200 mg/dl (the cut off for high risk category of total cholesterol). There were more individuals in the



**Fig-5: Mean blood glucose level in the study population**

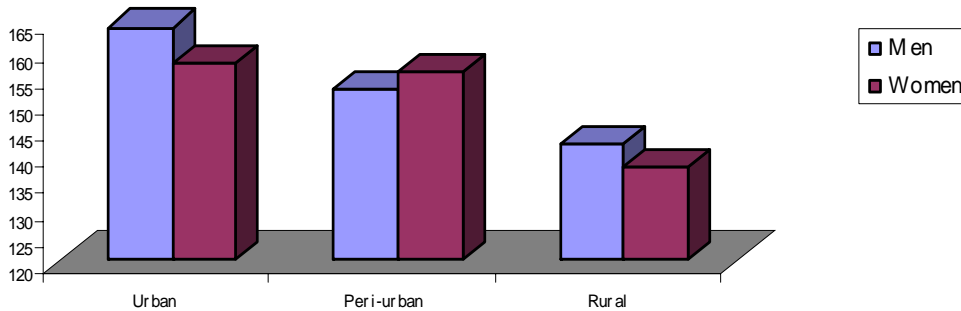
high risk category (total cholesterol  $\geq 200$  mg/dl) in urban area (men-18.1%, women-25.0%) than peri-urban (men-14.1%, women-12.1%) followed by rural area (men-7.1%, women-8.6%). There was an increase in the mean value of total cholesterol with the age.



**Fig-6: Mean total cholesterol level in the study population**

### 4.3 Summary findings of triglycerides level

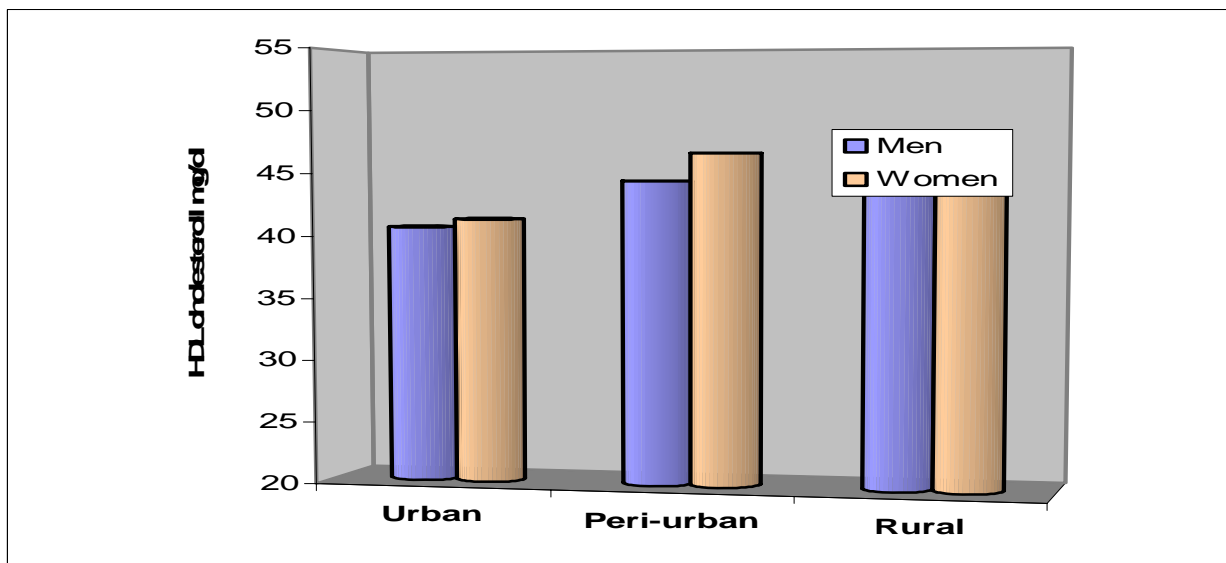
Overall, the mean value of triglycerides (Fig-7) was 151.17 mg/dl (men-152.61 mg/dl, women-149.73 mg/dl). There was gradual increase in mean triglyceride level with the age up to 54 years in both the sexes after which the mean values declined. Urban population had highest mean value of triglycerides (men-164.1 mg/dl, women-157.1 mg/dl), followed by peri-urban (men-152.5 mg/dl, women-155.4 mg/dl) and rural (men-142.1 mg/dl, women-137.6 mg/dl).



**Fig-7: Mean triglycerides level in the study population**

#### 4.4 Summary findings of HDL Cholesterol level

Overall, a mean HDL cholesterol level of 44.15 mg/dl (men-43.67.11 mg/dl, women-44.62 mg/dl) was found in the study population (Fig-8). In the urban area, the mean HDL cholesterol was 40.6 mg/dl and 41.3 mg/dl respectively among men and women. It was higher in peri-urban (men-44.4 mg/dl, women-46.7 mg/dl) and rural areas (men-45.8 mg/dl, women-45.9 mg/dl) compared to the urban population. In the urban area, the prevalence of high risk HDL cholesterol level (HDL  $\leq$ 35mg/dl) was higher (men-37.3%, women-31.3%), followed by peri-urban (men-36.0%, women-28.5%) and rural area (men-25.8%, women-28.3%).



**Fig-8: Mean level of HDL cholesterol in the study population**

## (B) CANCERS

## Project- 5 : Population based Northeast Cancer Registry Programme

**Investigators : Dr. J. Mahanta, Dr. R. K. Phukan, Dr. N. C. Hazarika**  
**Duration : 3 Years (2003 – 2006)**  
**Funding : ICMR (EM)**

This project has been in operation since April 2003. Under this project, a total of 6 population based cancer registries-3 in Assam (Assam Medical College, Dibrugarh; Dr. BBCI Hospital, Guwahati & Silchar Medical College, Silchar), 1 in Sikkim (STNM Hospital, Gangtok), 1 in Manipur (RIMS, Imphal) and 1 in Mizoram (Civil Hospital, Aizawl) have been established. Filled up core proformae, received from different centres are being maintained and analysed at RMRC, Dibrugarh, the central monitoring unit. The number of cancer cases and its distribution, as reported by different registry units of north-eastern states during 2003 and during 2004, is given in Table-3.

**Table-3: Cancer cases reported by different cancer registry units of north-eastern states**

Cancer Registry	2003		2004		Total
	Male	Female	Male	Female	
Guwahati	620	461	457	343	1881
Aizawl	553	455	228	158	1394
Dibrugarh	303	219	371	283	1176
Imphal	136	156	166	220	678
Gangtok	139	179	120	94	532
Silchar	88	52	35	36	211

The crude incidence rate varies from 37.1 per 100,000 in females in Dibrugarh district to 160.8 in males in Aizawl. A similar range is observed for the age adjusted incidence rate (AAIR) and truncated rate as well.

### 5.1 Leading sites of cancer

#### 5.1.1 Mizoram

Mizoram state show stomach as the leading site of cancer in males. The relative proportion of this site of cancer varies from 17.6% in Aizawl district to almost 30% in other districts. The AAR is higher in Aizawl district (46.6 per 100,000) in comparison to entire Mizoram state as a whole (43.5 per 100,000) and other districts of Mizoram (41.6 per 100,000). Cancers of the oesophagus and lung follow the stomach as the leading site of cancer in both Aizawl district and entire Mizoram state. In females, the leading site of cancer is cancer of the lung. The AAR of this site of cancer varies from 16.4 per 100,000 in other districts to 43.9 per 100,000 in Aizawl district. Cancer of the lung in females is closely followed by cancers of the stomach, cervix uteri and breast in Mizoram state as a whole, Aizawl district as well as other districts.

### 5.1.2 Imphal

Cancer of the lung is the leading site of cancer in both male and females in Imphal West district of Manipur state. It constitutes 19% of cancers in males and 17.3% of cancers in females. In males, cancers of the stomach, NHL and colon follow cancer of the lung as the leading site. In females, cancer of the cervix uteri, breast, NHL and thyroid follow lung cancer.

### 5.1.3 Assam

In Kamrup urban district cancer of the oesophagus, constituting 18.9% of all cancers in males, is the leading site of cancer with an AAR of 32.95 per 100,000. Cancer of the oesophagus is followed by other tobacco related cancers namely, hypopharynx, lung, tongue, larynx and mouth. In females cancer of the breast is the leading site of cancer constituting 18% of the cancers followed by cancer of the cervix, oesophagus and gall bladder.

Since the population covered in Silchar town is relatively small, the pattern of cancer including leading sites of incidence, rates have to be interpreted with caution. The leading site of cancer in males as well as females is dominated by sites of cancer associated with the use of tobacco. These include lung, larynx, tongue, hypopharynx and tonsil.

In Dibrugarh district cancer of the oesophagus, constituting 21% of all cancers, is the leading site with an AAR of 15 per 100,000 among males. It is followed by cancer of the hypopharynx, stomach, mouth and lung. In females, cancer of the breast is the leading site followed by oesophagus, cervix, uteri and gall bladder.

### 5.1.4 Sikkim

Among males, cancer of the stomach is the leading site followed by oesophagus, liver and nasopharynx. In females, the leading sites of cancer are breast, oesophagus, cervix, uteri and lung.

## Project- 6: Comprehensive study of carcinoma oesophagus at north-east India: Multidiscipline approach

**Investigators** : Dr. J. Mahanta, Dr. R. K. Phukan, Dr. N. C. Hazarika (RMRC, Dibrugarh) ; Dr. S. Saxena, Dr. S. Kapur (IOP, New Delhi) ; Dr. B. C. Das, Dr. J. K. Sharma (ICPO, New Delhi)

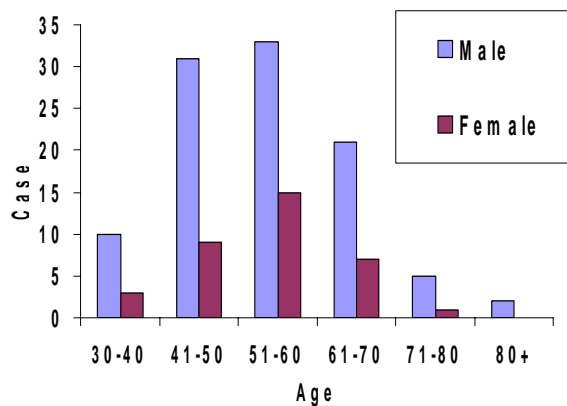
**Duration** : 3 Years (2004 – 2007)

**Funding** : ICMR (EM)

In view of largely unknown aetiology of carcinoma oesophagus, large geographical variation and familial aggregation in its incidence suggestive of causal importance of environmental exposure as well as familial pedigree, this collaborative study was initiated in April 2004. A total of 137 new histologically confirmed esophageal cancer cases have been recruited in the study (57 cases recruited during the reporting period) and their family history, socio demographic, food habits and other associated habits collected. The 32 blood samples and 17 biopsy samples were sent to IOP & ICPO, New Delhi for the molecular work.

