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UNIVERSITY**

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Manipal Centre for Virus Research

Manipal University, Manipal, Karnataka



**ANNUAL REPORT OF
HOSPITAL BASED SURVEILLANCE OF
ACUTE FEBRILE ILLNESS IN INDIA**

30 November, 2016

Project established under the Cooperative Agreement,
Grant No: 5U01GH001051, awarded to Manipal University
by Centers for Disease Control and Prevention (CDC),
Atlanta, USA

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About MCVR, Manipal

Manipal Centre for Virus Research (MCVR), Manipal University was created on 1st May 2010 by upgrading the virology laboratory of the Department of Microbiology, Kasturba Medical College, Manipal into a university department.

Currently, MCVR houses the IDSP-Regional Reference Laboratory For Influenza Virus and the DHR/ICMR Virus Research and Diagnostic Laboratory- Grade I. MCVR is also the NVBDCP Apex Referral Laboratory for Dengue, Japanese Encephalitis and Chikungunya; all of which are Ministry of Health and Family Welfare (MoHFW), Government of India supported programmes. MCVR is also one of the major facilities for Zika Virus diagnostics and surveillance in the country. The centre also enjoys excellent working relationship with National, State and District Public health services.

MCVR has strong collaborations with International institutions like Centers for Disease Control and Prevention (CDC), Atlanta, USA; WHO Collaborating Centre for Influenza Reference and Research at the Victorian Infectious Diseases Reference Laboratory (VIDRL), Melbourne, Australia; The Public Health England (PHE), Colindale, UK; American Society of Microbiology, USA and University of Lille 2, Lille, France.

MCVR has the uniqueness of hosting a public service programme on a private platform and in the short span of time it has proven to be one of the best public private partnership in the development of public health infrastructure in the country.

Apart from disease diagnostics, MCVR supports the state and national health services for outbreak investigation and disease surveillance activities. MCVR has been instrumental in confirming more

than 150 viral outbreaks, while around 30 outbreaks were investigated by MCVR team in various parts of the country including Karnataka, Kerala, Goa, Uttar Pradesh and Odisha in the recent past. The AFI Surveillance project under the Global Health Security Agenda (GHS) has been implemented in 27 Sentinel hospitals distributed across 10 states of India including Karnataka, Kerala, Assam, Goa, Gujarat, Maharashtra, Jharkhand, Tripura, Tamil Nadu and Odisha in close coordination and collaboration with the respective state health services.

Manipal Centre for Virus Research also offers Master of Science in Clinical Virology program, which is a focused unique competency based flexible postgraduate course intended to create a new cadre of virologists and conducts series of training programs in the field of practice oriented virology, biosafety and biosecurity to strengthen the manpower. The centre also runs short courses and training programmes, thereby contributing in creating a stronger public health cadre.

Research at MCVR focuses on translational virology which aims at transforming the department into a centre of excellence in diagnosis and research. Research includes community based epidemiologic studies, molecular epidemiology and development of viral diagnostic kits and devices.





HOSPITAL BASED SURVEILLANCE OF ACUTE FEBRILE ILLNESS IN INDIA

Acute Febrile Illness (AFI) are caused by a variety of infectious agents, including viruses, bacteria, and parasites some of which are amenable to therapeutic and/or preventative interventions. Advances in laboratory diagnostics have greatly enhanced understanding of the infectious aetiologies of Acute Febrile Illness (AFI). However, significant gaps remain about the knowledge and understanding of burden, etiologic spectrum, and risk factors associated with AFI happening in India.

With an objective to bridge this gap and generating evidence for public health action, Manipal Centre for Virus Research, Manipal University in collaboration with Centers for Disease Control and Prevention (CDC), Atlanta and the Health Departments of the respective states, initiated the Hospital Based Acute Febrile Illness (AFI) Surveillance in India, under the Global Health Security Agenda (GHSA).

Manipal Centre for Virus Research (MCVR) has been successful in extending credible support to the disease surveillance of the country through the AFI Surveillance platform by providing case based real time surveillance data. The project was first implemented in Shimoga district of Karnataka in June 2014 and the latest being Koraput District of Odisha in September 2016. The project as of date has been implemented in 27 Sentinel hospitals distributed across 10 states of India including Karnataka, Kerala, Assam, Goa, Gujarat, Maharashtra, Jharkhand, Tripura, Tamil Nadu and Odisha in close coordination and collaboration with the respective state health services.

Methodology

This study aims to characterize the infectious causes of Acute Febrile Illness (AFI) among patients in Sub-District Hospitals in India. The study focuses on identifying pathogens including parasite (limited to malaria), bacterial, viral and other unknown causes of AFI.

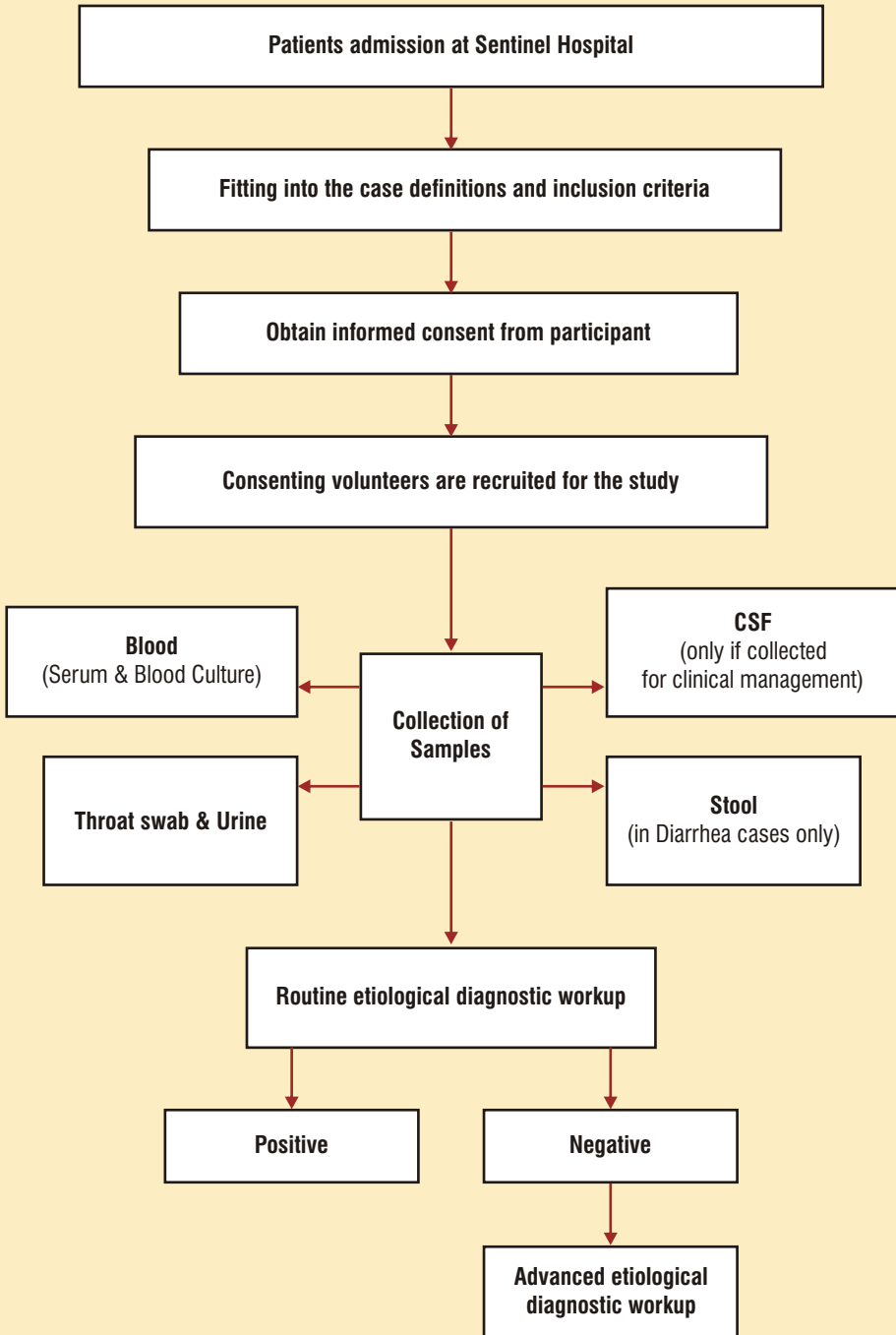
For the purpose of this project, a case of Acute Febrile Illness (AFI) is defined as, a sick case older than 1 year and younger than 65 years of age admitted to one of the participating hospitals with fever ($\geq 38^{\circ}\text{C}$). All cases falling under the definition is recruited as a case. Detailed clinic epidemiological data is collected from the cases on the Case Report Form (CRF). Various clinical samples including blood for serum, blood culture, urine, throat swab and stool sample (when required) and CSF (when collected by clinician as part of clinical management of the patient will also be obtained to conduct various tests for the aetiology of AFI.

We use serology (ELISA), molecular diagnostic assays (Real Time PCR) and antigen detection assays for the laboratory diagnosis of AFI cases. Clinical samples may also be tested for unknown pathogens using PCR - sequence based pathogen discovery techniques.

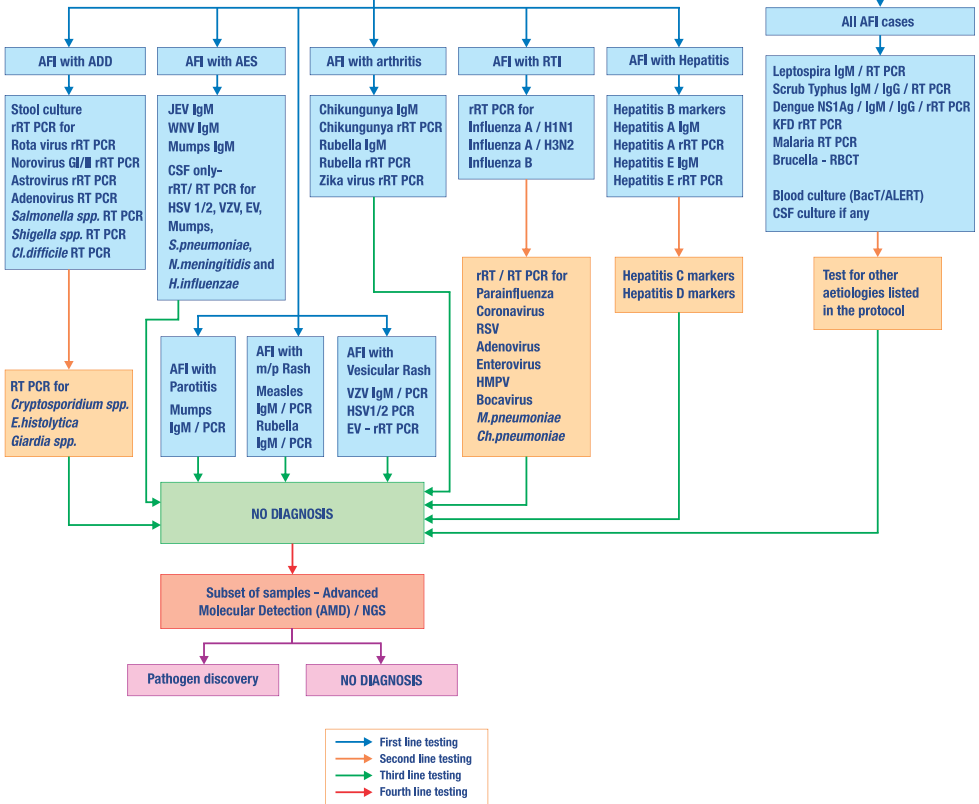
Clinical samples are transported to MCVR on a daily basis under cold chain. The results are communicated within 48 hours to the treating doctor under intimation to the State and District Health officials.



