Disease Alert
प्रकोप चेतावनी

A monthly Surveillance Report from Integrated Disease Surveillance Programme National Health Mission

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Inside

Investigation Report of Hepatitis E and A Outbreak at Bahadurgarh, District Jhajjar, Haryana

Background

Viral hepatitis is responsible for an estimated 1.4 million deaths per year from acute infection and hepatitis-related liver cancer and cirrhosis. The five hepatitis viruses (A, B, C, D and E) are very different, with different modes of transmission, affecting different populations and resulting in different health outcomes. Viral hepatitis A and E are food- and water-borne infections that can result in acute outbreaks in communities with unsafe water and poor sanitation.

In India, 460 viral hepatitis outbreaks have been reported to IDSP from 2011-2015. In the year 2016, 98/2679 (3.6%) outbreaks reported to IDSP were of viral hepatitis. Contaminated drinking water was identified as a cause for most outbreaks.

Time line of event

On 10 January, 2017 physician at sub-divisional hospital, Bahadurgarh informed District Surveillance Officer (DSO), Jhajjar about cases of jaundice from Ashok Nagar. The Rapid Response Team (RRT) visited Ashok Nagar on 10 January 2017 only and started active case search in the community from 11 January 2017.

Two EIS Officers from NCDC Delhi joined the investigation team on 23 January 2017. A systematic outbreak investigation was initiated to describe the characteristics of the outbreak, identify risk factors and propose recommendations.

Location

Bahadurgarh is located in Jhajjar district, and is situated in the eastern part of Haryana. The town is located on the border with New Delhi. The town has a total area of 50 km. There are 31 wards in the city. Total population of Bahadurgarh town as per 2011 census is 170,767.
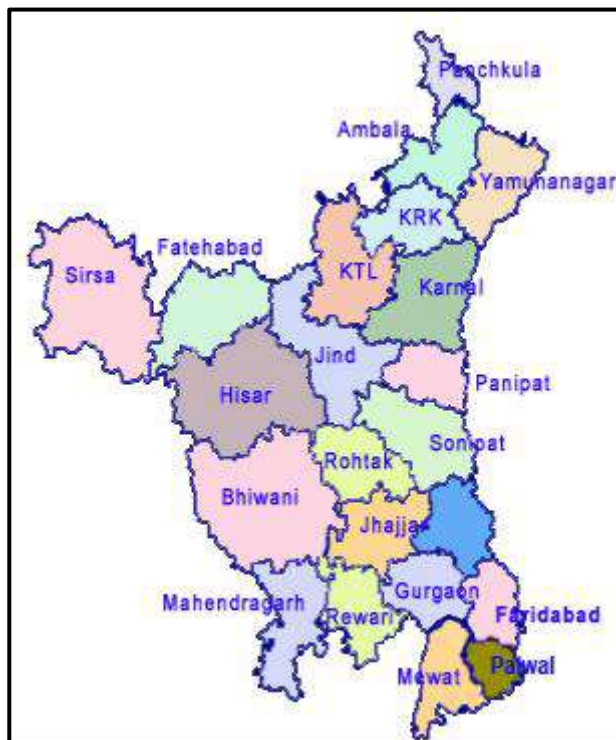
| Fig. 1: Map of State Haryana | Fig. 2: Map of District Jhajjar, State Haryana |

Objectives

The Team conducted outbreak investigation with the objective to describe the epidemiology of the outbreak; to assess the risk factors associated with the illness and to suggest measures to control the current outbreak and prevent similar outbreaks in future

Methods

Surveillance data available at the IDSP portal was reviewed to confirm the existence of the outbreak. District Epidemiologist, Medical Officer In-charge and other treating doctors of Govt. Hospital were interviewed to collect information regarding the outbreak and the control measures taken. Local private health practitioners and Nagar Parshad were also interviewed. A case definition was formulated/

Suspect Case

Yellow discoloration of sclera or dark urine with at least one additional symptom (fever, anorexia, fatigue, upper quadrant abdominal pain) in a resident of in Ashok Nagar, Chikara colony and Durga colony area of Bahadurgarh, district Jhajjar, Haryana from 16 November 2016 to 8 February 2017, residing.

Probable Case

A suspect case whose serum bilirubin is above 1.1 mg/dl or liver enzymes (SGOT/SGPT) are above 46 and 50 units, respectively.