## 6.1 Work done at RMRC, Dibrugarh

**6.1.1 Socio-demographic information:** More than 70% cases were in the age group of 40 to 70 years (Fig-9) with mean age of 55.1 years ( $\pm 10.8$ ) and male: female ratio of 2.9:1. Majority of the cases (24.9%) were from the Kamrup district, Assam. About 70.% cases were from rural areas. Nearly 57.0% cases were educated up to primary & middle level. Occupation wise distribution of the cases was 23.0% service holders, 9.0% business persons, 23.0% cultivators, 20.0% house wives, 9.0% unskilled workers and 5.0% skilled workers.



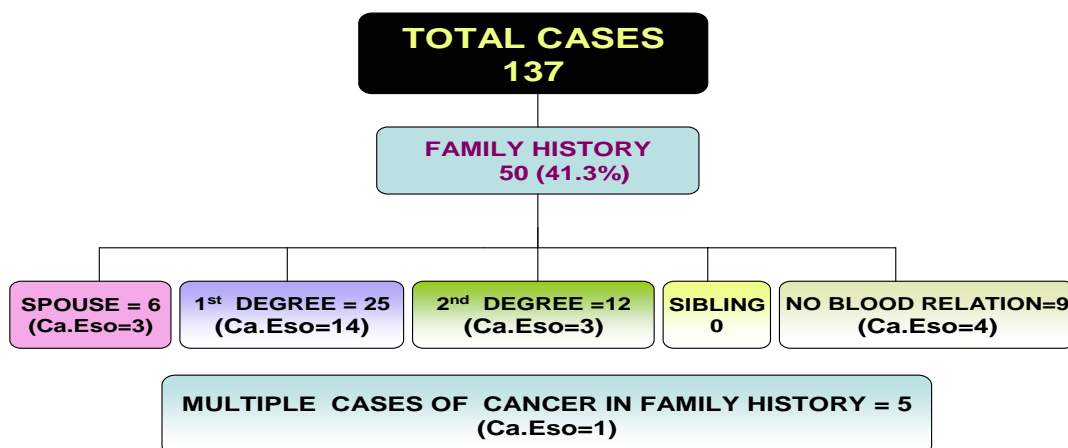
**Fig-9: Age-sex distribution of cancer cases**

**6.1.2 Clinical findings:** All the cases were confirmed by histology and endoscopy. Site wise distribution of cases was- 25.5% in the lower-third, 48.9% in the mid-third and 17.5% in the upper-third region of the esophagus. A total of 91.9% cases were SCC.

**6.1.3 Family history:** Familial history of cancer was reported in 41.3% cases which was first identified by verbal autopsy and then confirmed by personal visit to the affected family. Half of the cases had history of oesophageal cancer in their families. Oesophageal and other cancers had occurred in 50.0% of the cases among 1<sup>st</sup> degree relationship (Fig-10).

## 6.2 Work done at IOP, New Delhi

Blood samples from 22 oesophageal cancer patients (20 males, 2 females) aged between 32 and 75 years (5 patients had family history of oesophageal cancer, 1 had family history of liver cancer ; 16 patients were tobacco users and 6 were non-tobacco users) and endoscopic biopsy samples from 11 patients (3 patients had family history of oesophageal cancer ; 7 patients were tobacco users and 4 were non-tobacco users)



**Fig-10 : Family history of cancer cases**

were obtained. Single Strand Conformation Polymorphism (SSCP) analysis of D13S894 and D17S1303 microsatellite loci in oesophageal cancer patients and standardization of techniques for Gene expression analysis was done.

### 6.3 Work done at ICPO, New Delhi

A total of 43 blood samples, 30 tumor biopsies and 29 normal biopsies were obtained. Blood DNA was employed for studying polymorphism of GSTM1 and GSTT1 genes. GSTM1 null genotype was observed in 26 out of 43 cases (60.5%), significantly a higher frequency when compared to that of normal controls (36%) from other parts of India. GSTT1 null genotype was detected in 10 out of 43 cases (23.3 %). HPV was not found in any of the 18 cases analyzed. Mutations in exon 5 and 7 of the p53 gene were analyzed in 18 tumor and corresponding normal biopsies and 3 suspected mutation were observed (16.7%). Polymorphism of p53 gene was examined in 11 cases for proline and arginine alleles at codon 72 of exon 4.

HPV DNA detection was done by PCR using consensus primers from L1 region of HPV. Out of 36 case and control analyzed biopsies none was found positive for HPV DNA. Mutation in p53 gene was detected by PCR-SSCP method and so far exon 5 and exon 7 have been analyzed. Of the 18 cases, mutation is detected in exon 5 in two cases (11.1 %) and one in exon 7 (7.6%). Samples will also be analyzed for other exons. Polymorphism of p53 gene at codon 72 was analyzed using allele specific primers. A total of 11 samples were analyzed. Polymorphism of GSTM 1 and GSTT1 genes were done by PCR to detect homozygous null and non-null genotypes along with control albumin gene in a multiplex PCR. GSTM1 null genotype was found in 26 out of 43 cases (60.5 %) which is higher as compared to 36% reported in Indian population elsewhere. GSTT1 null genotype was found in 10 out of 43 cases (23.25%).

## Project- 7 : Cancers in North-east India: understanding the role of Tobacco & Pesticides

**Investigators** : Dr. J. Mahanta, Dr. R. K. Phukan, Dr. N. C. Hazarika (RMRC, Dibrugarh); Dr. H. N. Saiyed (NIOH, Ahmedabad); Dr. S. Saxena (IOP, New Delhi); Dr. B. C. Das (ICPO, New Delhi); Dr. Nand Kumar (NCRP, Bangalore)  
**Duration** : 3 Years (April 2005 – March 2008)  
**Funding** : ICMR (EM)

In view of very high incidence of cancer of all anatomical sites together as well as high incidence of sites of cancer associated with use of tobacco in north-eastern states of India the present collaborative project has been initiated to investigate the link between carcinogenic contents of tobacco used in north-east India and genetic variation including polymorphism/mutations associated with ethnic variation. The study is being carried out in the six population based cancer registry areas of the north-east India with a Case-Control epidemiologic design. In a meeting of all collaborators of the project it was decided to include the 4 major TRC (Stomach, Lung, Oesophagus & Oral cavity) in the study. It was also decided to train the staff of north-east cancer registries at IOP, New Delhi on the methodology of tissue collection. The formation of epidemiological questionnaire of the project was also discussed. The project staffs have been recruited and equipments are being procured. The collection of epidemiological data is in progress.

### (C) MOSQUITO-BORNE DISEASES

#### (C.1) MALARIA

## Project- 8: Anti-mosquito and anti-malarial activities of some select plants of north-east India

**Investigators** : Dr. Anil Prakash, Dr. S. K. Sharma, Dr. P. K. Mohapatra, Dr. D. R. Bhattacharyya  
**Duration** : 2 Years (March 2005 – February 2007)  
**Funding** : ICMR (EM)

This study is further investigating anti-malarial and anti-mosquito potential of a few select plants of north-east India which were found promising in previous preliminary study (5 plants for anti-larval, 1 plant for repellent and 1 plant for anti-malarial activity) During the reporting period, the selected plants were collected from various parts of Assam, identified and the desired crude extract (Petroleum ether, Methanolic chloroform, Oil -as the case may be) were prepared through Soxhlet extraction or Clevenger apparatus using the standard protocol. Laboratory bio-assays following the WHO method were carried out to determine the LC<sub>50</sub> and LC<sub>90</sub> values for crude petroleum ether and methanolic chloroform extracts of the 5 plants possessing potential antilarval activities (RMRC/MAL/02, RMRC/MAL/04, RMRC/MAL/07,

RMRC/MAL/10 and RMRC/MAL/11) against laboratory reared 3 vector mosquito species viz. *Anopheles stephensi*, *Aedes aegypti* and *Culex quinquefasciatus*. Of all the



**Extraction of a plant material**



**Bio-assay for larvicidal activity**

plants tested for larvicidal activity, RMRC/MAL/02, belonging to Fabaceae family, has shown the highest larvicidal activity. Its petroleum ether extract was found to have much higher activity than the methonolic chloroform extract and that was, by and large, found comparable to Propoxur, the synthetic larvicide, used as standard (Table-4).