A flow chart below is a summary of the activities



AFI DIAGNOSTIC ALGORITHM



Outcomes of the project

This hospital based AFI surveillance generates valuable epidemiological data on infectious diseases in the country to take evidence based public health action and generate evidence based health policy for the prevention and control of infectious diseases. This hospital based AFI surveillance aims to strengthen the public health

laboratories by providing necessary equipment and protocols to enable onsite diagnosis of common diseases. Further, it will help the public health infrastructure of the country in identifying emerging disease trends early which will in turn result in detection of outbreaks in the early stages and implementing effective control measures.



KARNATAKA



Shimoga / Shivamogga

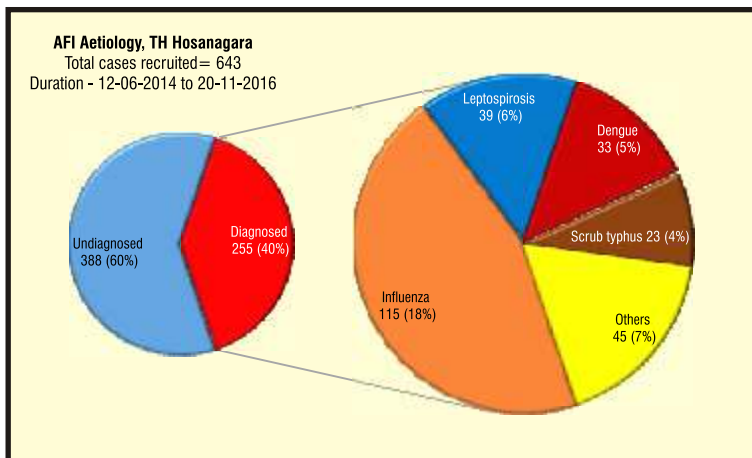
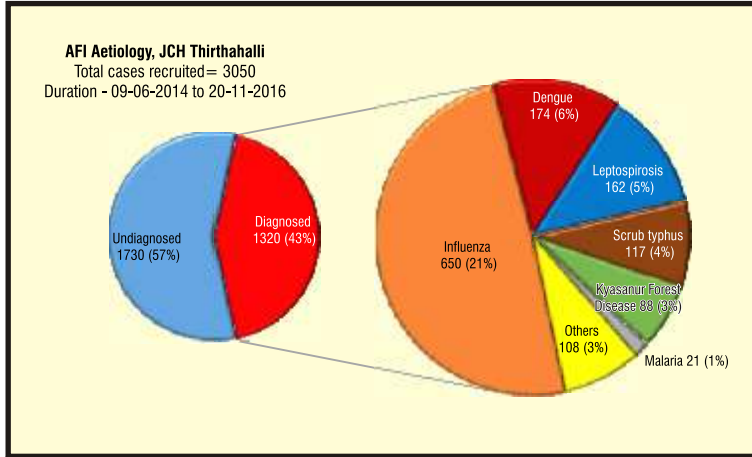
(Population: 1752753)

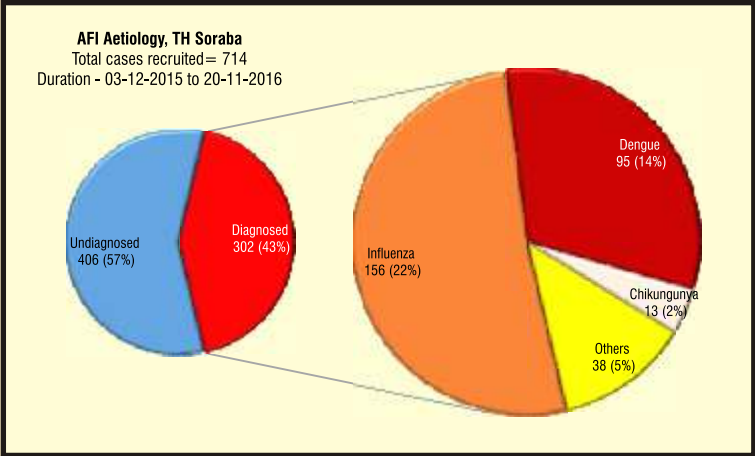
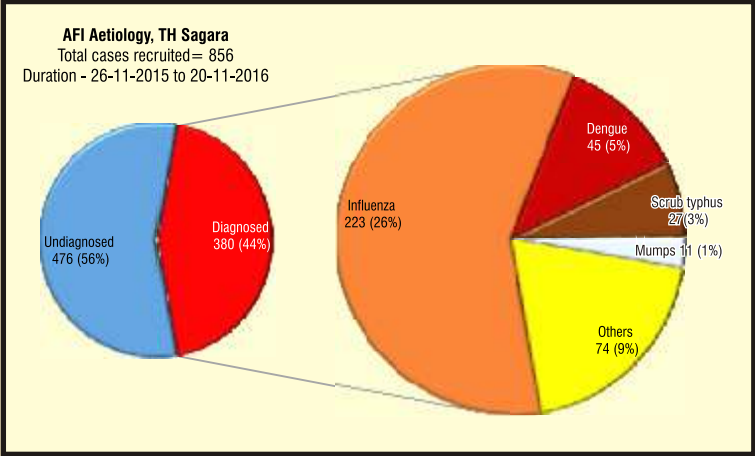
The Acute Febrile Illness (AFI) Surveillance Project began successfully in June 2014 with the launch of the study sites in Shimoga district, namely the Taluk hospitals in Thirthahalli and Hosanagara. The project began with the recruitment of the first case in JCH Hospital, Thirthahalli on 9th June 2014 and in Taluk Hospital in Hosanagara on 12th June 2014.

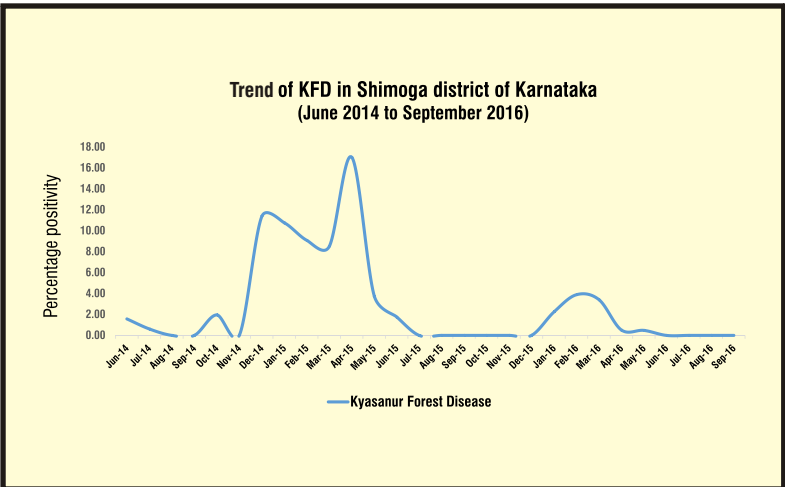
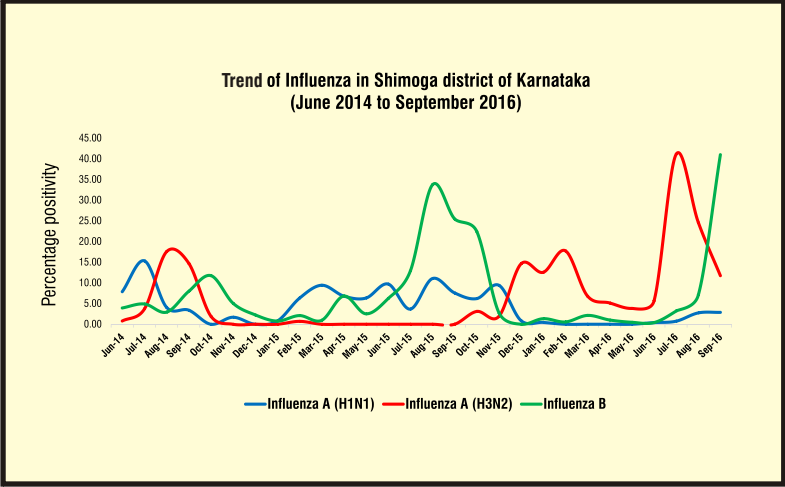
Shimoga lies in the Malnad region of Western Ghats and has seven taluks under its jurisdiction, out of which AFI sites are housed in four of the **Taluk Hospitals - Thirthahalli, Hosanagara, Sagara and Soraba.**

Taking average number of recruits in account the Taluk Hospital in Thirthahalli is the busiest of all the four and has a capacity of 100 beds which includes Male, Female, Paediatric and Maternity wards. Similarly, the Hosanagara Hospital holds 50 beds.

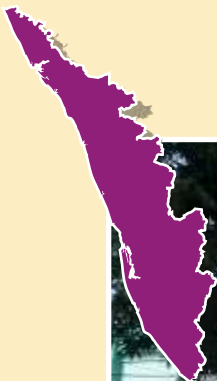
After the successful operation in these two sites, two more AFI sites were launched in Sagar Taluk Hospital on 26th November 2015 and Soraba Taluk Hospital on 3rd December 2015, both of which have a massive capacity of 100 beds.







KERALA



Wayanad (Population: 817420)

Wayanad is a district in the north-east part of Kerala state, stands on the southern top of the Deccan plateau and that span over a part of Western Ghats region with lofty ridges and rugged terrain interspersed with dense forest and deep valleys. This place has great importance as it is one of the leading tourist spot of South India and also has the largest population of aborigine people who belong to distinct tribes.

We initiated the AFI surveillance project **Taluk Headquarter Hospital (THQH) Sulthan Bathery, Wayanad**. The THQH is a 57 bedded hospital which caters to considerably large tribal communities. The implementation of the project was so well timed that we were able to detect the very first cases of Kyasanur Forest Disease (KFD) in the district. Early

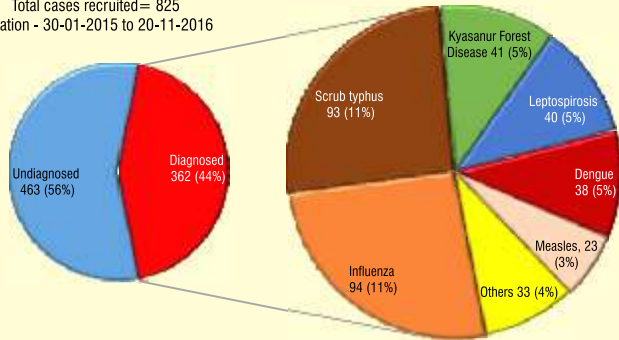
detection of the KFD outbreak in Wayanad was helpful to the district health administration in initiating preventive response mechanism effectively.

On 14th June 2015, we started the second sentinel site in **District Hospital, Manathavady**, a 274 bedded hospital.

As an outcome of this project, Manipal Centre for Virus Research (MCVR) in collaboration with Government of Kerala have established an advanced laboratory for infectious disease diagnostics in SulthanBathery, Wayanad. The laboratory which will be a milestone in the healthcare infrastructure of the district and is scheduled to be functional in December 2016.