Confirmed Case

A suspect case or a probable case whose blood serum sample was found positive for Hepatitis IgM E or A, or both E and A.

Case finding

The Team reviewed the OPD and IPD registers of Sub-Divisional hospital, Bahadurgarh and OPD register of urban health centres of affected areas along with the line list of active search already initiated by the district health

authorities. The Team initiated active case search in Ashok Nagar, Chikara colony and Durga colony. Data were recorded in a structured questionnaire on the onset of illness, symptoms, investigation, hospitalization, occurrence of secondary cases in the house, common exposures to food and water, travel history, and outcome of illness. The Team created a line-list of cases by reconciling data from all sources.

The Team analysed the data to describe the occurrence of cases over time using an epidemic curve, spot map to understand the geographic distribution of cases and age and gender distribution of cases. The Team collected information from six cases, ten families, Anganwadi workers (AWW) and Accredited Social Health Activist (ASHA) using open, unstructured interviews to generate hypotheses about potential sources of outbreak.

Laboratory Investigation

Blood samples drawn from 16 suspect cases (13 from Ashok Nagar and 3 from Chikara colony) on 12 January, 2017 and were sent to General hospital Panchkula, Haryana for laboratory confirmation of viral hepatitis by the district health authorities.

Environment Assessment

The Team reviewed the source of water and water supply network of Ashok Nagar, Chikara colony and Durga colony by visiting water treatment plant and pumping station and mapping souces of water on spot map. Water pipelines outlay was verified with the records provided by the Irrigation and Public Health Department. The Team also surveyed the general sanitation of the three affected areas. Water samples (N=24, Household=23, Water pumping station=1) were collected by the district health authorities from the three affected areas and sent for bacteriological testing and biochemical testing. Details are as per table 10.The Team also collected water samples from houses of the affected areas during active case search for biochemical testing of residual chlorine levels and rapid microbiological assessment of faecal coliforms.

Results

The present outbreak occurred at Ashok Nagar, Chikara colony and Durga colony area which is situated in north of Delhi-Rohtak highway behind sub-divisional hospital. Bahadurgarh town is in industrial belt of National capital region (NCR), Delhi. The population comprises mostly of migrant labour.

The outbreak was confirmed by comparing the trend of number of cases with raised serum bilirubin levels from the IDSP reporting units in Bahadurgarh block 2015-17. There was an increase in reporting of cases with raised serum bilirubin levels from week 1-5 in 2017 and the increase was above 2 SD (Table 1).

Table 1. Distribution of cases with raised S. Bilirubin from Quarter1 –Quarter4, year 2015-17, block Bahadurgarh, Jhajjar, Haryana, 2015-2017 (L Form IDSP)					
Year	**Quarter 1 (1–13 Week)**	**Quarter 2 (14–26 Week)**	**Quarter 3 (27-39 Week)**	**Quarter 4 (40-52 Week)**	**Total**
2015	0	5	1	0	6
2016	0	0	0	1	1
2017*	25*	-	-	-	25

* Data for the year 2017 is available from week 1 to week 5
* Out of total 86 cases 25 were probable (with raised serum bilirubin)

As per IDSP data six cases with raised serum bilirubin were reported in year 2015 and one case in 2016 at Bahadurgarh town as compared to 25 cases in year 2017 from week 1-13.