**Table-4: Larvicidal activity of the select plants of north-east India**

Plant/extract	<i>Cx. quinquefasciatus</i>		<i>Ae. aegypti</i>		<i>An. stephensi</i>	
	LC <sub>50</sub> (ppm)	LC <sub>90</sub> (ppm)	LC <sub>50</sub> (ppm)	LC <sub>90</sub> (ppm)	LC <sub>50</sub> (ppm)	LC <sub>90</sub> (ppm)
RMRC/MAL/02 PE (Fabaceae) MC	<b>0.62</b>	<b>1.44</b>	<b>1.05</b>	<b>2.13</b>	<b>0.31</b>	<b>0.58</b>
	4.21	12.4	1.13	2.75	2.35	5.6
RMRC/MAL/04 PE (Thymeleaceae) MC	4.13	28.2	80.6	1023.2	11.27	57.03
	45.3	572.2	13.3	29.0	12.0	48.5
RMRC/MAL/07 PE (Euphorbiaceae) MC	19.9	55.4	13.3	104.7	20.8	52.0
	47.0	82.0	95.6	227.5	18.5	25.5
RMRC/MAL/10 PE (Lauraceae) MC	294.3	889.0	~500	-	467.4	-
	101.9	205.7	78.3	330	320	1935
RMRC/MAL/11 PE (Euphorbiaceae) MC	69.3	504.4	86.4	628.6	13.2	73.9
	220.2	2974	93.0	541.34	407.4	2793
Propoxur (Standard)	<b>0.41</b>	-	<b>0.45</b>	-	<b>0.44</b>	-

-Could not be determined

**Project- 9:** A randomized therapeutic trial of sulfadoxine-pyrimethamine alone and in combination with artesunate in uncomplicated falciparum malaria cases in Indo-Myanmar border districts of Arunachal Pradesh

Investigators : Dr. P. K. Mohapatra, Dr. Anil Prakash, Dr. D. R. Bhattacharyya  
 Duration : 2 Years (Sept 2004- Aug 2006)  
 Funding : ICMR (EM)



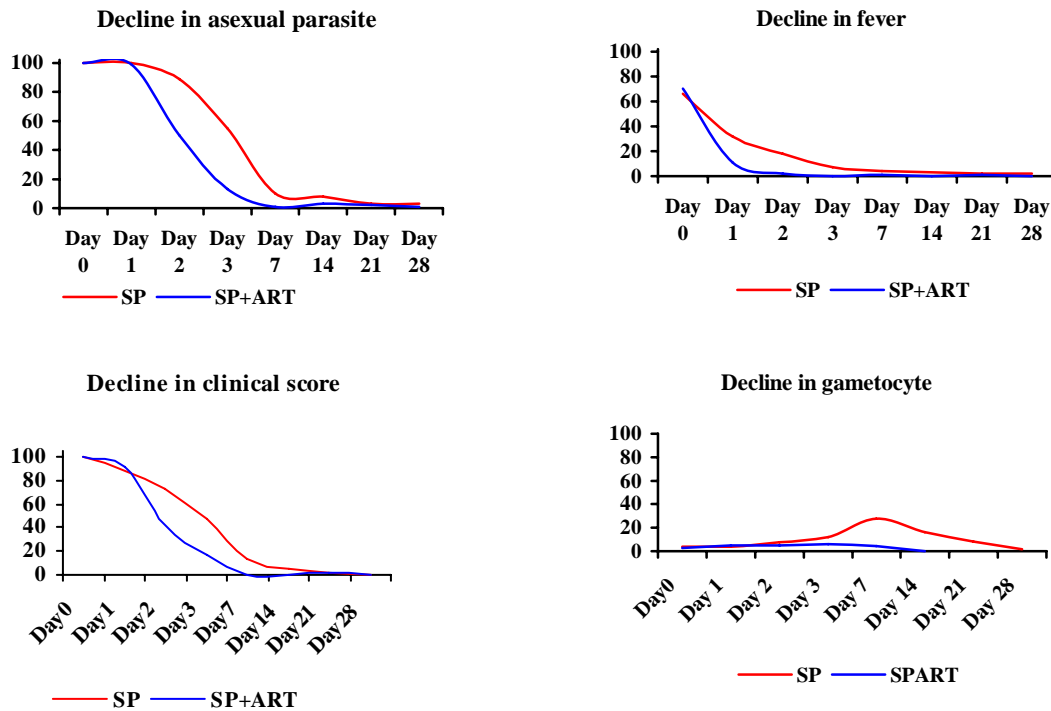
### Work progressing in Namsai PHC

During the transmission season of 2005, the study was carried out in 2 CHC/PHCs of Myanmar bordering Lohit district of Arunachal Pradesh viz. Chongkham CHC and Namsai CHC. A total of 4,497 fever cases reporting to OPD (Chongkham 2,623, Namsai 1,874) were screened of which 1,254 were found positive for malaria (Chongkham 776, Namsai 478) including 1,002 Pf, 206 Pv, 14 Pm and 32 Pf+Pv mixed. Among the malaria positives, 442 uncomplicated Pf cases, satisfying inclusion and exclusion criteria, were recruited in the study (Chongkham 321, Namsai 121) and 221 cases each were allotted randomly to the two arms of treatment i.e. sulphadoxine-pyrimethamine (SP) and SP+Artesunate. Day 0 parasitaemia ranged from 9,054 to 98,000 (mean 11,432± 21,500) per  $\mu$ L of blood. In case of SP treated cases adequate clinical and parasitological response (ACPR) was found in 62.6% (132/211) whereas in SP+Artesunate group, ACPR was 93.6% (205/219) (Table-5).

**Table -5: Therapeutic efficacy of SP alone and SP+Artesunate in Lohit district**

Category	Chongkham CHC		Namsai CHC		Total	
	SP	SP+ART	SP	SP+ART	SP	SP + ART
<b>ETF</b>	22 (14.2%)	0	17 (30.4%)	0	39 (9.1%)	0
<b>LCF</b>	10 (6.5%)	3 (1.9%)	9 (16.1%)	3 (5.0%)	19 (5.8%)	6 (2.7%)
<b>LPF</b>	16 (10.3%)	8 (5.1%)	5 (8.9%)	0	21 (6.8%)	8 (3.7%)
<b>ACPR</b>	107 (69.0%)	147 (93.0%)	25 (44.6%)	58 (95.1%)	132 (78.3%)	205 (93.6%)
<b>Withdrawal</b>	4	1	4	0	8	1
<b>Loss</b>	2	1	0	0	2	1
<b>Cases Selected</b>	160	160	60	60	220	220

Parasite clearance time in SP alone group was found to be >72 hours whereas it ranged from 16–30 hours in SP+Artesunate group. The fever clearance time varied from 24 to 72 hours in SP cohort as against 8-24 hours in SP+Artesunate cohort . In cases under SP+Artesunate therapy the gametocytaemia disappeared by Day 2 and did not appear during the follow up period (Fig-11).

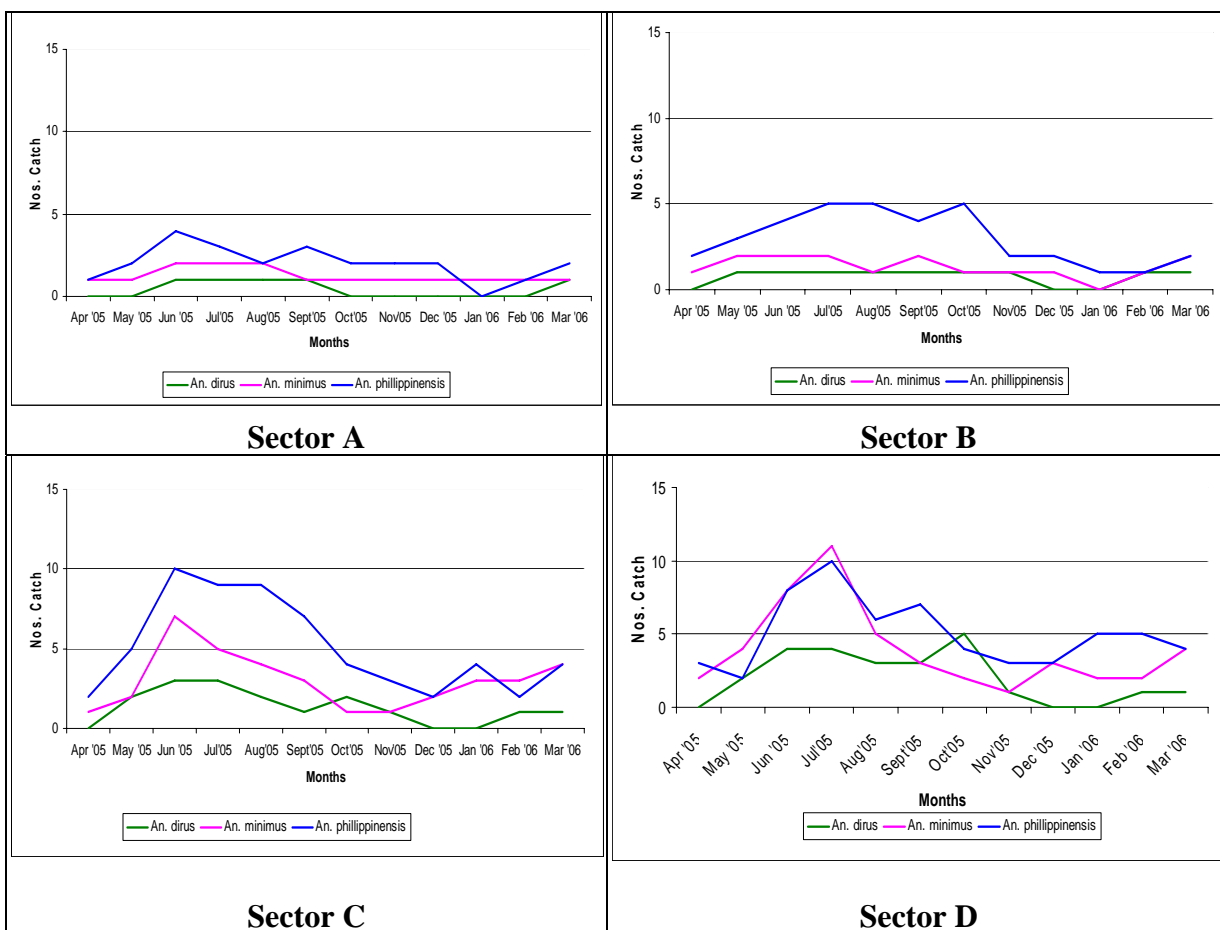


**Fig-11: Clinical & parasitological parameters of patients treated with SP alone and SP+Artesunate**

### Project- 10: Malaria control in a forest fringe village of Assam - a pilot study

**Investigators :** Dr. P. Dutta, Dr. A. M. Khan, Dr. S. A. Khan, Dr. N.C. Hazarika  
**Duration :** 3 Years (2003 – 2006)  
**Funding :** ICMR (EM)

. This study is being undertaken in four forest fringed villages (sectors-A, B, C, D) bordering Bokakhat town and Karbi Anglong districts of Assam with an objective to develop a module to control malaria by reducing man-vector contact. Sector A is under coverage of insecticide treated bed nets (ITBN) plus mosquito repellent, sector B is under ITBN only, sector C is under repellent alone and sector D is without any intervention. After implementing different strategies in the earmarked areas regular entomological as well as parasitological monitoring was done. The recorded vector densities (indoor-collections) were low in sectors A (range 1-7) and B (range 1-8) in comparison to sector C (range 3-20) and sector D (range 5-25). The vector densities in the intervention area, except sector C, remained low (Fig.12).