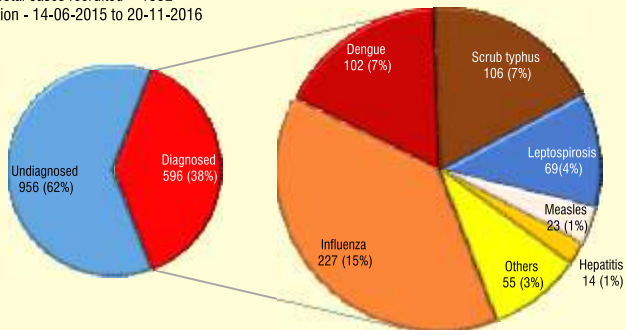
AFI Aetiology, THQH Sulthanbathery

Total cases recruited = 825
Duration - 30-01-2015 to 20-11-2016

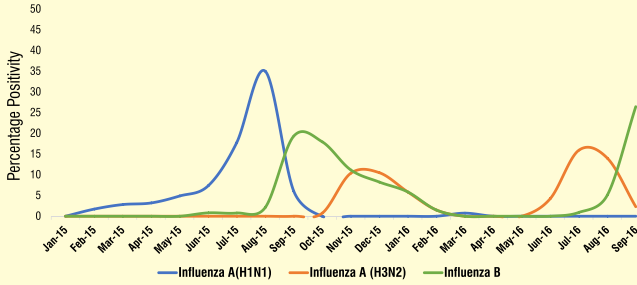


AFI Aetiology, DH Mananthwady

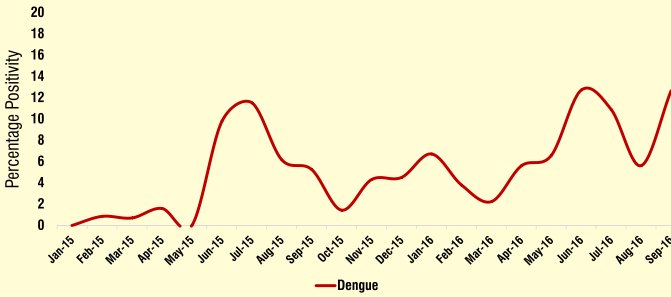
Total cases recruited = 1552
Duration - 14-06-2015 to 20-11-2016



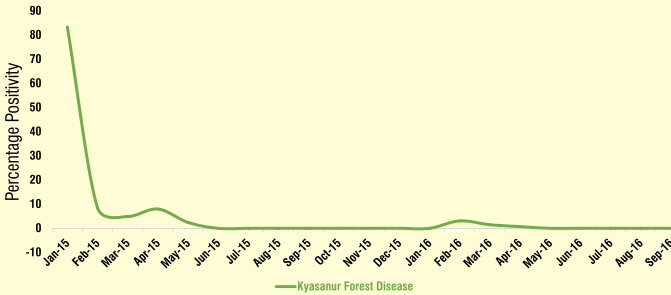
**Trend of Influenza in Wayanad district of Kerala
(January 2015 to September 2016)**



**Trend of Dengue in Wayanad district of Kerala
(January 2015 to September 2016)**



**Trend of Kyasanur Forest Disease in Wayanad district of Kerala
(January 2015 to September 2016)**



ASSAM



Assam is a state in North-Eastern India known for its wildlife, archaeological sites and tea plantations. Agriculture is the major occupation of the people. The symbiotic relation with the forest is evident in the region. The culture of the local people has evolved due to the cultural assimilation of different ethno-cultural groups under various politico-economic systems in different periods of time.

The AFI Surveillance project covers five sentinel hospitals across three districts including Kamrup Metropolitan, Kamrup and Morigaon.

Kamrup Metropolitan (Population: 1253938)

Recruitment of cases from District Hospital (DH), Sonapur commenced on 28 October 2015. The hospital is equipped with 60 beds and soon to be upgraded to 200 beds. It caters to a large population with patients from two adjacent districts.

Kamrup

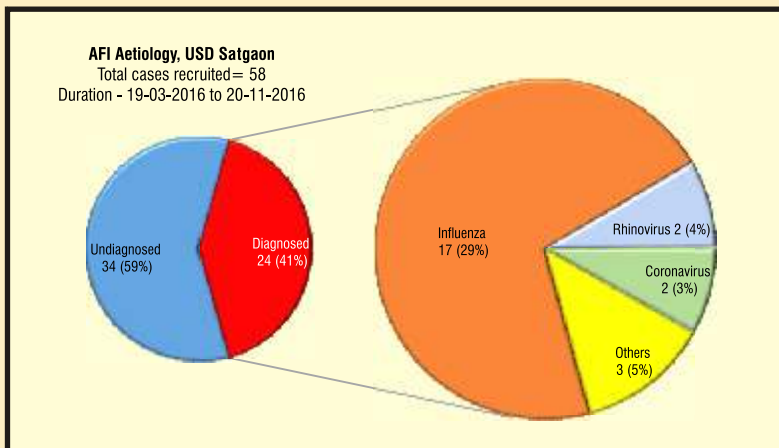
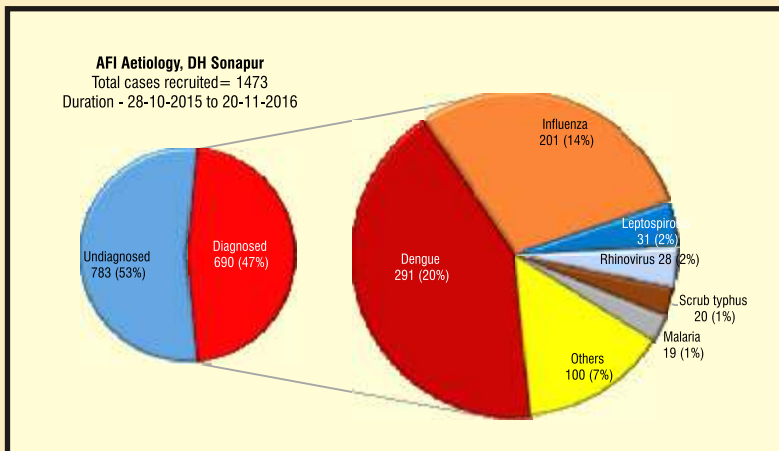
(Population: 1517542)

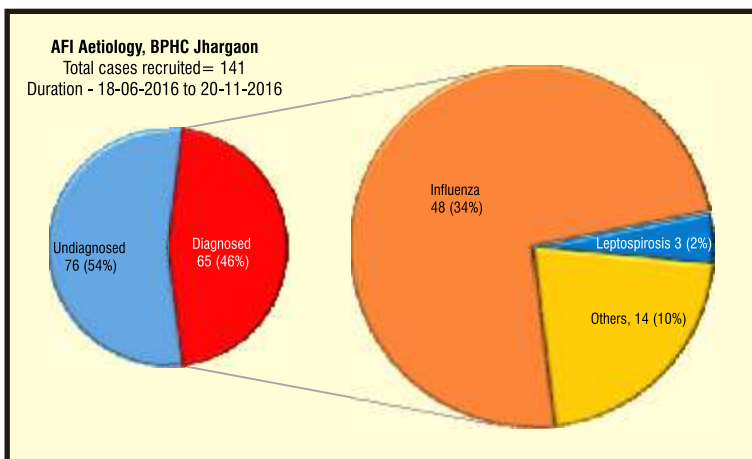
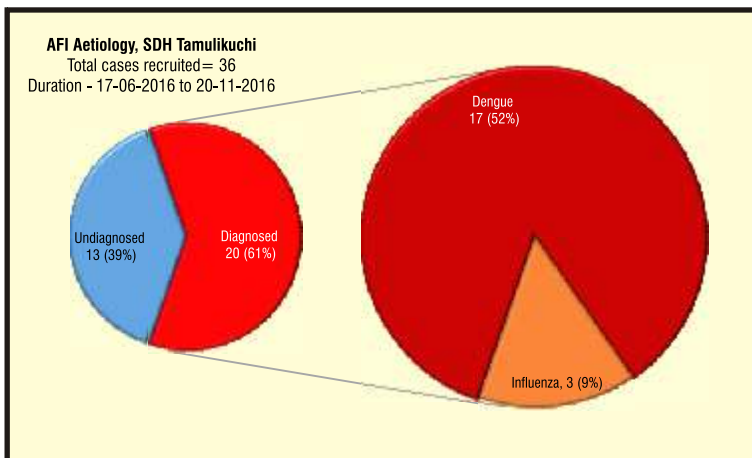
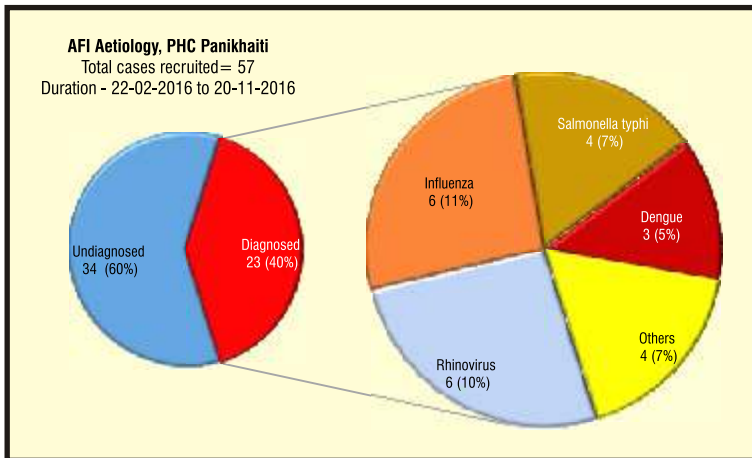
The AFI surveillance also covers three sentinel sites in Kamrup district of Assam. Recruitment of cases from Panikhaiti Mini PHC started on 22 February 2016; while recruitment from the Urban State Dispensary (USD), Satgaon started on 15 March 2016. Located in the state border of Meghalaya and Assam, Sub District Hospital (SDH), Tamilikuchi is the fourth Sentinel hospital from where recruitment started on 17 June 2016. Most of the population covered by this hospital resides in the hills and the livelihoods involve close proximity to forests.

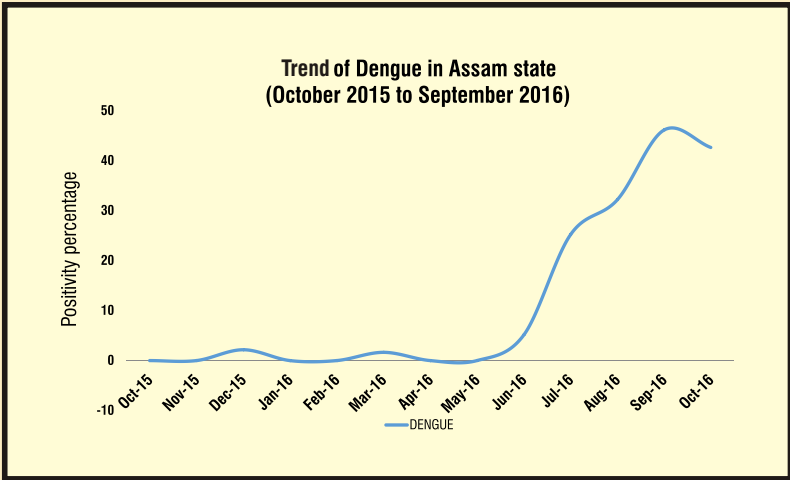
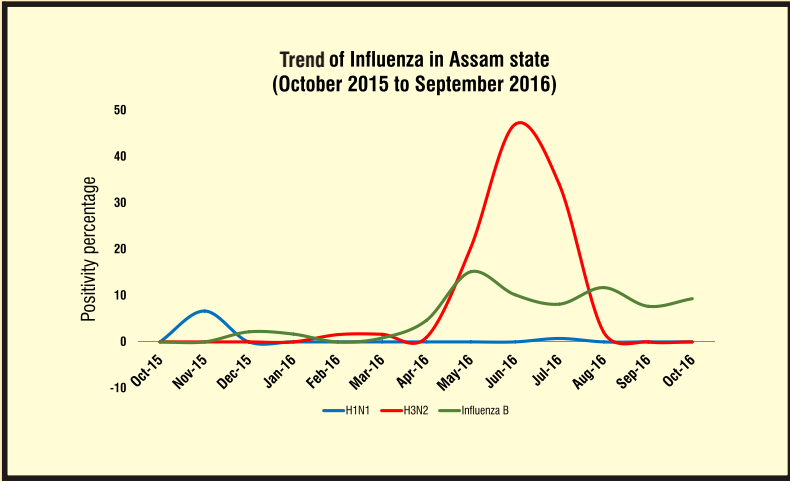
Morigaon

(Population: 957423)

Block PHC (BPHC), Jhargaon located in Morigaon district is the fifth Sentinel hospital in Assam. Jhargaon is a village located 23 km towards west from District headquarters Morigaon. The north of Jhargaon is bound by the picturesque ranges of the outer Himalayas, while Killing, Kolong and Kopili rivers flow through the southern part. The recruitment started from the Jhargaon Block PHC, a 10 bedded Public Health Centre, on 18th June 2016.