The total population of these three colonies (Ashok Nagar, Chikara Colony and Durga Colony) is 4,810. There are 962 house hold in these three different colonies. Total 86 cases of jaundice were identified through active and passive surveillance (suspect: 45, probable: 25, laboratory confirmed: 16). Median age was 25 years (range: 5 -53 years) and 48 (56%) were male. Two (3%) were pregnant. Six (11%) cases were hospitalized and no deaths were reported. Six houses had more than one case.
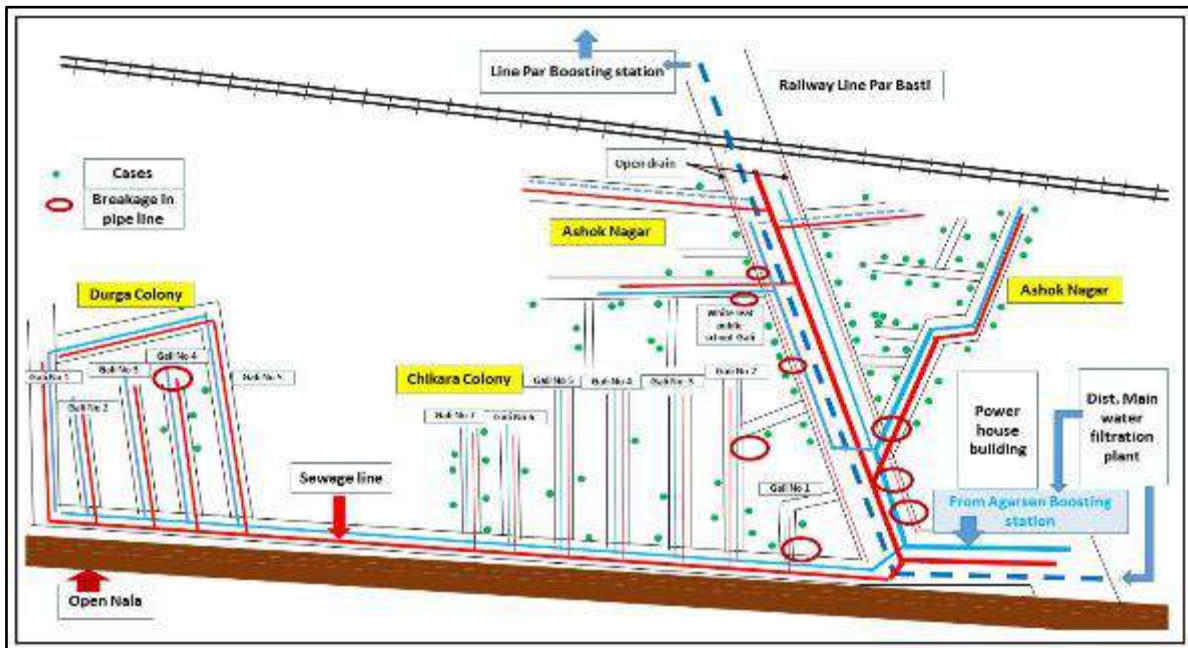

Fig.3: Distribution of hepatitis cases by residence, block Bahadurgarh, district Jhajjar, Haryana. (N=86)

* Direction of sewage flow is towards open nala
* Distance between main water filtration plant and Agarsain boosting station is about 3 Km approx.
* Map not to scale, prepared by investigators as per their observation, pipeline breakage in Durga colony could not be verified.
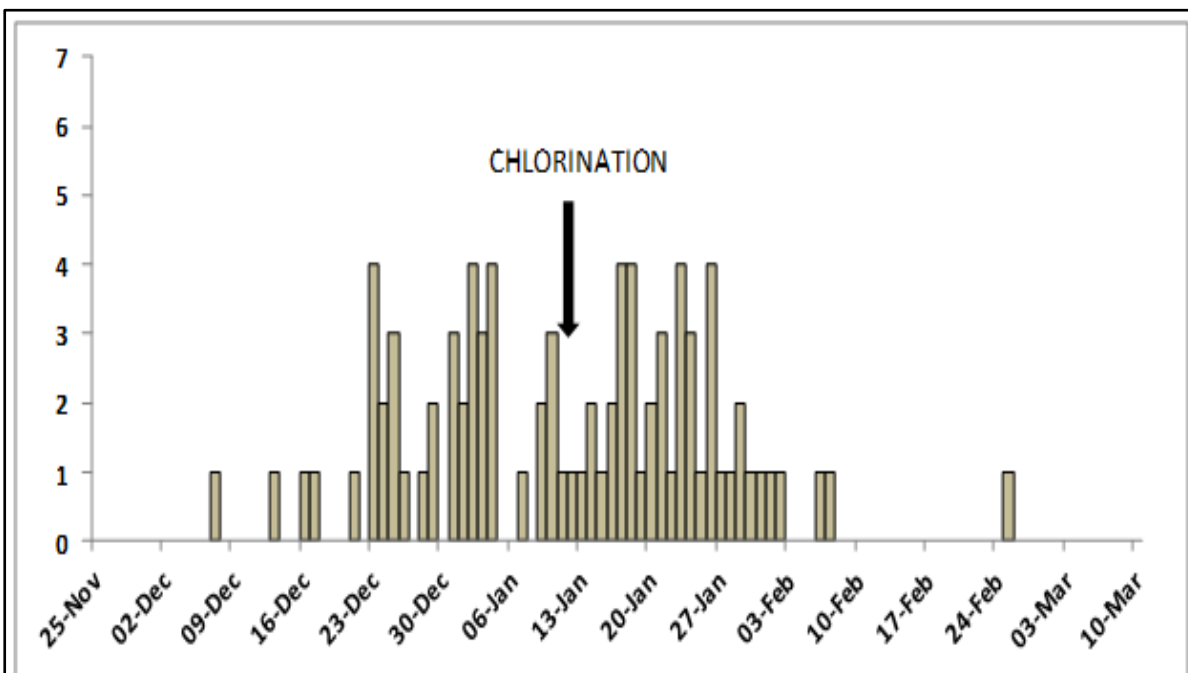