**Fig-12 : Prevalence of potential vectors in study area**

In outdoor collections, the composition of potential vectors/vectors recorded was: sector A- *An. philippinensis-nivipes* 76%, *An. minimus* 20% and *An. dirus* 4%; sector B- *An. philippinensis-nivipes* 64%, *An. minimus* 24% and *An. dirus* 12%; sector C- *An. philippinensis/nivipes* 63%, *An. minimus* 25% and *An. dirus* 12%; and sector D- *An. philippinensis/nivipes* 48%, *An. minimus* 38% and *An. dirus* 14%. During the reporting period, the Slide Positivity Rate (SPR) recorded in sector A was 3.6% and in sector B 2.3%. Relatively higher SPR was recorded in sector C (14.1%) and sector D (16.1%) (Fig-13).

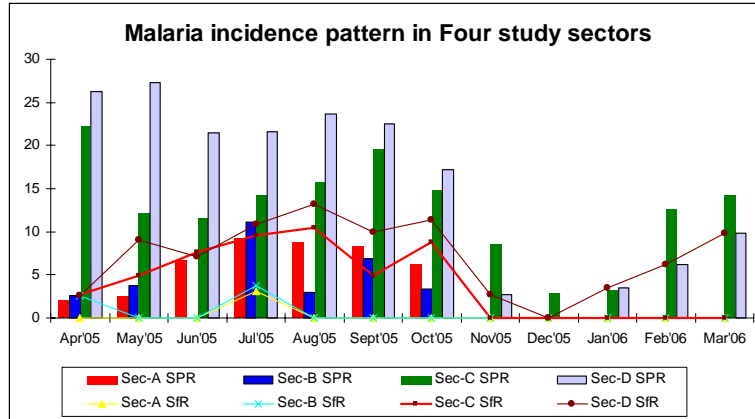


Figure-13

Project- 11: Incidence and molecular characterization of G-6-PD deficiency in north-east India

Investigators : Dr. J. Mahanta, Dr. P. K. Mohapatra, Dr. S. K. Sharma (RMRC, Dibrugarh); Dr. D. Mohanty, Dr. R. B. Colah, Dr. M. B. Mukerjee (IIH, Mumbai)

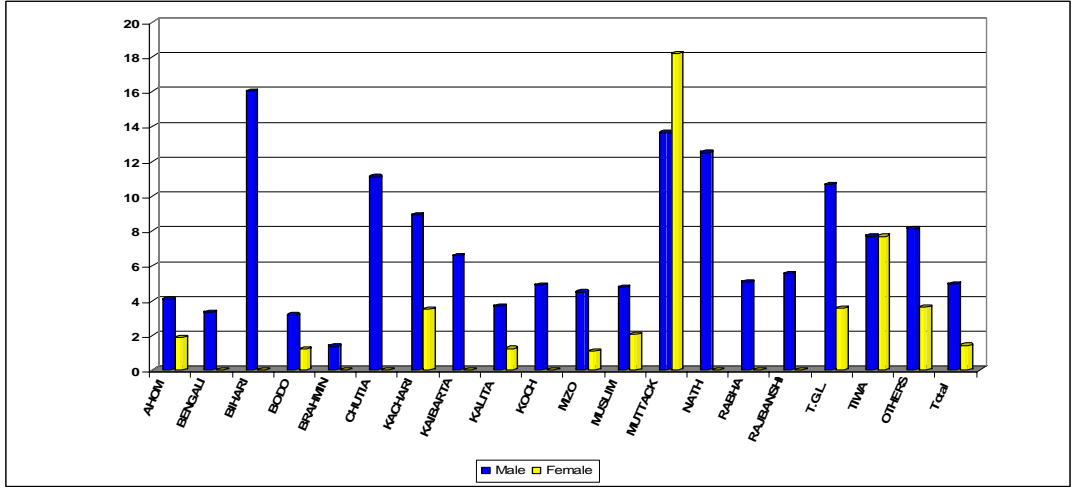
Duration : 3 Years (2003 – 2006)

Funding : ICMR (EM)



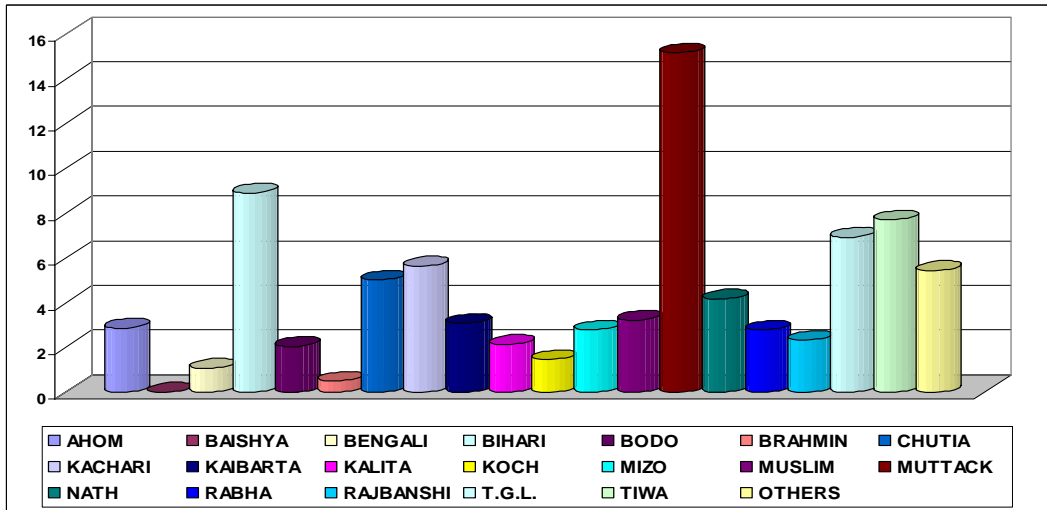
Views of the Camp held for blood collection

During the reporting year the blood samples from different ethnic groups in Assam and Mizoram were collected and processed. Until now, a total of 3,185 subjects (males 1,360, females 1,825) representing 58 ethnic groups have been screened from these two states. The mean age ( $\pm$ SD) of the study subjects was  $23.9 \pm 11.2$  years (range 1-80 ). The ABO blood group pattern among the study population was also studied. The most predominant blood group was O (36.3 %) followed by B (30.2 %), A (24.0 %) and AB (9.5%). Negative Rh factor was observed in 1.9% subjects. The overall prevalence of G-6-PD deficiency was found to be 2.9 %. The deficiency was higher in males (4.9%) than females (1.4 %) subjects (Fig-14).



**Fig-14: Sex wise distribution of G-6-PD deficient in various ethnic groups**

The frequency of G-6-PD deficiency varied among various ethnic groups, the highest being in Muttack community (15.2%) and the lowest (0.5%) in Brahmins (Fig-15)



**Fig-15: Distribution of G-6-PD deficient among various ethnic groups**

Molecular analysis of G-6-PD deficient samples, done so far at IHH, Mumbai, showed the presence of G-6-PD Orissa mutation in 32.4% subjects, G-6-PD Kerala-Kalyan mutation in 17.5% subjects while 50.1% subjects did not show presence of any of the 3 common Indian mutations.

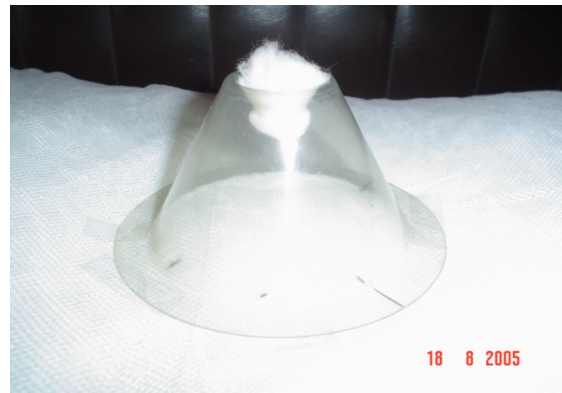
Misc-1: Phase II entomological evaluation of the long lasting insecticidal nets PermaNET® 2.0 against vector of malaria in north-east India

**Investigators** : Dr. D. R. Bhattacharyya, Dr. Anil Prakash, Dr. P. K. Mohapatra  
**Duration** : 9 months (July 2005 – March 2006)  
**Funding** : Extramural (Sponsored Research)

This short term sponsored research study, in collaboration with National Institute of Malaria Research, Delhi, was initiated in July 2005 to evaluate the entomological efficacy of PermaNET® 2.0, the long lasting insecticidal mosquito nets (LLINs) manufactured by M/S Vestergaard Frandsen, in north-east India against malaria vectors viz. *Anopheles minimus* and *An. philippinensis/nivipes*. The hut level Phase II study, carried out in a foot hill village under PHC Titabor, district Jorhat, Assam, evaluated entomological parameters like insecticidal wash resistance of LLINs, blood feeding inhibition by LLINs, excito-repellency effect of LLINs along with social acceptability of LLINs. In the study village, half of the households were given the LLINs and the remaining half the plain nets. The entomological parameters were monitored at monthly intervals (blood feeding inhibition, excito-repellency) while insecticidal wash resistance was monitored at fortnightly interval and the community response was gathered once. Although the excito-repellent action of LLINs was not evident, mosquito feeding on people sleeping under LLINs was effectively inhibited. LLINs recorded about 35% mortality of *An. minimus* in cone bioassay tests after 20 washings with the detergents.