GOA



North Goa (Population: 818008)

Goa is located in southwest India, bounded by Maharashtra to the north and Karnataka to the east and south, while the Arabian Sea forms its western coast. It is India's smallest state by area. Goa, being in the tropical zone and near the Arabian Sea, has a hot and humid climate for most of the year. The month of May is the hottest and the monsoon rains arrive by early June which last till late September. The Western Ghats, which form most of eastern Goa is recognised as one of the biodiversity hotspots of the world.

Community Health Centre, Valpoi, located in the Sattari taluk of North Goa district was selected as the first sentinel site. The Western Ghats form the

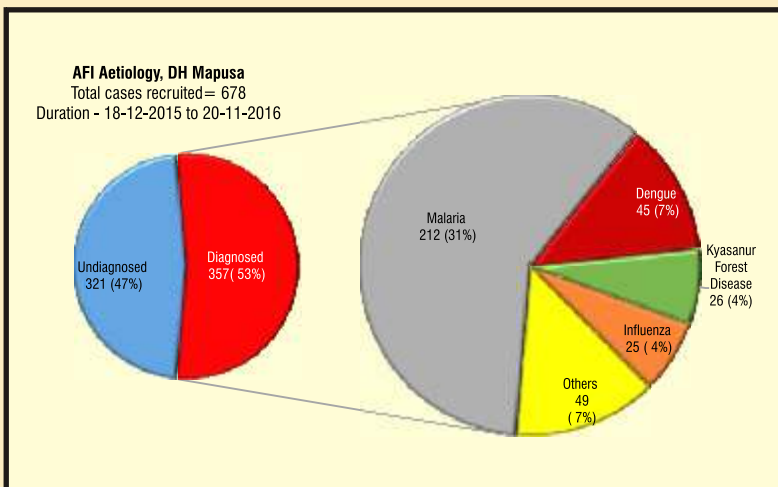
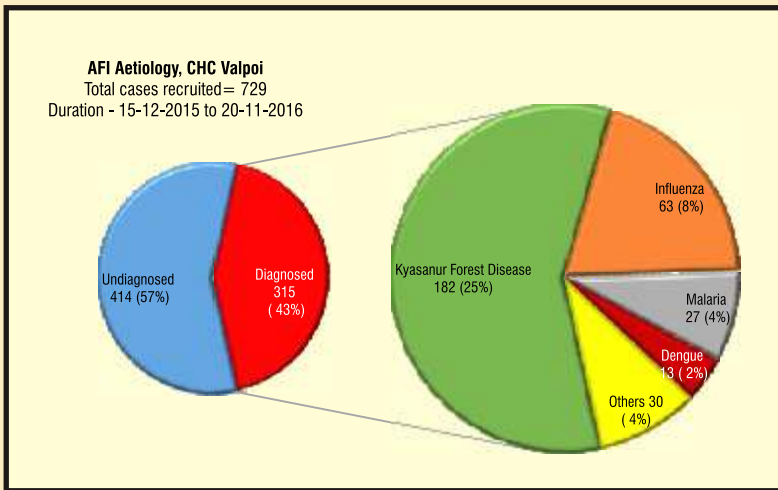
eastern part of Sattari taluka with most of the villages situated in close proximity to the dense forests and Mhadei wildlife sanctuary. Most of the population visiting the CHC Valpoi are from the surrounding villages of Sattari taluk and from Valpoi town. A big majority of the population live in close proximity to the forest. Major occupations involve cashew plantations, distributed along the periphery of the forest.

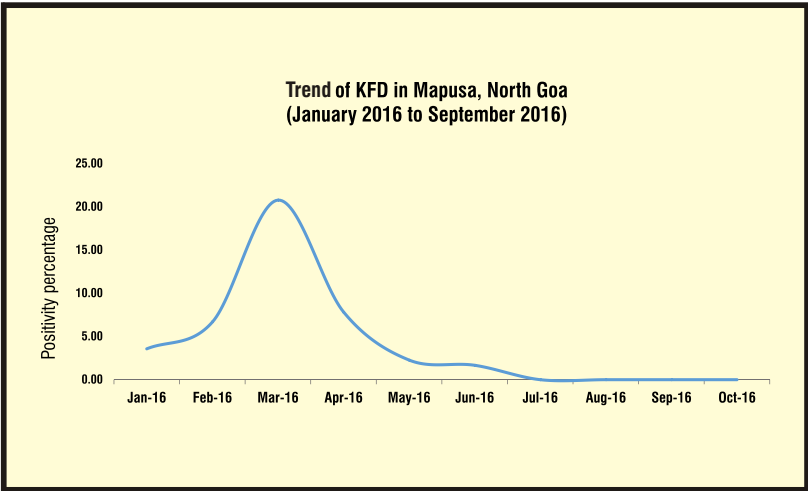
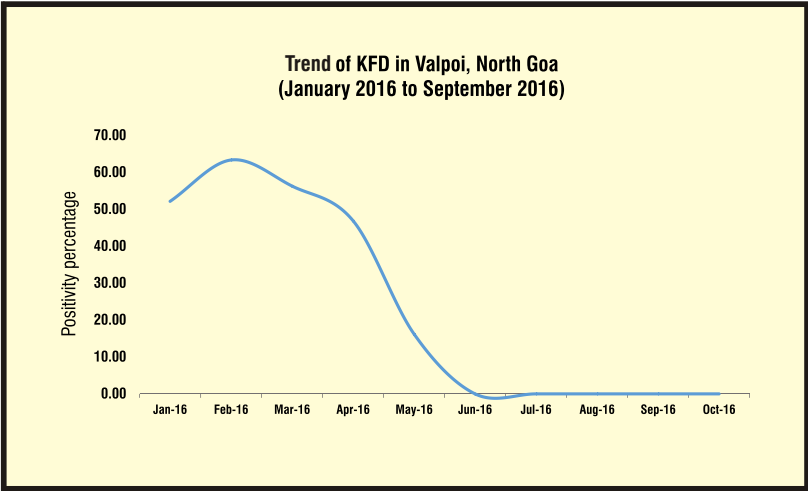
Recruitment of cases from CHC Valpoi started on 15th December 2015. The common etiologies from the CHC include Influenza, Malaria and Kyasanur Forest Disease (KFD). CHC Valpoi reported highest number of KFD cases during December 2015 to

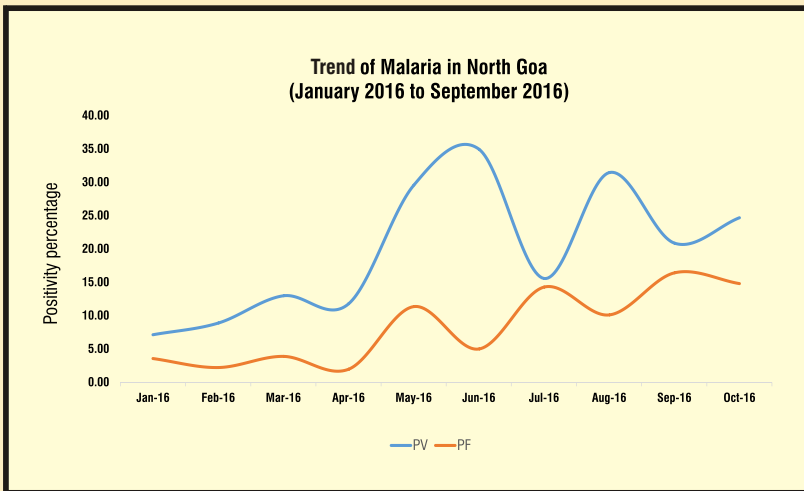
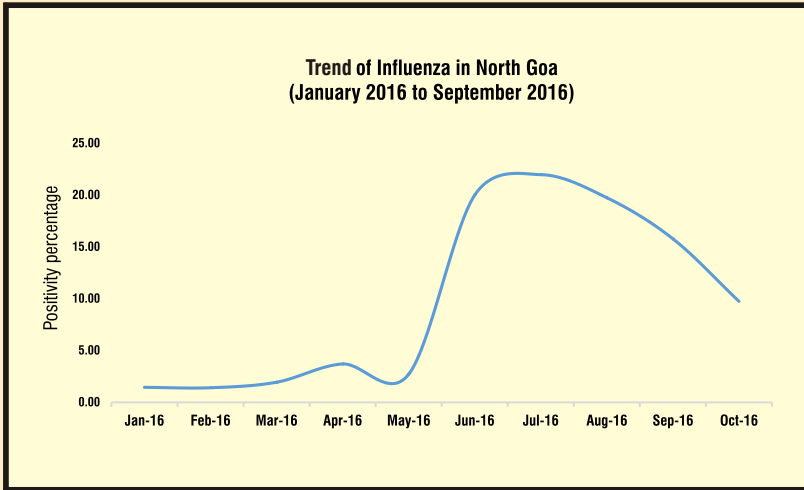
May 2016. The first KFD case was reported on the very first day of commencement of the site.

District Hospital- Mapusa, our second sentinel site, is situated at Mapusa which is the sub division of North Goa district. The site serves mainly to the urban population and migrants from different states.

Approximately 40% of the cases are migrants (Bihar, UP, Orissa, Jharkhand, Maharashtra and Karnataka) who work as manual labourers. It is the first referral unit for all the PHCs of the surrounding talukas. Few cases are also referred from the PHCs of Dodamarg taluka of Sindhudurg district of Maharashtra.







GUJARAT



Sabarkantha (Population: 2428589)

Idar also known as mountain city is located at the southern end of the Aravalli mountain range with semi-arid climate, having highest temperature in Gujarat state during summer reaching above 50 degree Celsius. It is situated in north part of Gujarat, 80 km away from Rajasthan and 130 km from Ahmedabad.

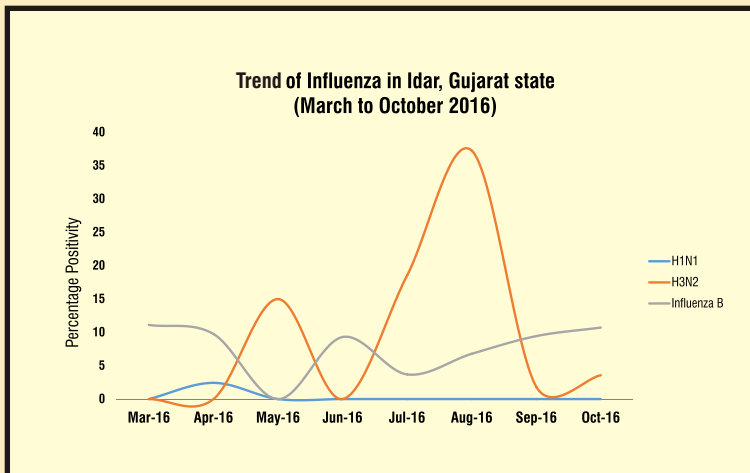
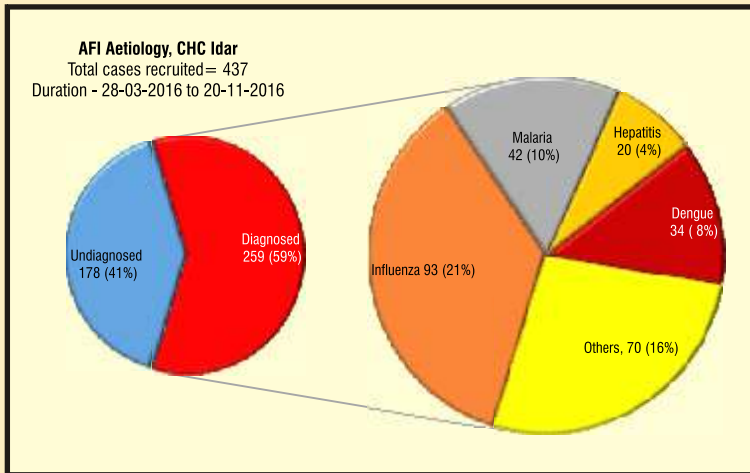
Idar had a population of 29,567. Males constitute 52% of the population and females 48%. Idar has an average literacy rate of 68%. It is a region which has become hub for cotton ginning and processing. It also has a very strong network of dairy co-operatives which helps it stay firm on economic footing in years where the rains are not good. It is

known for the manufacture of handmade wooden toys, tiles, its temples and various beautiful architectural monuments. Idar is home to the very scenic and beautiful mountains with round shaped grey or red granite rocks.