Fig.4: Distribution of hepatitis cases by date of onset, Block Bahadurgarh, District Jhajjar,

The present outbreak stared on 7 December 2016. The epi curve shows cases are clustered over a period of time with multiple peaks. Intervention was started on 12 January 2015. Cases continued to occur even after the initiation of intervention although showing decline in February. No cases were reported after 25 February 2017.

Table 2 states the attack rates by the diseases under consideration. Highest attack rate (2%) was seen in age group above 15 year.

Table 2. Attack rate by age, block Bahadurgarh, district Haryana 2016-17 (N=86)			
Age in years	Population	Cases	Attack rate (%)
0- 5	436	1	0
6 to 14	1144	11	1
>15	3230	74	2
Total	4810	86	1.8

As per Table 3, maximum number of cases 61 (71%) were reported from Ashok Nagar area followed by Chikara colony 21 (24%) and Durga colony 4 (5%).Over all attack rate was 1.8%. Maximum attack rate was seen at Ashok Nagar area (4.7%).

Table 3. Distribution of hepatitis cases by residence, block Bahadurgarh, district Jhajjar, Haryana-2016-17 (N= 86)			
Area	Total population	Cases (%)	Attack rate (%)
Ashok Nagar	1310	61 (71%)	4.7
Chikara Colony	2200	21 (24%)	1
Durga Colony	1300	4 (5%)	0.3
Total	4810	86	1.8

Lab investigation

Out of 16 blood sample taken on 12-01-2017 for laboratory investigation and tested at General hospital Panchkula for IgM hepatitis A and E, 10 were found positive for Hepatitis E and 5 were found positive for Hepatitis A & E. One (1) case was found positive for hepatitis A alone.

Environmental investigations

The house hold pipeline passes over the open drain present on both side of road. In several places these water pipelines were found submerged in the open drain. At eight places breakage were identified. The broken pipelines were observed to be rusted. Out of eight breakage/leakages identified, 6 were in Ashok Nagar and 2 in Chikara colony. Due to intermittent supply of water it is possible when the water supply is stopped from the

pumping station the drainage water get sucked in main water pipe line due to negative pressure and contaminate the main pipe line.

Conclusions

The epidemiological analysis along with laboratory results and environmental examination suggests that there was an outbreak of hepatitis A and E in Ashok Nagar, Chikara Colony, and Durga Colony, block Bahadurgarh, district Jhajjar, Haryana due to contamination of drinking water through leaking and broken water pipelines at several places.

Recommendations

a. Short term

1. Public Health Actions

- Continue surveillance in the affected area until no new cases for 120 days after last documented case.
- Line listing of new cases to be done using new line list format capturing information on date of onset of illness, secondary cases in the house hold, risk factor such as pregnancy status by ANM.
- Health education regarding water treatment (stated below) and sanitation to be emphasized among residents of three affected colonies by ASHA, AWW, and ANM.
  - **Water treatment - boiling water for three minute**
  - **Storage – In narrow neck container/ container with tap.**
  - **Retrieve - By tap or using long handle mug.**
  - **Hand wash – Hand wash with soap and water after defecation, before cooking/serving and eating**
- ASHA/ANM/MO to screen all pregnant women in the affected area for any sign of jaundice and prompt referral to health facility if any sign is found**.**
- Weekly residual chlorine level measurement and bacteriological testing from the houses in all three affected colonies by district health authorities. If test are found positive hyper chlorination to be done by PHE at boosting station (2-3ppm) before supplying and survey for breakages.
- IEC material (posters, wall paintings, pamphlets) containing awareness messages and prevention methods against water borne illness should be displayed/distributed in the affected area by Chief Medical officer office