PermaNET in use in a village hut



Set up for cone bio-assay

Misc-2: Detection of biological activity of plants/synthetic compounds: collaborative studies

**Investigators** : Dr. Anil Prakash, Dr. D. R. Bhattacharyya, Dr. P. K. Mohapatra  
**Funding** : ICMR (IM)

Itanagar Field Unit of Regional Research Laboratory, Jorhat signed a MOU for 2 years with RMRC, Dibrugarh for testing of extracts/compounds of plants/synthetic

origin, submitted by them, for biological activity (especially anti-mosquito, anti-malarial and anti-molluscicidal) detection. So far, 9 extracts/compounds have been submitted by RRL, Itanagar of which 5 have been evaluated for mosquito repellent activity.

On request from Indian Lac Research Institute, Ranchi, 5 synthetic compounds submitted by them were also evaluated for mosquito repellent activity.

**Misc-3: Consultancy for situation analysis and malaria control at Singharsi Air Force station, Jharkhand**

**Investigators : Dr. P. K. Mohapatra, Dr. Anil Prakash**

**Funding : ICMR (IM)**

The Principal Medical Officer, Eastern Air Command, Shillong requested RMRC, Dibrugarh to suggest control measures for malaria in the Singharsi air force station, district Pakur, Jharkhand state. Accordingly, a team visited the place from 4-7 May 2005. After taking stock of the malaria situation and ongoing malaria control activities in the Campus and the surrounding villages through analysis of existing data, field visits, interaction with air force station and the district health authorities suitable malaria control measures were recommended to the Air Force authorities which helped greatly in controlling malaria there.

## (C.2) FILARIASIS

**Project- 12: Integrated filariasis control in a tea garden set up: Effect of single annual dose of mass DEC therapy in adjunct to vector control measures and community participation**

**Investigators : Dr. A. M. Khan, Dr. P. Dutta, Dr. S. A. Khan**

**Duration : 6 Years (2000 – 2006)**

**Funding : ICMR (IM)**



**A patient with elephantiasis**

The effect of single annual dose of mass DEC therapy and vector control measures on transmission of lymphatic filariasis in a tea garden setup covering about 4,000 population in Dibrugarh district is being studied since 2000. The study has been extended for 1 more year by the 19<sup>th</sup> SAC. At the beginning of the study (pre intervention), the mf prevalence in Group I (Cohort with out vector control measures) and Group II (Cohort with vector control measures) was 10.3 and 10.2 % respectively. Microfilaria prevalence rate and vector infection rates after 5<sup>th</sup> round of mass drug therapy in Group I and Group II came down to 0.8 and 0.7% respectively. During the reporting year the 6<sup>th</sup> round of mass chemotherapy was initiated and completed in the Group I (93% coverage) . Chemotherapy is in progress in the Group II. A total of 523 night blood samples in the Group I and 368 samples in the Group II have so far been collected. Routine entomological monitoring was carried out as per the schedule. Dissection of vector mosquitoes indicated further decline in the infection and infectivity. Vector infection was found only in the month of September (Infection rate 0.04%). No infective mosquito was found during the year.

### (C.3) JAPANESE ENCEPHALITIS

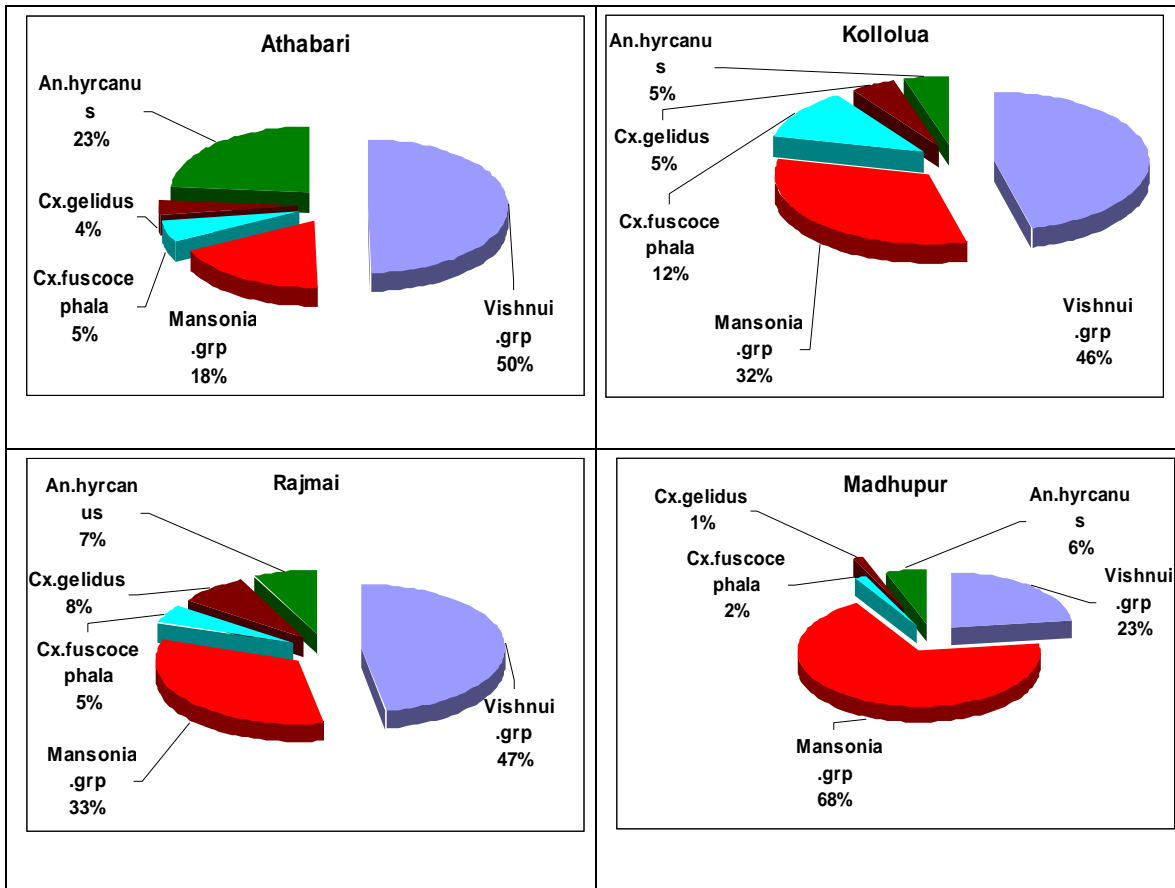
**Project- 13: Epidemiological evaluation of the impact of insecticide treated mosquito nets on incidence of seroconversion of Japanese encephalitis in selected endemic PHC areas of upper Assam, India**

**Investigators : Dr. P. Dutta, Dr. S. A. Khan, Dr. A. M. Khan, Dr. A.C. Phukan**  
**Duration : 3 Years (2003 – 2006)**  
**Funding : ICMR (EM)**



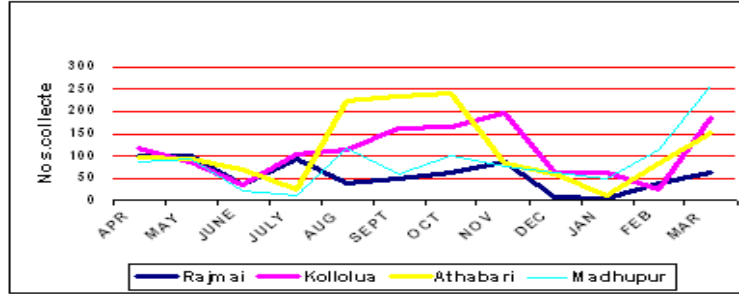
**Fig, Ardeid birds and ducklings (Reservoir of JE)**

This project is evaluating the impact of insecticide treated bed nets (ITBNs) on the transmission of Japanese encephalitis in four villages of Dibrugarh district, Assam, namely, Athabari (human population under ITBNs), Kollolua (both human and pig population under ITBNs), Rajmai (pig population under ITBNs) and Madhupur (no intervention). The pattern of potential vector densities in dusk collections (Fig.16)



**Fig. -16: Prevalence pattern of Potential JE vectors in study villages**

revealed that while in Athabari, Kollolua and Rajmai villages the relative proportion of *Cx. vishnui gp.* mosquitoes was the highest, in the Madhupur village there was a predominance of *Mansonia gp.* mosquitoes. In the Athabari village the inter-specific proportion of the *vishnui gp.* mosquitoes remained high throughout the year except in July when *Mansonia gp.* occupied the top position. In the Kollolua village the densities of *vishnui gp.* mosquitoes remained high throughout except in June and October when *Mansonia gp.* took over. In the Rajmai village the inter specific prevalence of *Cx. vishnui gp.* was highest during April, May, July, August, November, December, February and March whereas in the months of June, September and October *Mansonia gp.* was the highest. In the Madhupur village except during the period of January-April, when the densities of *Cx. vishnui gp.* were the highest, the densities of *Mansonia gp.* mosquitoes remained highest throughout. The relative prevalence of *Cx. vishnui gp.* mosquitoes in different months of the reporting period is given in Fig-17. So far about 600 pools of different potential JE vector mosquitoes have been preserved in liquid nitrogen for vector incrimination. Processing of a few mosquitoes pools by IFT revealed positivity for JE in 11 species.



**Fig-17: Prevalence pattern of *Cx. vishnui* gp. mosquitoes in the study area**

Periodical collection of blood samples from pig, and children group was carried for monitoring of JE antibodies. A total of 503 human and 303 pig blood samples were subjected to Haemagglutination Inhibition (HI) test using the JE virus-P20778 strain and JE Immune Peritoneal Fluid (IPF) No.83892-2 as Control (received from National Institute of Virology, Pune). In the Kollolua village (both human and pigs under ITMN)-14.4% pig sera and 10.9% human sera; in the Rajmai village (only pigs under ITMN)-11.6% pig and 12.2% human sera; in the Athabari area (only human under ITMN) –50.7% pig and 9.5 human sera and in Madhupur area (no intervention area) 43.8% sera and 33.5% human sera exhibited detectable JE antibody.

**Project- 14: Development of an early warning system for the transmission and outbreak of Japanese encephalitis (JE) with the help of Remote Sensing and GIS in conjunction with the epidemiological studies in Assam**

**Investigators : Dr. S. A. Khan, Dr. P. Dutta, Dr. J. Mahanta (RMRC, Dibrugarh); Dr. K. K. Sharma ( NESAC Shillong)**  
**Duration : 3 Years (2002 – 2005)**  
**Funding : Extramural (Deptt of Space)**

The main objective of this collaborative project was to develop a decision support system in the GIS domain towards development of an early disease warning system for the outbreak of Japanese encephalitis in Assam. The study was carried out in 8 villages under 4 PHCs viz. Khowang, Borbarua, Lahoal and Naharani in Dibrugarh district. The study has been completed.