The Referral **Community Health Centre (CHC) hospital, Idar** was selected as the sentinel site for the AFI surveillance project in Gujarat. The hospital has 70 beds capacity with male, female and maternity ward, operation theatre and laboratory facilities. CHC Idar is located at the end of the city covered with mountains from three sides.

Case recruitment from CHC Idar was initiated on 29th March 2016. The district health team has been very receptive of the activities of the project and prompt

in responding to the reports from MCVR in initiating preventive public health activities accordingly.





**MANIPAL
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**MANIPAL CENTRE
FOR VIRUS RESEARCH**



**SABARKANTHA,
GUJARAT**
12) CHC Idar



**SAWANTWADI,
MAHARASHTRA**
13) RH Dodanserg
15) SCH Sawantwadi



WAZHANAD, KERALA
3) TH Sultan Bathery
4) DH Masanthwady



SHIMOGA, KARNATAKA
1) JCH Thirthahalli
2) TH Hoanavagera
6) TH Sagara
7) TH Soraba



THE NILGIRIS, TAMILNADU
24) GH Gudalur
25) OH Pandalur
26) CHC Nelakottai



NORTH GOA, GOA
8) CHC Velpoi
9) DH Mapusa

HOSPITAL BASED SURVEILLANCE OF ACUTE FEBRILE ILLNESS IN INDIA

27 Sentinel sites | 13 Districts | 10 States



KAMRUP, ASSAM
11) Satgaon Urban
State Dispensary
20) SDH Tamulkeuch
10) PHC Panikhaiti



MORIGAON, ASSAM
21) PHC Jhargaon



DHALAI, TRIPURA
16) CHC Meru
17) SDH Longthari valley
18) CHC Chowmanu
19) PHC Masikpur



SIMDEGA, JHARKHAND
14) Soder Hospital, Simdega



MAHARASHTRA



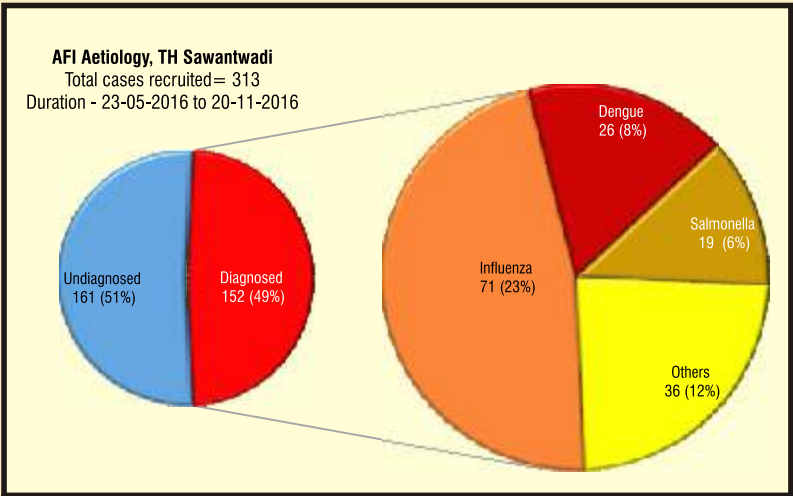
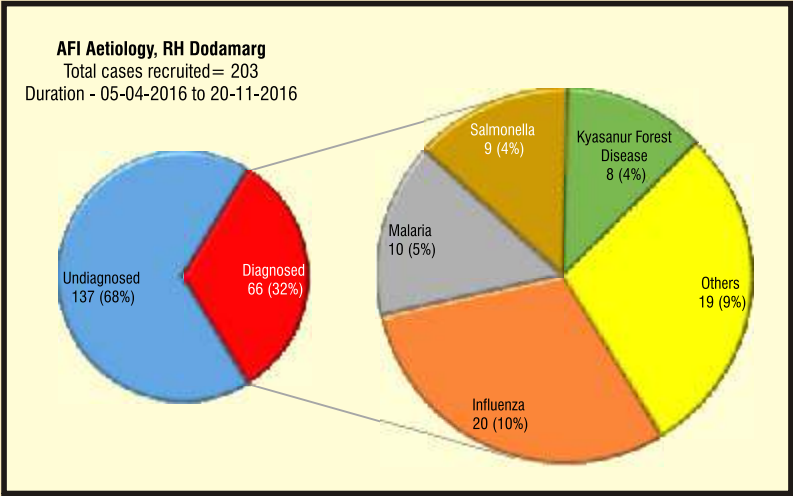
Sindhudurg (Population: 849651)

Sindhudurg district is the southern part of the greater tract known as the 'Konkan' which is historically famous for its long coast line and safe harbours. Sindhudurg district is spread over an area of around 5,207 sq. kms.

The district is surrounded by the Arabian Sea on the east, the Belgaum District (Karnataka) and Goa on the South and the Ratnagiri district on the North. Sindhudurg being a coastal district, the climate is generally moist and humid and the temperature variations during the day and throughout the seasons are not large. Sindhudurg is accessible by road on the NH-17 which passes through major towns of Kankavli, Kudal and Sawantwadi or by the picturesque journey on the Konkan Railway. Being

at the tip of Goa the culture of the people mainly reflects the Goan culture. Fishing, cashew plantation related works are the most common livelihood at Dodamarg.

Maharashtra has two sentinel sites for AFI Surveillance. Case recruitment for the project started at **Rural Hospital Dodamarg** on 5th April 2016. Dodamarg RH is a 50 bedded facility with provisions for OPD services and laboratory. The second sentinel site in Maharashtra is **Sawantwadi Sub Divisional Hospital (SDH)**. The Sawantwadi SDH is a 300 bedded hospital with OP, IP facilities in addition to the laboratory facilities and an AYUSH clinic in the campus. Recruitment from Sawantwadi SDH began on 23rd May 2016.



JHARKHAND



Simdega (Population: 599578)

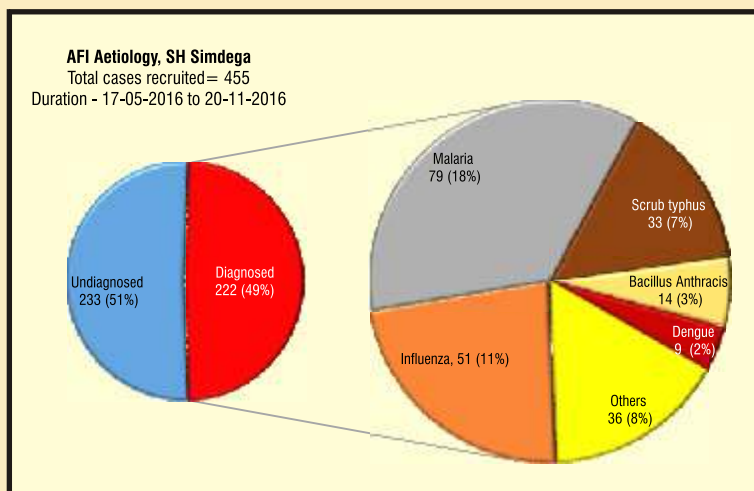
Simdega District is situated in the southwestern part of the state of Jharkhand. It borders with Orissa and Chhattisgarh states. It comprises of erstwhile Simdega Subdivision of the district Gumla and was created on 30th April 2001. It consists of ten blocks/Circles namely Simdega, Kurdeg, Bolba, Thethaitangar, Kalebira, Bano, Jaldega, Pakartanr, Bansjore and Kersai. Simdega is primarily a rural district with 94% of the total population living in the rural areas. Simdega district is primarily settled by

the Scheduled Tribes (ST) with 70.2% population, which is the highest among all the districts of Jharkhand. Majority of the tribal population in the district belongs to Christian faith, making the district a minority concentrated district. Simdega district has about 32% of forested area. Almost 90% of the total population depends on agriculture. The main crop of this area is paddy. Millets, Mustard, Niger and Maize are also quite popular.

Acute Febrile Illness (AFI) surveillance project at **Sadar Hospital**, was initiated on 16th May 2016 with the aim of providing advanced laboratory diagnosis of fever cases admitted in the hospital. Sadar Hospital is a 75 bedded district hospital which includes male, female and maternity wards. Majority of the population of the district is mainly dependent on this hospital for their routine healthcare. The hospital also provides services in dentistry, ophthalmology, radiology and OBG.

Along with routine fever surveillance programme, this place gave us a great opportunity to investigate the outbreak of human Anthrax in the district.

With the help of district health officials, as well as the state health officials the team from MCVR at Simdega actively participated in carrying out the outbreak, collecting epidemiological information and specimen collection.



TRIPURA



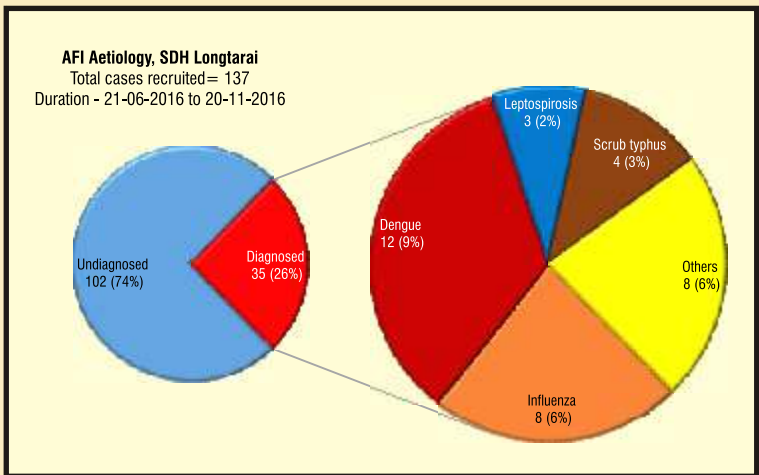
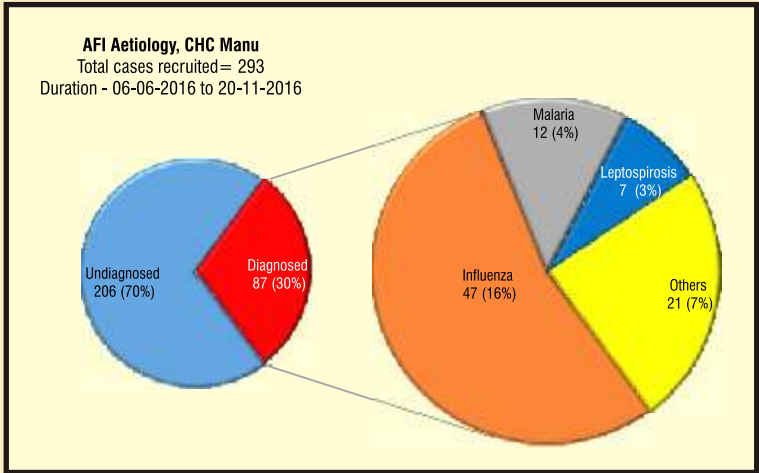
Dhalai (Population: 378230)