Pic.1: Water leakage from rusted pipe line

Pic.2: Water pipeline along open drains

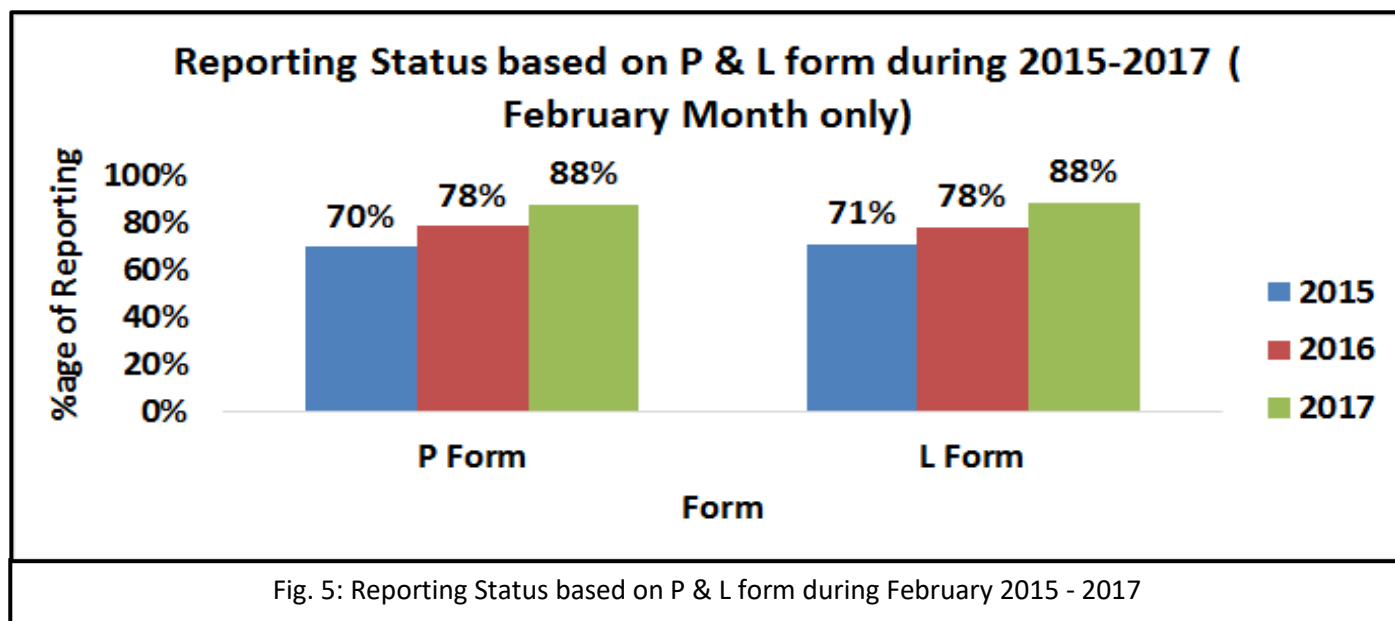* Data extracted from IDSP Portal (www.idsp.nic.in) as on 5 May, 2017.