**Ground verification of satellite data**



**Mansonioid mosquito breeding site**

### 14.1 Morbidity and mortality trend analysis

Long term trend of the JE cases and deaths was analyzed by fitting the data into different trend equations such as Linear, Quadratic, Exponential, Logarithmic etc. An increasing trend of JE cases since 2000 was observed after a consistently declining trend between 1990 and 1999. However, there was a consistent decline in deaths due to JE (Fig-18).

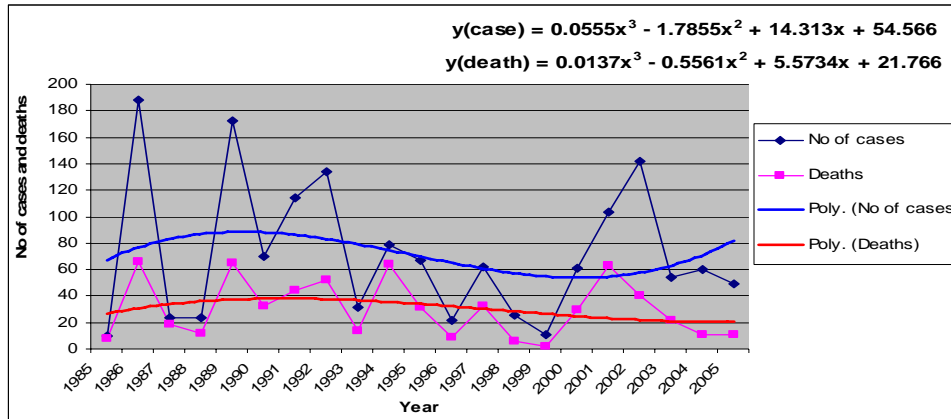


Fig- 18: Trend of JE cases and deaths (1985-2005) in Dibrugarh district

### 14.2 JE virus incrimination

Vector incrimination was done by Indirect Immuno-Fluorescence Test (IIFT). Presence of JE virus was demonstrated in the *Culex vishnui* group of mosquitoes viz. *Cx. vishnui*, *Cx. pseudovishnui* and *Cx. tritaeniorhynchus*. In addition, *Cx. fuscocephala*, *Cx. gelidus*, *Cx. quinquefasciatus* and *Mansonia annulifera* were also incriminated as JE vectors.

### 14.3 Serological Studies

A total of 2,560 blood samples from children of paediatric age group and 1,004 from pigs in the study villages were collected and tested for JE/arboviral antibodies by HAI test. Positivity of human sera ranging 4-20% and that of pig sera ranging 50-80% in different villages and different seasons were found. However, no significant demonstrable titre was found in caprine sera tested. About 25% of the collected sera were also subjected to Neutralization Test by using Vero Cell Lines (obtained from NIV, Pune) to confirm JE virus activity.

### 14.4 Mosquito breeding habitat characteristics in the sample collection points

Adult mosquito densities were correlated with the percentage of area under different mosquito breeding habitats in a buffer zone of 3 km from the sample collection sites. Significant variations were observed in mosquito abundance for different sample points. Extent of different land cover pattern showed varying effect on mosquito densities and species diversity. Extent of forest cover and wet land showed maximum influence on mosquito densities. Distribution and densities of mosquito larvae were found significantly correlated with the extent of settlement density, area under rice crop and area under wetlands in and around the sample collection points.

## 14.5 JE prediction model

Prediction of three outcome parameters *viz.* JE onset, disease intensity and JE prone areas was done using three different statistical approaches (Fig-19). Four seasons of disease occurrence were identified based on historical data *viz.* Very Early (May and before), Early (June), Normal (July) and Late (August and after).

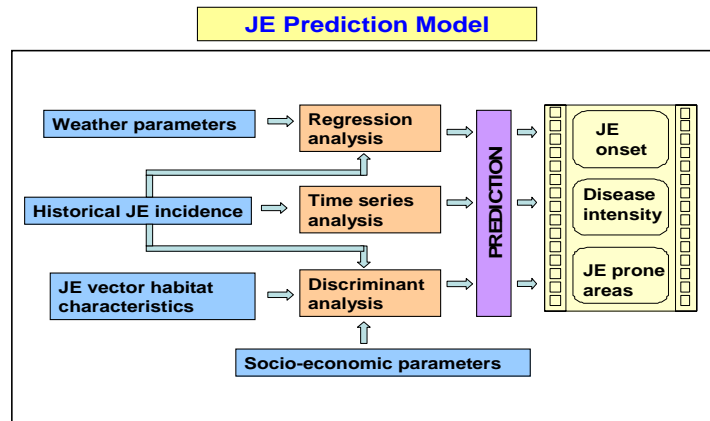


Figure-19

### 14.5.1 Predicting JE onset

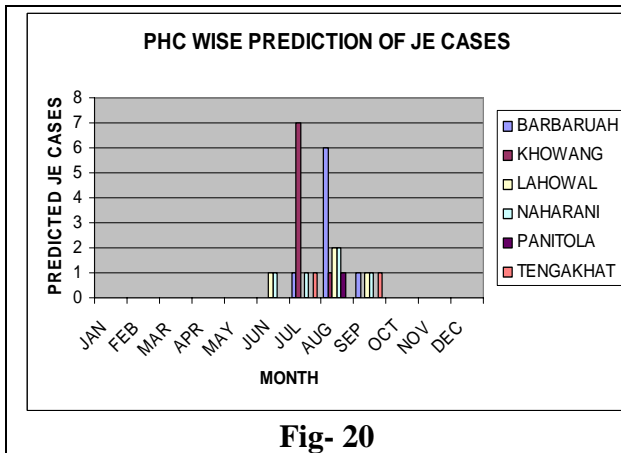
Discriminant analysis was carried out taking the weather parameters as the dependent variable and occurrence of JE cases as the group variables. From the historical data of occurrence of JE, four categories were made-

1. Very Early- If onset is reported in the month of May, April or earlier
2. Early - If onset is reported in the month of June
3. Normal- If onset is reported in the month of July
4. Late- - If onset is reported in August, September or later

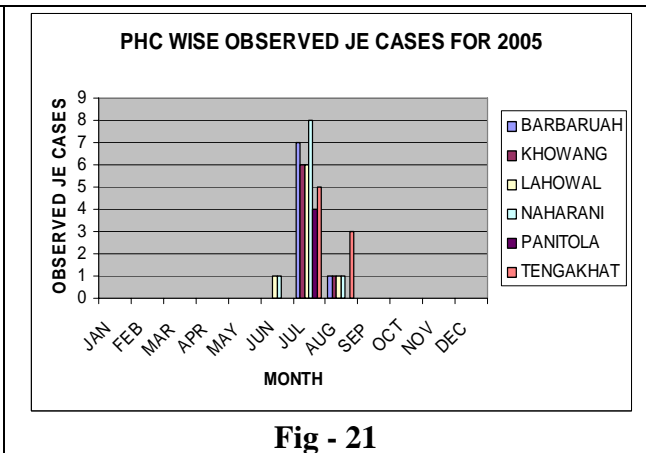
Among the individual weather parameters correlation between rainfall and JE cases was found to be significant ( $p < 0.01$ ). A minimum temperature range of near  $18.5^{\circ}\text{C}$  was found critical for the disease to appear and also to cease.

### 14.5.2 Predicting disease intensity

PHC wise prediction was made for all the 6 PHCs of Dibrugarh district for the year 2005. No cases were predicted from the two PHCs *viz.* Lahowal and Naharani in the month of June which matched perfectly with the observed situation (Fig. 20 & 21).



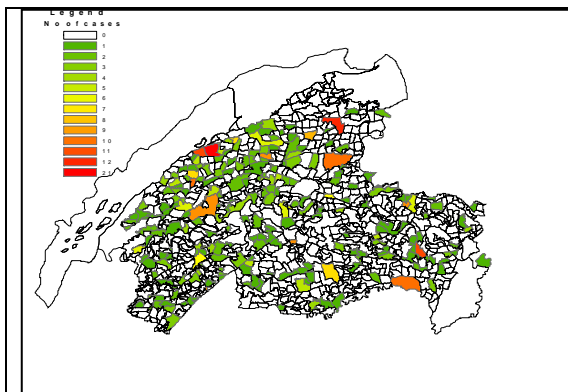
**Fig - 20**



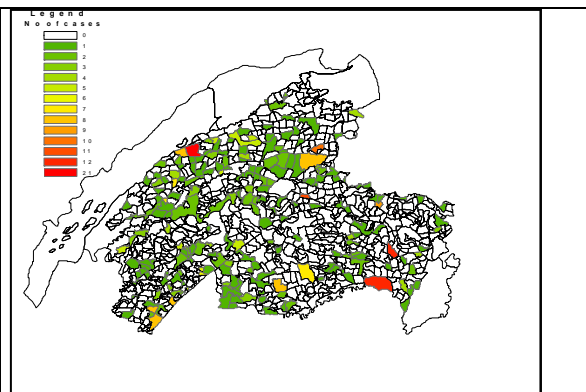
**Fig - 21**

### 14.6 Categorization of JE prone villages

JE prone villages were categorised based on the previous case history, land cover composition and corresponding mosquito density in the villages. Five categories for disease prone villages were made viz. very high, high, medium, low and very low. Ten yearly JE cases were clubbed and decadal maps of JE cases for Dibrugarh district were prepared (Fig.22 and 23).