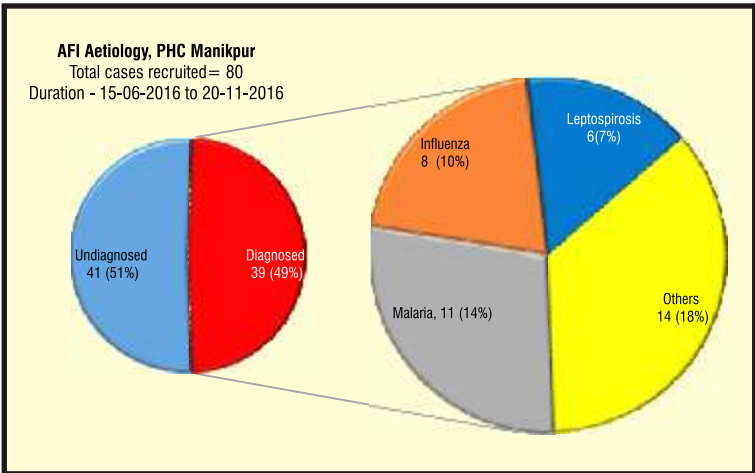
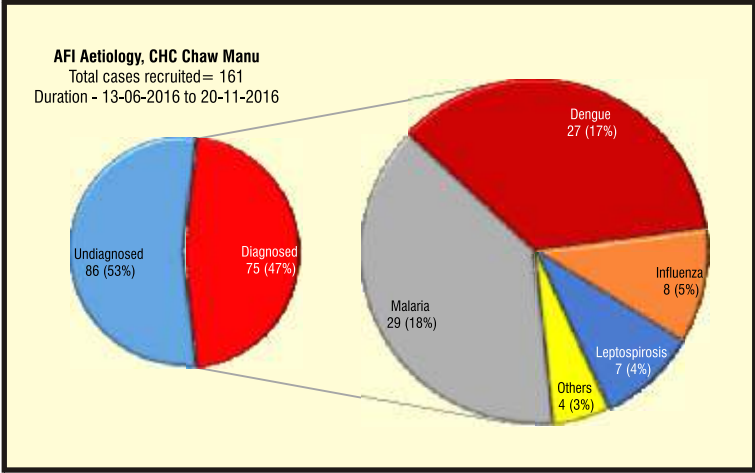
Dhalai District was created in the year of 1995 by bifurcating North Tripura District and including part of Amarpur Sub-Division of the South Tripura District. It was created keeping in view the administrative exigency of providing development and good governance to the largely tribal and inaccessible areas. The District is named after Dhalai river which originates in the District.

Located in the North-eastern part of Tripura, the District covers an area of about 2426 sq km. It is mainly located between two hills namely 'Atharamura range' and 'Sakhan Range'. More than 70% area is hilly and forest covered. The terrain is mostly undulating and hilly with small water streams (chharas), rivers and fertile valleys

intervening. The District headquarter at Ambassa is located at a distance of about 85 km from the capital, Agartala. The District is surrounded by Bangladesh on the northern and southern sides.

The case recruitment for the AFI Surveillance Project started on the 6th of June 2016 at **Community Health Centre (CHC), Manu**. CHC Manu is a 50 bedded hospital, which is a referral unit for the surrounding areas. We initiated recruitment from **Sub Divisional Hospital (SDH), Longtarai** on 21st June 2016 followed by **Primary Health Centre (PHC), Chawmanu** on 13th June 2016. The fourth sentinel site was set up in **Primary Health Centre (PHC), Manikpur** wherein the case recruitment was initiated on 15th June 2016.







TAMIL NADU



Krishnagiri (Population: 1879809)

Krishnagiri district was formed as the 30th district of Tamil Nadu on 9th February, 2004. This district was formed by carving out five taluks and ten blocks of the erstwhile Dharmapuri district.

Krishnagiri district covers an area of 5143 sq.km. Krishnagiri district is bound by Vellore and Thiruvannamalai districts to the East, state of Karnataka to the west, state of Andhra Pradesh to the North and Dharmapuri District to the south. This district is elevated from 300m to 1400m above the mean sea level. Eastern part of the district

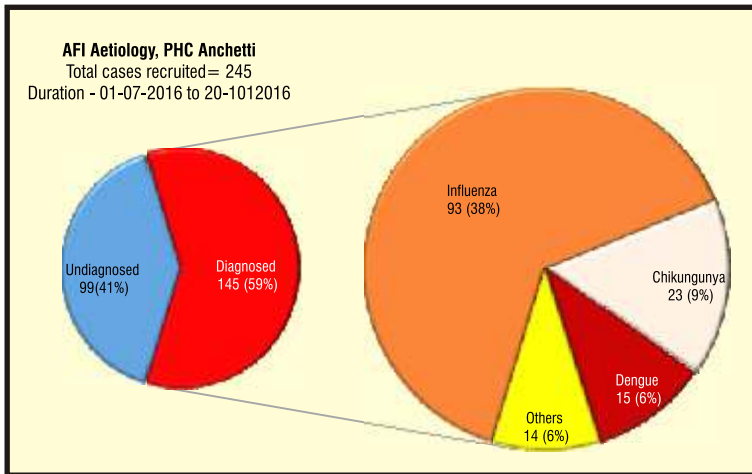
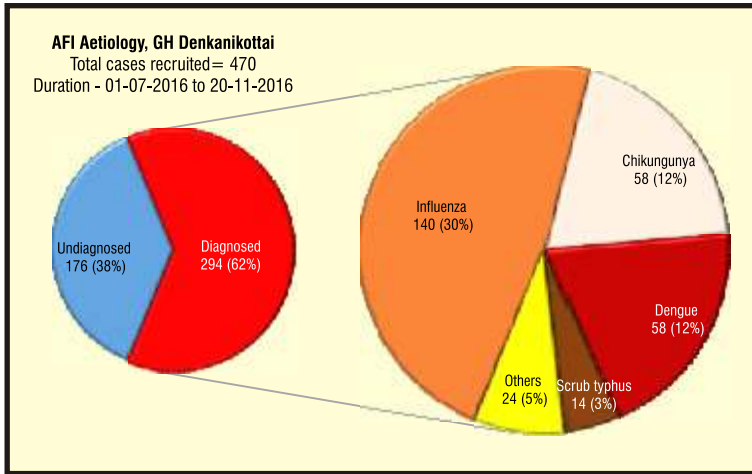
experiences hot climate and Western part has a contrasting cold climate. The average rainfall is 830 mm per annum. Three languages namely Tamil, Telugu and Kannada are predominantly spoken in this district. This district stands as an ideal exhibit of National integration and religious harmony. Tribal clans like 'Irular' live in the forest of Denkanikottai. As they are away from towns they do not lose their identity and individuality. The people are skilled in tree climbing, honey collection and protecting themselves from wild animals.

Acute Febrile Illness (AFI) surveillance programme in Krishnagiri district was initiated on 1st July 2016.

Government Hospital Denkanikottai is a 38 bedded hospital with male, female, gynecology, pediatric, operation theatre and emergency wards. Majority of the population of Denkanikottai is mainly dependent

on this hospital for their routine healthcare. The hospital also has casualty, blood bank, dental, laboratory, radiology and pharmacy.

Primary Health Centre Anchetti is a 30 bedded hospital having other facilities like dentistry, pharmacy, radiology and laboratory.



The Nilgiris (Population: 735394)

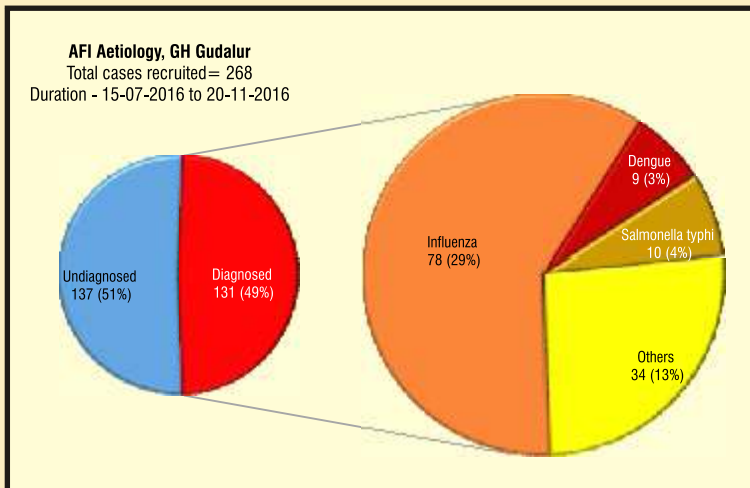
The Nilgiris, a part of the Western Ghats is one of the oldest mountain ranges, located at the tri-junction of Tamil Nadu, Kerala and Karnataka. Nilgiris is India's first biosphere. It has been declared as one of the 14 hotspots of the world because of its unique biodiversity. The district of Nilgiris is a very famous tourist destination in the state of Tamil Nadu in India.

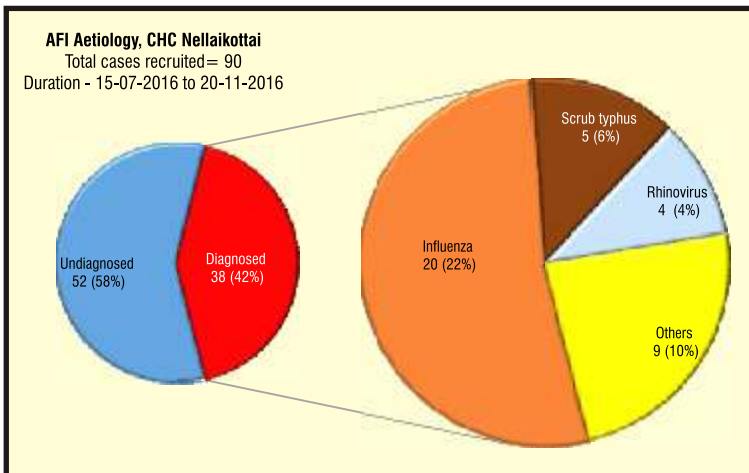
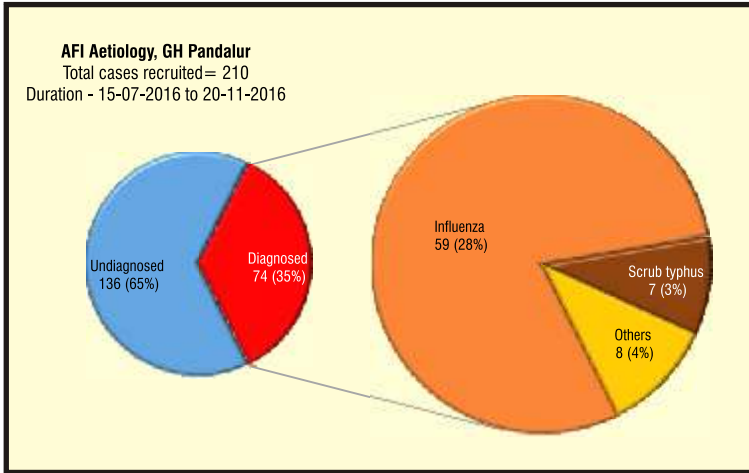
Anthropologists, who have worked intensively in this district for the past 140 years, recognize 15 tribes living here. Their origins are uncertain as there were no written records about them. The best-known of these are the Toda and Kota, whose related cultures are based on pastoral management of the buffalo, with its dairy products being the basis of their diets. The district is also home to the Kurumba, Irula, Paniyan and Kattunaicken or Nayaka, as well as the Badaga tribes.

Gudalur is a municipality and taluk in Nilgiris district. As of 2011, the town had a population of 49,535. The economy is dependent majorly on the tea industry.

Acute Febrile Illness (AFI) surveillance programme in Nilgiri district was initiated on 16th July 2016 at **GH Gudalur, GH Pandalur and CHC Nellakottai**.

Government Hospital Gudalur is a 120 bedded hospital with male, female, gynecology, pediatric and emergency wards. Majority of the population of Gudalur taluk is mainly dependent on this hospital for their routine healthcare. The hospital also has casualty and poison treatment department, blood bank, dentistry, laboratory, radiology and pharmacy. Government Hospital Pandalur is a 25 bedded hospital with general wards, laboratory and pharmacy, while Community health Centre, Nellakkottai is a 30 bedded hospital.