Fig. 5: Reporting Status based on P & L form during February 2015 - 2017

As shown in fig 5, in February 2015, 2016 and 2017, the 'P' form reporting percentage (i.e. % RU reporting out of total in P form) was 70 %, 78% and 88% respectively across India, for all disease conditions reported under IDSP in P form. Similarly, L form reporting percentage was 71%, 78% and 88% respectively across India for all disease conditions, during the same month for all disease conditions reported under IDSP in L form. The completeness of reporting has significantly increased over the years in both P and L form, thereby improving the quality of surveillance data.
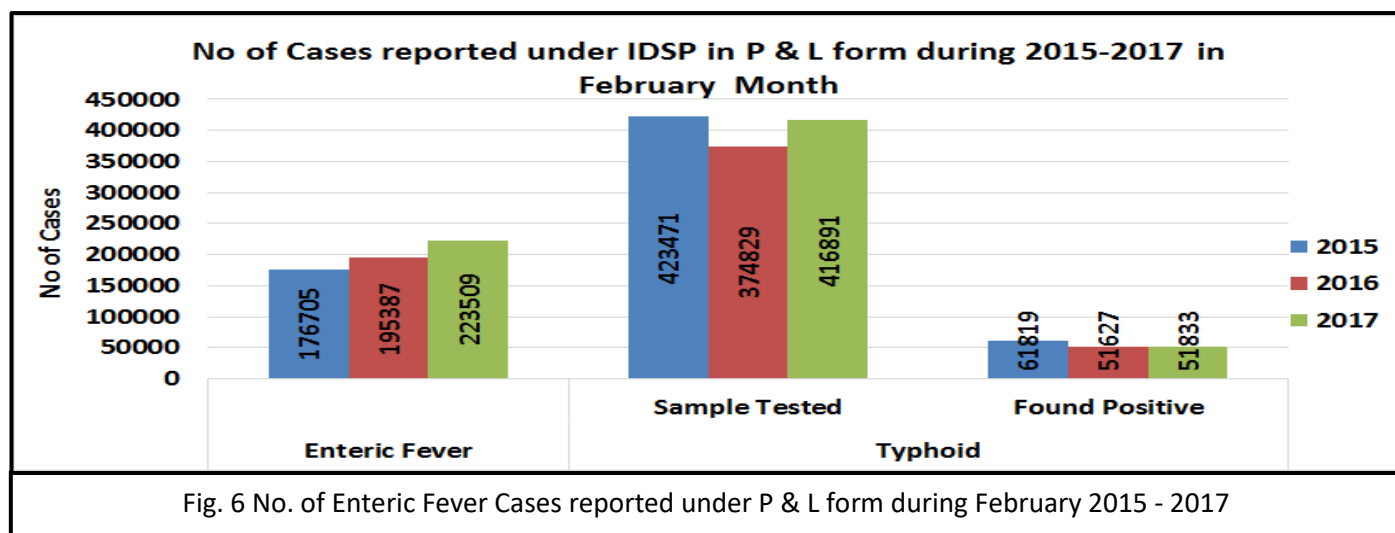
Fig. 6 No. of Enteric Fever Cases reported under P & L form during February 2015 - 2017

As shown in fig 6, number of presumptive enteric fever cases, as reported by States/UTs in 'P' form was 176705 in February 2015; 195387 in February 2016 and 223509 in February 2017. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in February 2015; 423471 samples were tested for Enteric fever, out of which 61819 were found positive. In February 2016; out of 374829 samples, 51627 were found to be positive and in February 2017, out of 416891 samples, 51833 were found to be positive.

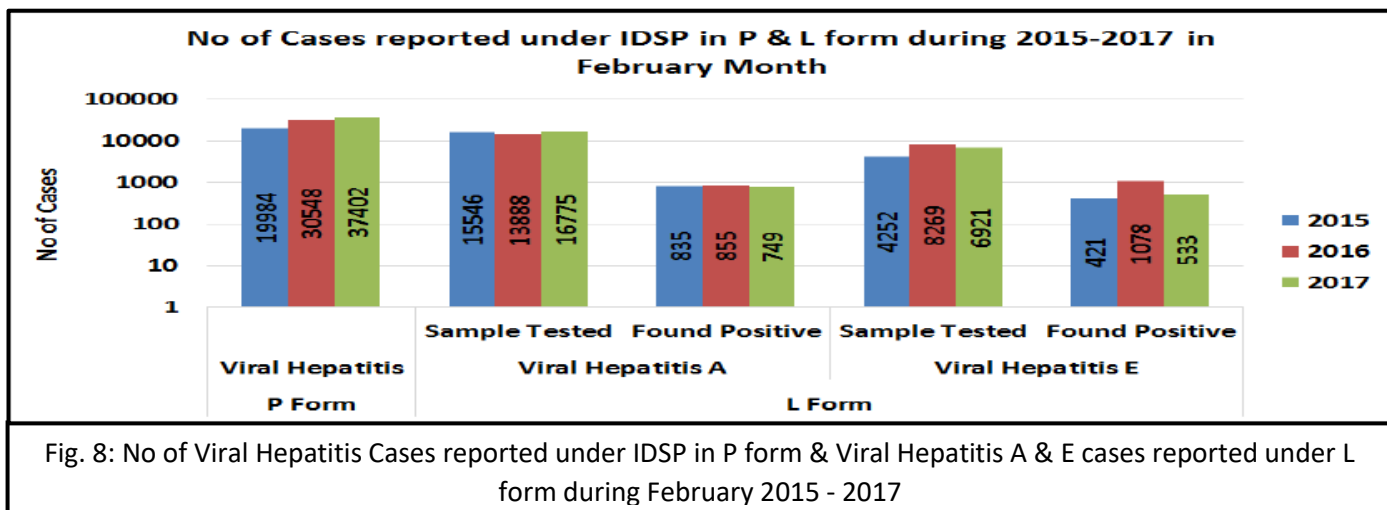Sample positivity has been 14.5%, 13.7% and 12.4% in February month of 2015, 2016 & 2017 respectively.