**Fig-22: Decadal map of JE cases (1985-1995) for Dibrugarh district**



**Fig-23: Decadal map of JE cases (1996-2005) for Dibrugarh district**

### (D) HIV/AIDS AND DRUG ABUSE

Project- 15: Studies on HIV/AIDS and Drug abuse in Aizawl, Mizoram

**Investigators : Dr. J. Mahanta, Dr. P. K. Challeng; Director Health Services Mizoram**  
**Duration : 3 Years (2004 – 2007)**  
**Funding : ICMR (Task Force)**

This project aims to build up capacity for research in NE region and to conduct comprehensive research in the field of HIV/AIDS and drug abuse in Mizoram. The study is divided in to 3 phases and in the ongoing Phase I the sero-prevalence among the high-



**Drug Abuser in Mizoram**

risk behavioural groups (IDUs) and risk behaviour of other susceptible groups in the acquisition of HIV is being studied. During the reporting period, a total of 241 subjects were enrolled of which 230 were tested for HIV, HCV and HBV. The prevalence of HIV, HCV & HBsAg was found 13.5 , 56.1, and 5.7 % respectively (Table-6). HIV positive subjects were also tested for tuberculosis and information on socio-demography and risk behaviour of the enrolled subject was also collected.

**Table-6: Seroprevalence of HIV, HCV & HbsAg among IDUs in Mizoram (n=230)**

Age Years	HIV +ve			HCV +ve			HBs Ag +ve			All positives		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
10<	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
11-20	2	3	5	19	5	24	2	1	3	23	9	32
21-30	12	9	21	61	26	87	4	4	8	77	39	116
31-40	3	2	5	14	4	18	2		2	19	6	25
41-50	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
51-60	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
60+	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
<b>Total</b>	<b>17</b>	<b>14</b>	<b>31</b>	<b>94</b>	<b>35</b>	<b>129</b>	<b>8</b>	<b>5</b>	<b>13</b>	<b>119</b>	<b>54</b>	<b>173</b>

**Project- 16: Studies on HIV/AIDS and Drug abuse in Nagaland**

**Investigators : Dr. J. Mahanta, Dr. H. K. Das; Director Health Services, Nagaland**  
**Duration : 3 Years (2004 – 2007)**  
**Funding : ICMR (Task Force)**

This project aims to build up capacity for research in NE region and to conduct comprehensive research in the field of HIV/AIDS and drug abuse in Nagaland. The study is divided in to 3 phases and in the ongoing Phase I the sero-prevalence among the high-

risk behavioural groups (IDUs) and risk behaviour of other susceptible groups in acquisition of HIV is being studied. During the reporting period, a total of 154 subjects were enrolled including 119 IDUs from Kohima and adjoining districts. The age of the study subjects ranged from 16 to 41 yrs with intra quartile range of 23-29 yrs and a median age of 26 yrs. Prevalence of HIV, HCV & HBsAg among the current IDUs was found 6.7 %, 37.8 %, & 4.2 % respectively (Table-7). Prevalence of HCV increased with the increasing age (p=0.009) while the reverse was true for HBsAg (p=0.002). Hepatitis C co-infection among the HIV +ves was 33.3 %. No HIV+ve was positive for Hepatitis B surface antigen. HCV prevalence was highly significant with the duration of injecting career (p=0.002).

**Table-7: Seroprevalence of HIV, HCV & HbsAg among IDUs in Nagaland (n=152)**

Study group	N	HIV	%	HCV	%	HbsAg	%
Injecting Drug users	119	8	<b>6.7</b>	45	<b>37.8</b>	5	<b>4.2</b>
Past IDUs	20	1	5	3	15	1	5
Oral Drug Users	12	0	0	2	16.6	1	8.3

**Project-17: Mapping, size estimation and integrated behavioural and biological survey for HIV/AIDS in Manipur and Nagaland**

**Investigators : Dr. J. Mahanta, Dr. G. K. Medhi**  
**Duration : 5 Years (2005-2009)**  
**Funding : Extramural**

The study was initiated in 5 districts of the two north-eastern states of India viz Nagaland (Dimapur, Phek and Wokha districts) and Manipur (Bishenpur and Churachandpur districts) mainly to evaluate the on going HIV/AIDS intervention programmes under the AVAHAN initiative in high risk population groups like injecting drug users (IDUs) and female sex workers (FSWs). The study is aiming to collect information on different biological and behavioural indicators of risk of HIV/AIDS infection. While in Manipur only IDU population has been included, in Nagaland both the high risk groups i.e. FSWs and IDUs are being covered. Respondent driven sampling (RDS) method, suitable for hidden population, is being adopted for the sampling. The estimated sample size for study is 400 for each target group in each district.

During the reporting period the study instruments for both the groups were developed, pre-tested and modified to be used for behavioural data collection. The detailed training programmes were held for each stage of the study for the project staff. In each district two RDS centers were setup for achieving required coverage and data collection began in both the states. In Manipur, 90% of sample size was covered. In Nagaland, more than half of FSW samples was covered and data collection for IDUs started. Biological samples are being analyzed centrally at RMRC, Dibrugarh.



**A RDS centre in Manipur**



**IBBA Laboratory**

## (E) TREMATODE INFECTIONS

### **Project-18: Molecular characterization and infrapopulation differentiation of *Paragonimus lung flukes* in north eastern region of India**

**Investigators: Dr. K. Narain, Dr. K. Rekha Devi, Dr. J. Mahanta**

**Duration : 3 Years (2005 – 2008)**

**Funding : ICMR (EM)**

Of the 50 or more species of *Paragonimus* reported only 9 species are known to infect man. However, the taxonomic identity of many species is under question pending further molecular characterization of these flukes. Even the *Paragonimus westermani*, the most common lung fluke of man, is known to be a complex of species and shows variation in pathogenicity and other biological variations in different geographical areas. Paragonimiasis is endemic in many areas of north-east India, nevertheless, the species of paragonimus present in NE region have yet to be characterized at molecular level. In view of this the present study was taken up to identify at molecular level different species of *Paragonimus* prevalent in the region and to study intra-specific genetic diversity of *Paragonimus*.

Surveys were carried out in the two north-eastern states, Arunachal Pradesh and Meghalaya. Human focus of *P. westermani* was detected in both the states based on clinical data and ELISA screening. Crabs were collected from the study area and examined for metacercarial infection. The metacercariae were collected from the crabs and developed to adult worms in experimental animal. Both the strains of *P. westermani* developed to adult stage in the animal model. Adults and metacercariae of *Paragonimus* recovered from both the study states were processed for molecular identification by sequencing second internal transcribed spacer (ITS2) of the nuclear ribosomal gene

repeat and partial sequence of mitochondrial cytochrome C oxidase subunit 1 (CO1). Analyses for multiple sequences were done to build phylogenetic tree.

## (F) OTHER MICROBIAL DISEASES

Project- 19: Diagnosis and molecular epidemiology of tuberculosis in the North-east

**Investigators : Dr. J. Mahanta, Dr. K. Narain, Dr. K. Rekha Devi, (RMRC, Dibrugarh) ; Dr. V. M. Katoch (CJIL, Agra)**

**Duration : 3 Years (2004 – 2007)**

**Funding : ICMR (EM)**

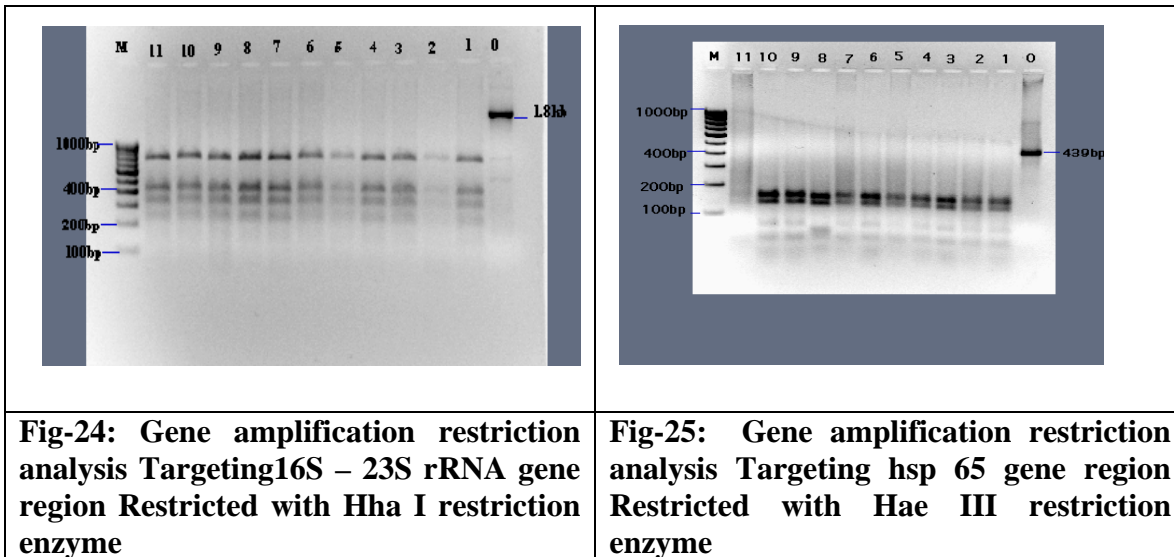
This collaborative project is being undertaken to understand the transmission of tuberculosis using DNA fingerprinting techniques in select populations of north-east India; and to establish microbiological & molecular biological techniques for tuberculosis diagnosis and determination of drug resistance in north-east India. During the period under report a total of 301 sputum samples were collected from the tuberculosis patients (187 males, 114 females) attending DOTS clinics under RNTCP in Assam. Among these, 106 sputum samples were positives for AFB on direct smear. A total of 158 samples were processed- 58 were culture positive. A total of 21 culture positive and 8 direct smear positive sputum samples were submitted to Central JALMA Institute, Agra for identification.

The drug susceptibility profile of 18 isolates of *M. tuberculosis* revealed that all the isolates were susceptible to rifampicin. However, 3 strains were resistant to one or more antimicrobial agents (Table-8).