ODISHA



Koraput (Population: 1379647)

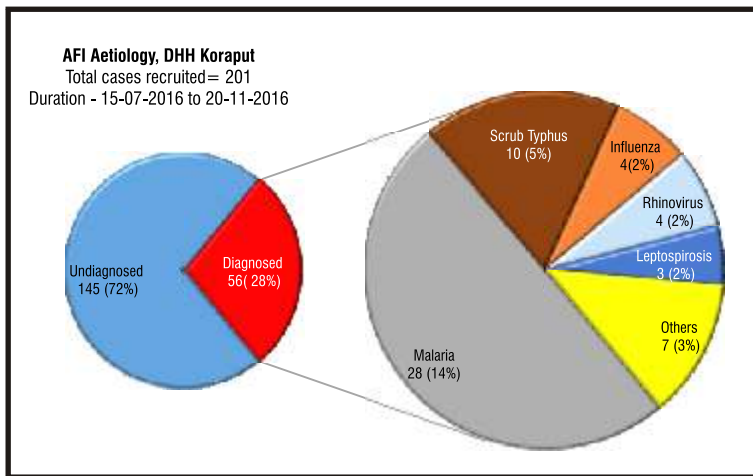
Koraput is one of the tribal populated district of Indian state Odisha geographically located at 18.82°N and 82.72°E on the eastern ghat with an average elevation of 870 metres (2854 feet). The district is bounded by Rayagada in the east, Bastar district of Chhattisgarh in the west, Nabarangapur district in north and Srikakulam district of Andhra

Pradesh and Malkangiri district in its south. Climatic condition of the district is warm and humid. Average annual rainfall of the district is 1567 mm. Mean Maximum summer temperature is 34.1°C and Mean Minimum Winter temperature is 10.4°C. The district is ornamented with natural dense forests, waterfalls, valleys and hill stations.

The Koraput District covers an area of 8807 sq km consisting total 13,79,647 population as per 2011 census. Of which 64.81% belongs to schedule tribe and Schedule caste. The Koraput tribal populations include – Bonda, Parija, Desua, Khoya, Dharua, Didaya, Bhumia, Santala, Juanga, Jatapa etc. The district has literacy rate 49.21%. The Economy of Koraput District is primarily based upon forestry and agriculture. The forest cover is mainly semi-evergreen to deciduous vegetation endowed with various wild plants as a natural resource.

The sentinel site opened at Koraput District Headquarter Hospital (DHH) on 27th of October

2016 as the 27th site of AFI project. The DHH is a 188 bedded multispecialty hospital catering services in Obstetrics & Gynecology, Pediatrics, Medicine, Surgery, Orthopedics, ENT, Transfusion Medicine & Blood Bank, AYUSH etc. More than 35 physicians are working in the hospital. The hospital is serving as a nodal point for health care access among the people of Koraput, Rayagada, Malkangiri, Nabarangpur. The hospital is being upgraded to medical college hospital.



Zika Virus Surveillance

Zika virus disease is an emerging viral disease transmitted through the bite of an infected *Aedes* mosquito. This is the same mosquito that is known to transmit infections like dengue and chikungunya. Zika virus was first identified in Uganda in 1947. World Health Organization has reported 22 countries and territories in Americas from where local transmission of Zika virus has been reported. Microcephaly in the newborn and other neurological syndromes (Guillain Barre Syndrome) have been found temporally associated with Zika virus infection.

Zika virus disease has the potential for further international spread given the wide geographical distribution of the mosquito vector, a lack of immunity among population in newly affected areas and the high volume of international travel.

World Health Organization has declared Zika virus disease to be a Public Health Emergency of International Concern (PHEIC) on 1st February, 2016. As of now, the disease has not been reported in India. However, the mosquito that transmits Zika virus, namely *Aedes aegypti*, that also transmits dengue virus, is widely prevalent in India.

Manipal Centre for Virus Research (MCVR), Manipal University is one of the facilities for Zika Virus Diagnostics and surveillance in the country. The table below gives an overview of the Zika Virus Surveillance activities in India by MCVR.

Methodology

All samples collected through the AFI sentinel surveillance network were screened for Zika virus infection since January 2016 .

Laboratory Testing

The CDC's recommended real-time PCR assay is used for the detection of Zika virus in blood and urine samples.

Testing kits used

PCR

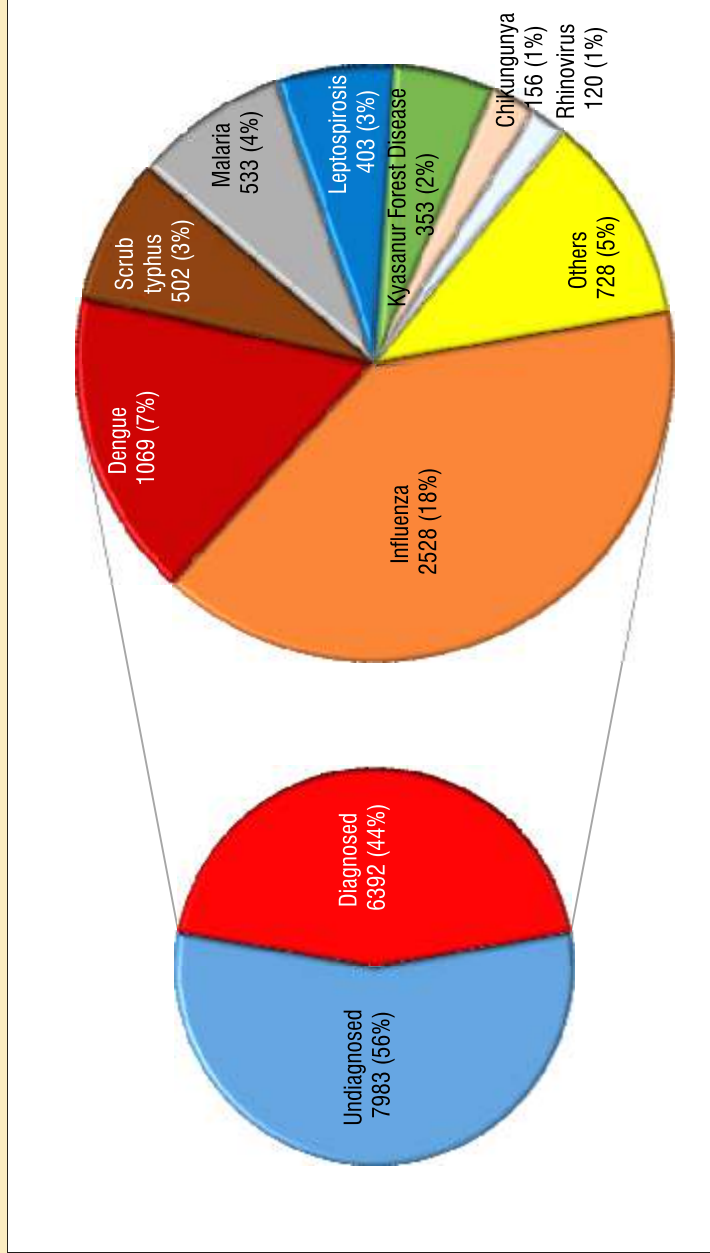
- Triplex Real-time RT-PCR Assay. (CDC, Atlanta)
- Uniplex rRT PCR – (Reference: Lanciotti RS, Kosoy OL, Laven JJ, Velez JO, Lambert AJ, Johnson AJ, Stanfield SM, Duffy MR. Genetic and serologic properties of Zika virus associated with an epidemic, Yap State, Micronesia, 2007, Emerg Infect Dis 2008; 8: 1232–1239)

Summary of the Zika Virus testing result among AFI cases (till 20th November 2016)

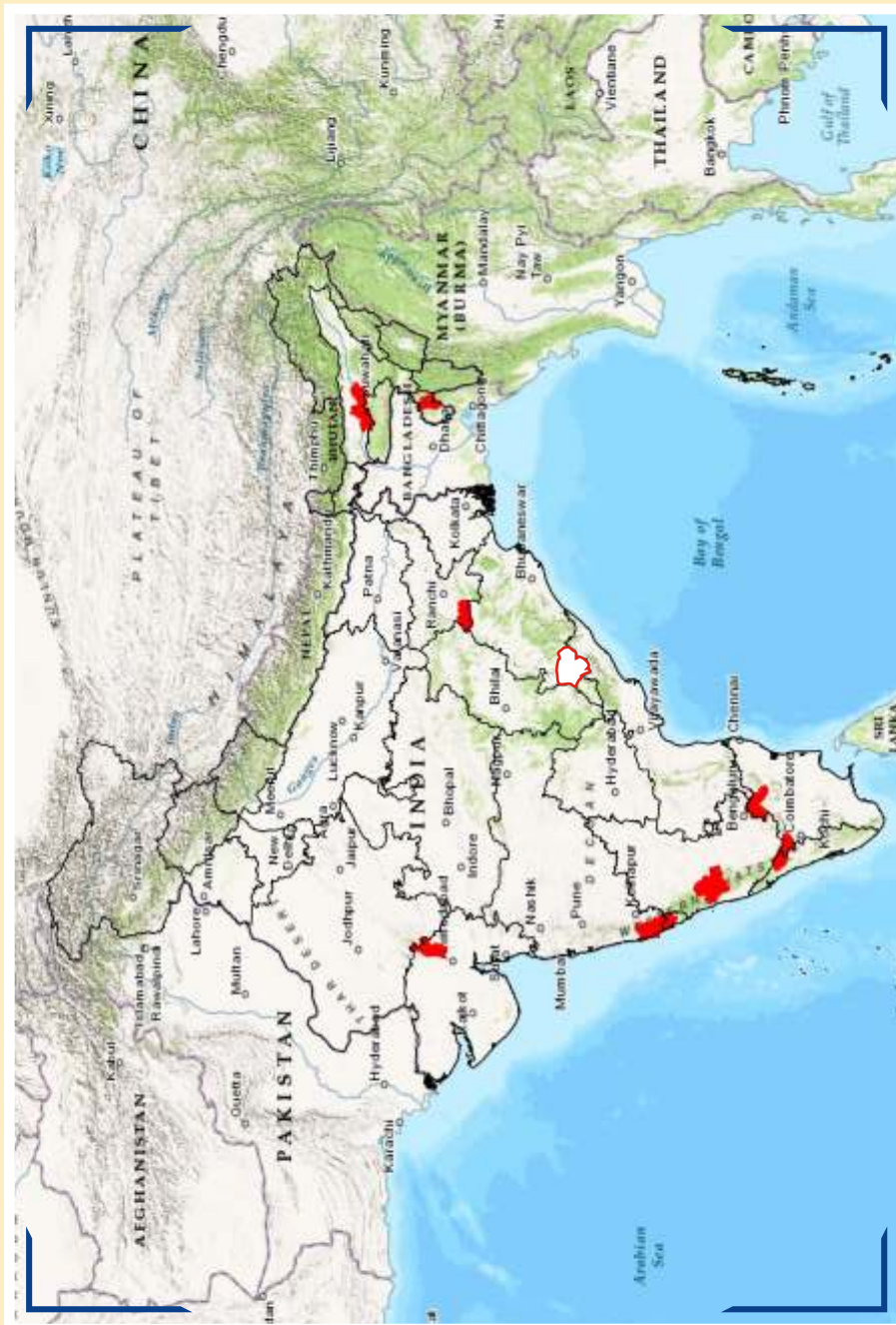
State	Total No of samples screened for ZIKAV	Total tested positive for ZIKAV
KERALA	1431	0
KARNATAKA	2935	0
GOA	1377	0
ASSAM	1535	0
GUJARAT	434	0
MAHARASHTRA	521	0
JHARKHAND	452	0
TRIPURA	681	0
TAMILNADU	1354	0
ODISHA	213	0
TOTAL	10933	0