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Limitation: The test by which above mentioned samples were tested could not be ascertained, as currently there is no such provision in L form.

Fig. 7: No. of ADD Cases reported under IDSP in P form & Lab confirmed Cholera cases in L form during February 2015 - 2017
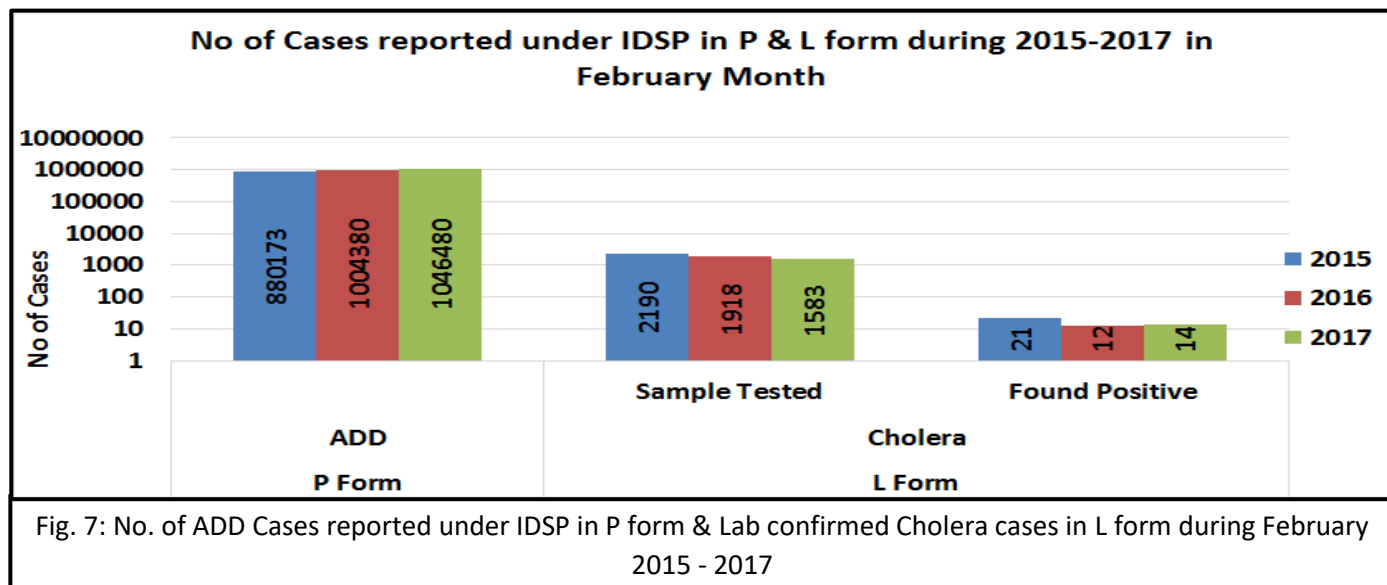
As shown in fig 7, number of Acute Diarrhoeal Disease cases, as reported by States/UTs in 'P' form was 880173 in February 2015; 1004380 in February 2016 and 1004380 in February 2017. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in February 2015, 2190 samples were tested for Cholera out of which 21 tested positive; in February 2016, out of 1918 samples, 12 tested positive for Cholera and in February 2017, out of 1583 samples, 14 tested positive.

Sample positivity of samples tested for Cholera has been 0.95%, 0.62% and 0.88% in February month of 2015, 2016 & 2017 respectively.