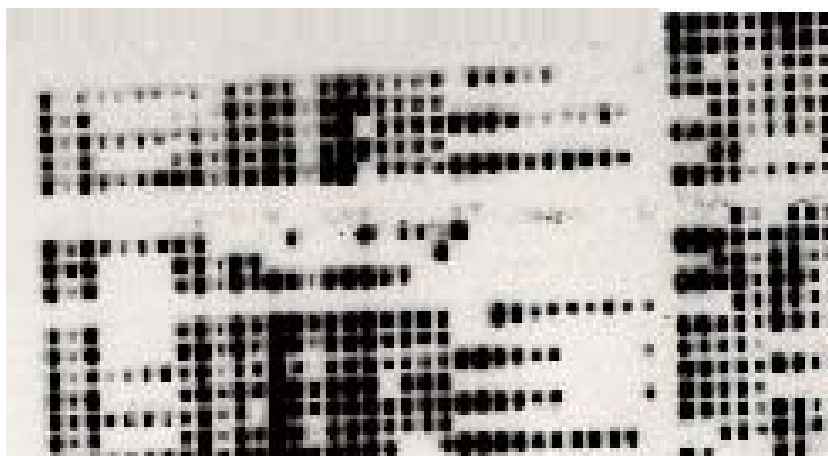
**Table-8: Drug susceptibility profile of *M. tuberculosis* isolates**

Susceptibility status	Refampicin	Isoniazid	Ethambutol	Streptomycin	Pyrazinamide
Sensitive [%]	100	70.6	94.4	72.2	100
Resistant [%]	0	29.4	5.6	27.8	0
Total strains tested	18	17	18	18	9

Conventional biochemical tests and molecular methods confirmed that 19 of 21 tested AFB positive samples belonged to *M. tuberculosis* complex (Fig 24 & 25).

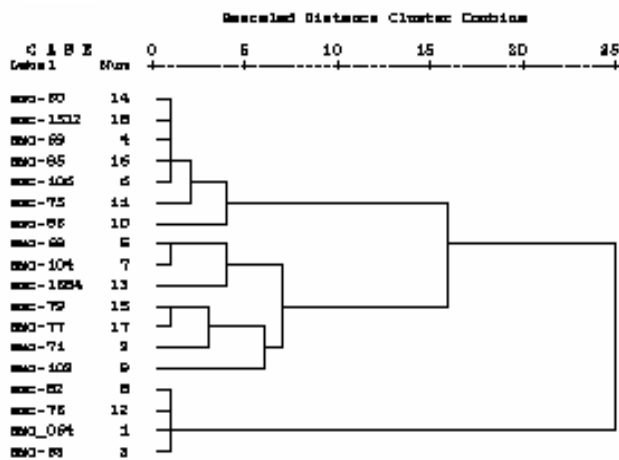


The results of spoligotyping (Fig-26) revealed that 11 (61.1 %) spoligotypes belonged to previously identified shared spoligotypes. Seven (38.9%) isolates were orphan i.e. were unique to Assam. Predominant spoligotypes were ST1 (Beijing) 22% and ST26 (CAS family) 16%.



**Fig-26: Spoligotyping of *M. tuberculosis* isolates from Assam**

Cluster analysis (Fig-27) revealed that the 18 *M. tuberculosis* isolates formed three distinct clusters. Cluster 1 (lower cluster) includes ST1 isolates (Beijing clade), middle cluster includes 4 unique strains (orphan) strains in addition to 3 shared types. The upper cluster mostly included ST 26 spoligotypes (CAS clade).

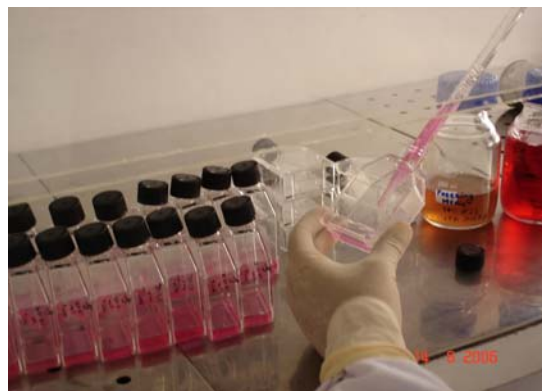


**Fig-27: Relatedness among *M. tuberculosis* strains (n=18) of Assam based on Spoligotyping**

**Project- 20 : Multi-site monitoring of human influenza virus in India**

**Investigators : Dr. J. Mahanta, Dr. D. Biswas**  
**Duration : 2 Years (2005-2007)**  
**Funding : Extramural (WHO-CDC-ICMR)**

This collaborative project was taken up with the objectives of (i) establishing an Influenza Surveillance Centre in Dibrugarh as a part of overall network in India and (ii) to isolate and characterize the prevalent human influenza virus strains from the patients with acute respiratory infections in Dibrugarh, Assam. A total of 281 nasal/throat swab samples (males 144, females 137) were collected from one PHC and a referral hospital of



**Cell lines being maintained at the centre**

Dibrugarh of which 191 were sent to AIIMS, New Delhi and 90 to NIV, Pune. Tissue culture facility was established in RMRC, Dibrugarh and a 6 virus isolations (5 H1N1 and 1 Type B) were made after processing 111 samples (Table-9). Forty eight samples were inoculated into embryonated eggs and HA test was performed on the harvested amniotic

fluid. HA titre was detected in 8 samples. These samples have been sent to the reference laboratory for strain identification.

**Table-9: Age distribution of Influenza virus isolates in Dibrugarh district**

Age group (Years)	Isolated Influenza viruses			
	Type-A (H1N1)	Type-B	Others	Total
≤5	1	0	0	1
6-12	2	1	0	3
13-18	0	0	0	0
> 18	2	0	0	2
Total	5	1	0	6

**Project-21: An epidemiological survey of superficial fungal infections with special reference to Sporotrichosis among tea garden workers in and around Dibrugarh, Assam**

**Investigators : Dr. D. Biswas, Dr. J. Mahanta (RMRC, Dibrugarh); Dr. A. Chakravorti, Mr. J. A. David, Dr. M. Sarmah (PGIMER, Chandigarh)**

**Duration : 3 Years (2003 – 2006)**

**Funding : ICMR (EM)**

This collaborative project is estimating the prevalence of clinical sporotrichosis in tea garden population and characterizing the strains of *S. schenckii* available in this area. The study was carried out in 4 tea garden hospitals of Dibrugarh district among OPD attendees with or without skin lesions. During the reporting period, a total of 484 persons (256 males, 228 females) were examined of which 21.7% showed positive sporotrichocin test (8.9% males, 12.8% females). The environmental samples and samples from the skin lesions were processed for demonstration of the fungal element, isolation and identification of the fungus by direct microscopy (KOH preparation), inoculation into the SDA media and observing the culture characteristics. A total of 147 samples, out of 207 collected, were processed of which 55 were found KOH positive and fungus was isolated from 46. Remaining samples have been sent to PGI, Chandigarh for further processing.

## (G) SOCIAL AND BEHAVIOURAL SCIENCES

**Project-22 : Study of health consequences of domestic violence with special reference to reproduction health**

**Investigators : Dr. J. Mahanta, Dr. N. C. Hazarika, Dr. H. K. Das**

**Duration : 2 Years (2004-2005)**

**Funding : ICMR (EM)**

In view of lack of data on prevalence of different forms of domestic violence, correlates of violence and the health consequences, especially on reproductive health, from the north-eastern region of India, the present multi-centric Task Force study of ICMR was undertaken during 2004-2005 in 3 north-eastern states *viz.* Assam, Meghalaya and Sikkim to gather first hand information and analyse various pathways, outcome and their relationship with domestic violence and related issues. A total of 2,254 women and equal number of men (Rural 1,581, Urban 673) from Meghalaya (n=454), Assam (n=650) and Sikkim (n=1,150) were included in the study. The study area comprised of 16 villages (for Women 8, for Men 8) from 2 districts in each state *viz.* Dibrugarh, Kamrup (Assam), East Khasi Hills, West Garo Hills (Meghalaya) and East Sikkim, North Sikkim (Sikkim).

Of all types, psychological violence (Rural 28.1%, Urban 19.3%) was the major form of domestic violence followed by physical violence (Rural 3.4%, Urban 3.7%) and sexual violence (Rural 2.3%, Urban 2.5%). Among the 3 states, the magnitude of domestic violence was highest in Assam followed by Sikkim. Although domestic violence was reported irrespective of classes, ages, religions and castes, some socio-demographic variations were observed. Psychological violence in Christian community (42.2%), physical violence in Hindus (5.6%) and sexual violence in Muslim community (4.2%) were more commonly reported. The psychological violence was highest (32.4%) among the lowest income group (per capita income Rs. 1000-3000). Domestic violence was predominantly reported among the women who refuse sex with husband or who perceive to have a girl child during the pregnancies. Psychological violence (98.8%) followed by physical violence (56.3%) was the major form of violence faced by women during pregnancy. Overall, reasons for various types of domestic violence were financial hardship, alcohol consumption, extramarital affairs and illiteracy.

## (H) OUTBREAK INVESTIGATIONS

### 1. Outbreak investigation of suspected hepatitis in Upper Dibang Valley district, Arunachal Pradesh

**Investigators : Dr. D. Biswas, Dr. J. Mahanta**

**Funding : ICMR (IM)**

On request from the State Health Authority, Arunachal Pradesh, a team of investigators from RMRC, Dibrugarh visited Dibang valley district of Arunachal Pradesh from 12-14 August 2005 to investigate suspected hepatitis outbreak in Anini township. A community based survey was undertaken and a total of 438 blood samples were collected from 198 male and 240 females suspected cases of hepatitis. The cases were clinically examined and blood samples were tested for Hepatitis-B and Hepatitis-C virus infection. All the samples were found negative for HCV and 21.2% samples were positive for HBsAg.



**Suspected Hepatitis investigation at Anini**

## **2. Investigation on outbreak of fever of unknown aetiology in Nagaland**

**Investigators : Dr. D. Biswas, Dr. J. Mahanta**

**Funding : ICMR (IM)**

In response to the request of DGHS (EMR), New Delhi a team from RMRC, Dibrugarh accompanied the five member team from Delhi to investigate outbreak of unknown fever in Mokokchung district of Nagaland during November, 2005. The team visited Longsa, Longleng and Pongo villages. Detailed clinical history and clinical findings from the fever cases were recorded and 14 blood samples, 7 peripheral blood smears and 14 nasal and throat swabs were collected from the fever cases. Samples were sent to NICD, Delhi for laboratory investigations. Six out of 14 blood samples showed serological evidence of infection of scrub typhus and all the peripheral blood smears were found negative for malarial parasite.