Aetiology of Acute Febrile Illness (AFI) in India, n = 14375

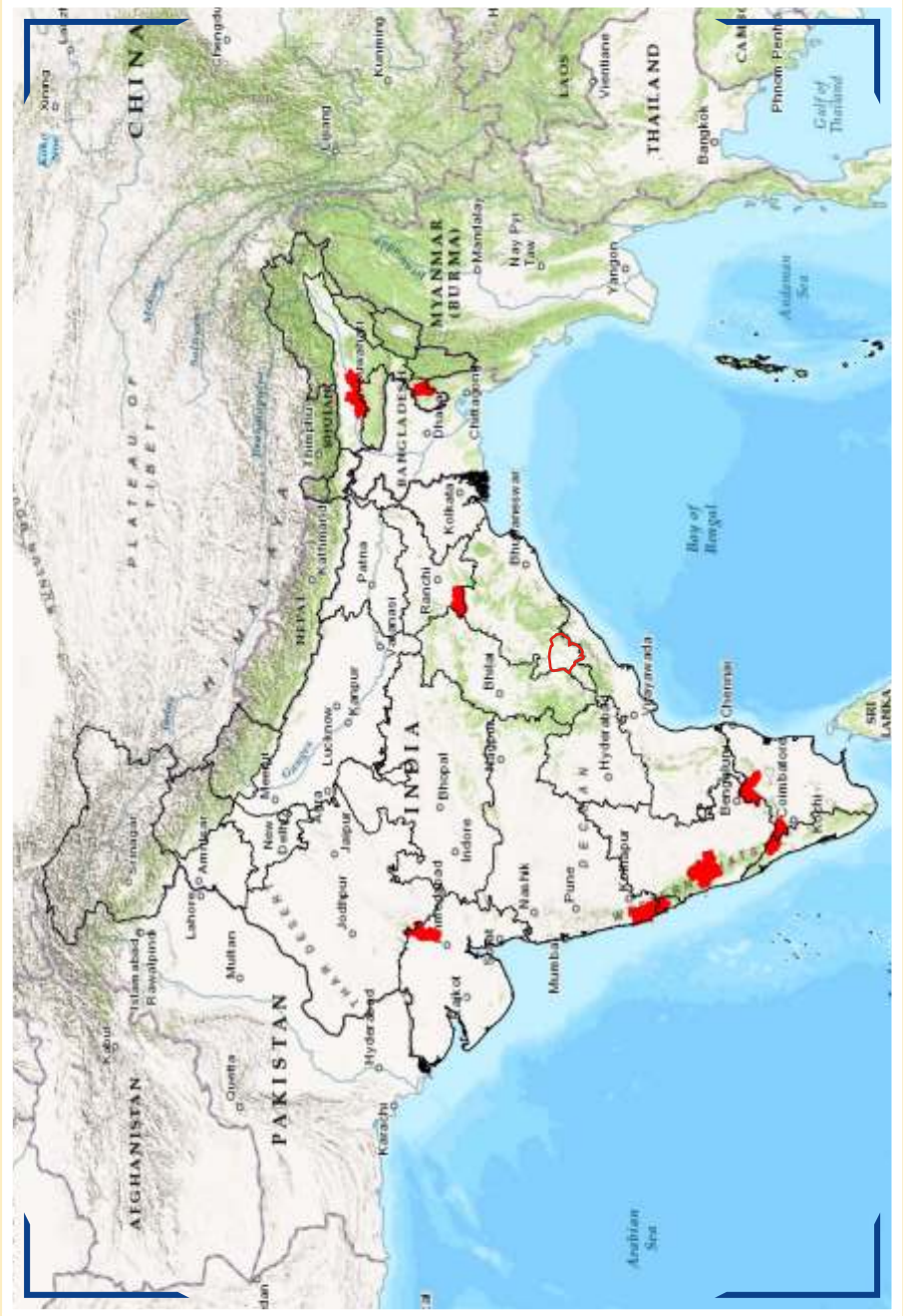
Duration: 9 June 2014 to 20 November 2016



Influenza A (H1N1, H3N2) /B



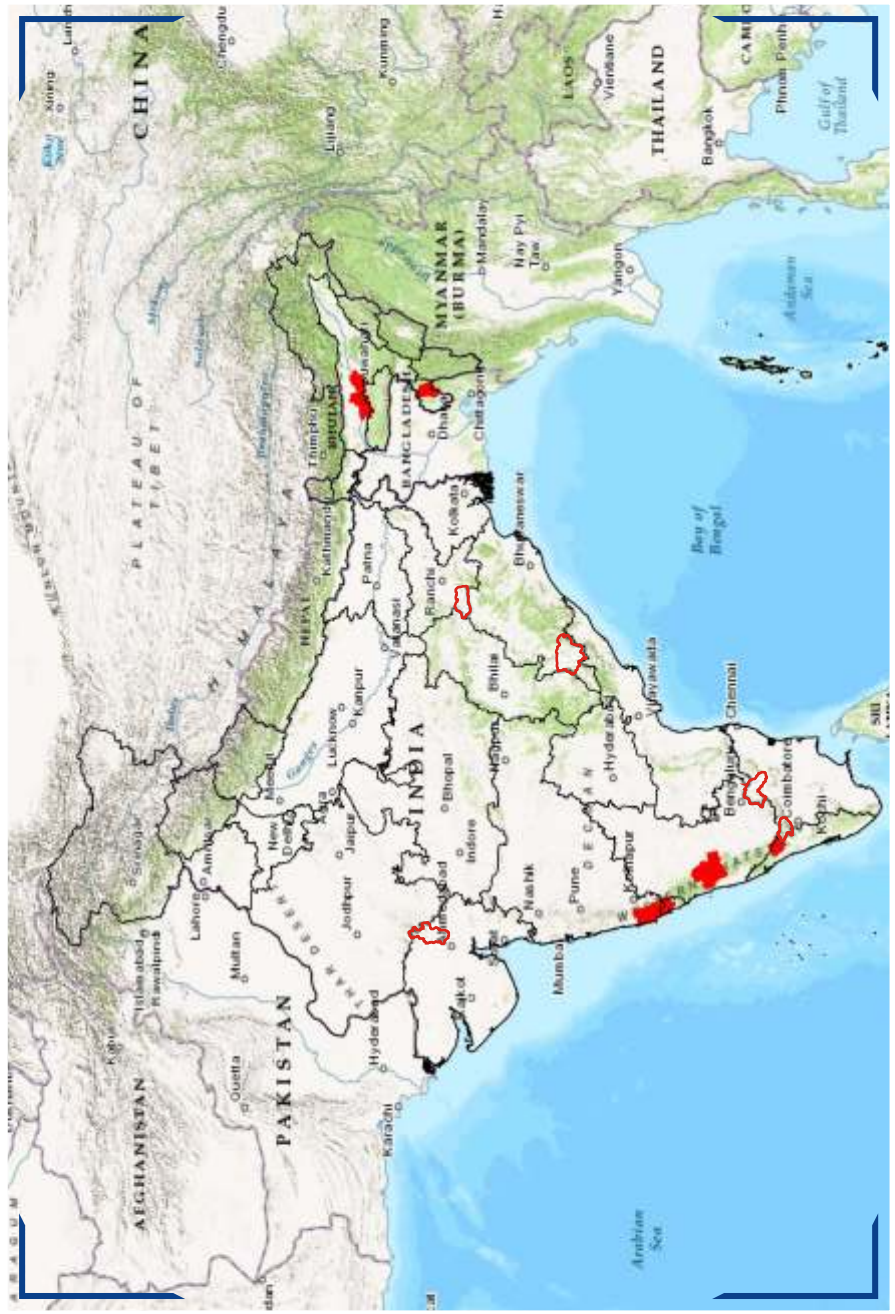
Dengue



Scrub Typhus



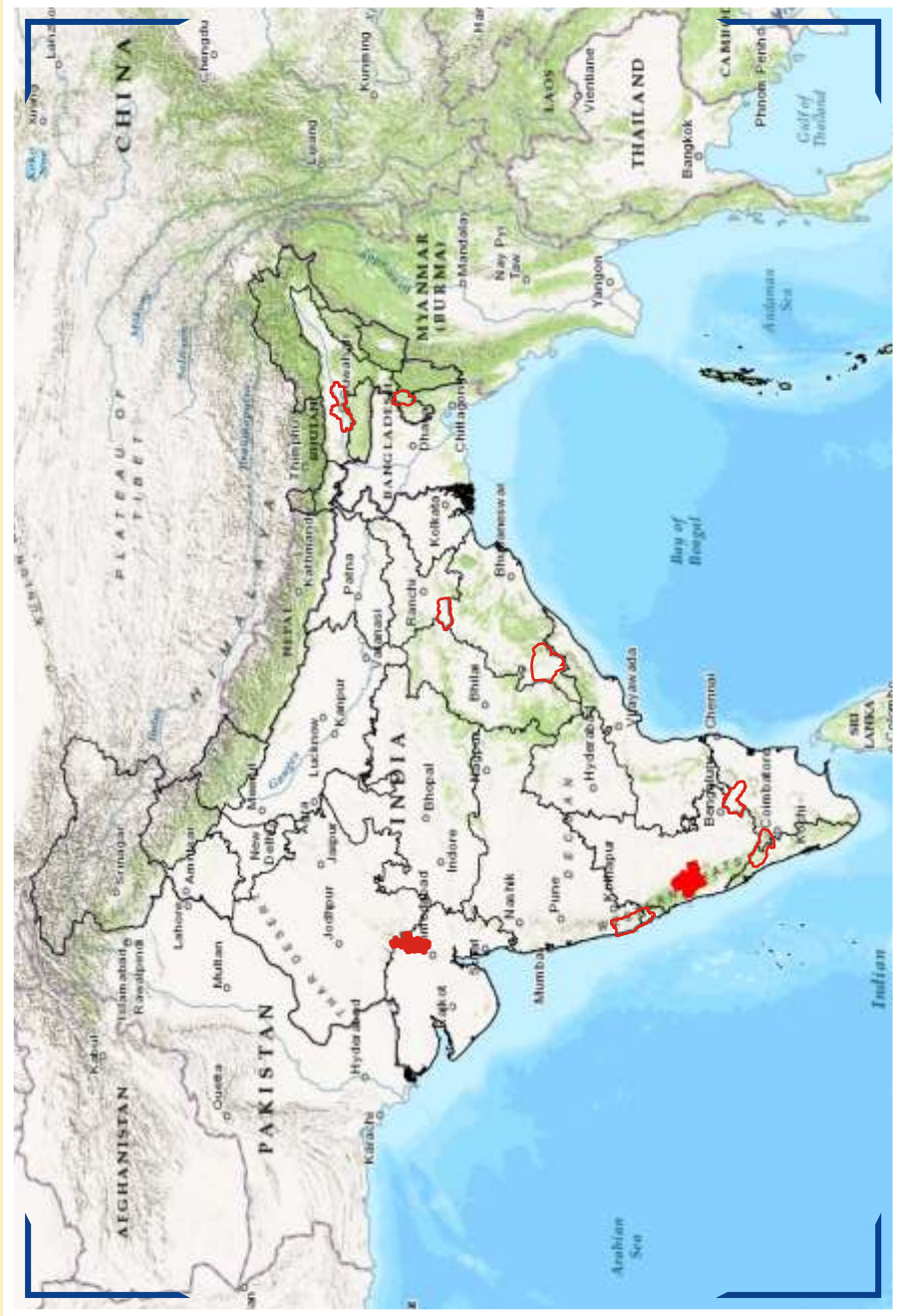
Leptospirosis



Anthrax

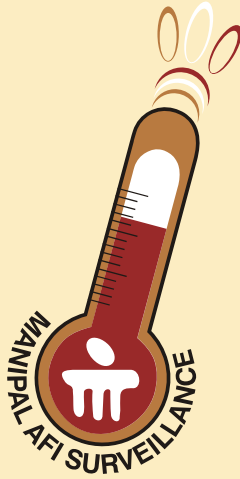


Brucellosis



Kyasanur Forest Disease





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