Fig. 8: No of Viral Hepatitis Cases reported under IDSP in P form & Viral Hepatitis A & E cases reported under L form during February 2015 - 2017

As shown in fig 8, the number of presumptive Viral Hepatitis cases was 19984 in February 2015, 30548 in February 2016 and 37402 in February 2017. These presumptive cases were diagnosed on the basis of case definitions provided under IDSP.

As reported in L form for Viral Hepatitis A, in February 2015; 15546 samples were tested out of which 835 were found positive. In February 2016 out of 13888 samples, 855 were found to be positive and in February 2017, out of 16775 samples, 749 were found to be positive.

Sample positivity of samples tested for Hepatitis A has been 5.3%, 6.1% and 4.4% in February month of 2015, 2016 & 2017 respectively.

As reported in L form for Viral Hepatitis E, in February 2015; 4252 samples were tested out of which 421 were found positive. In February 2016; out of 8269 samples, 1078 were found to be positive and in February 2017, out of 6921 samples, 533 were found to be positive.

Sample positivity of samples tested for Hepatitis E has been 9.9 %, 13.0% and 7.7% in February month of 2015, 2016 & 2017 respectively.
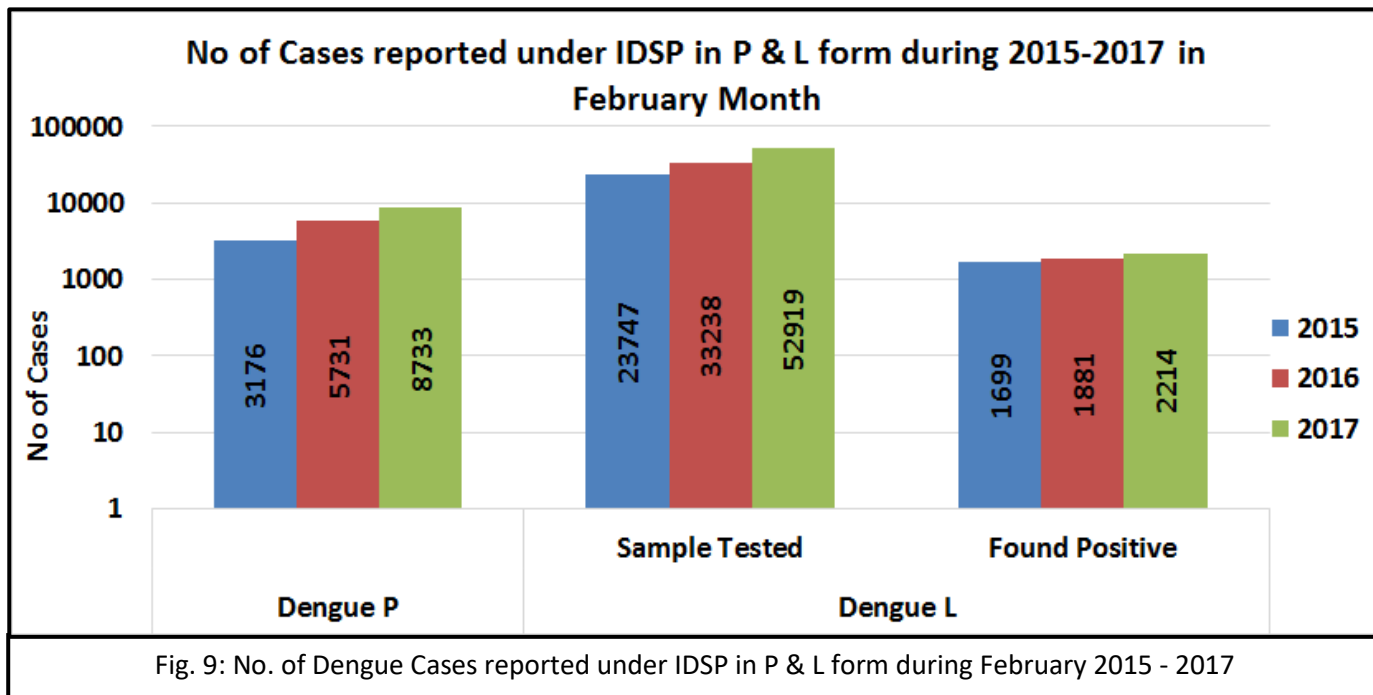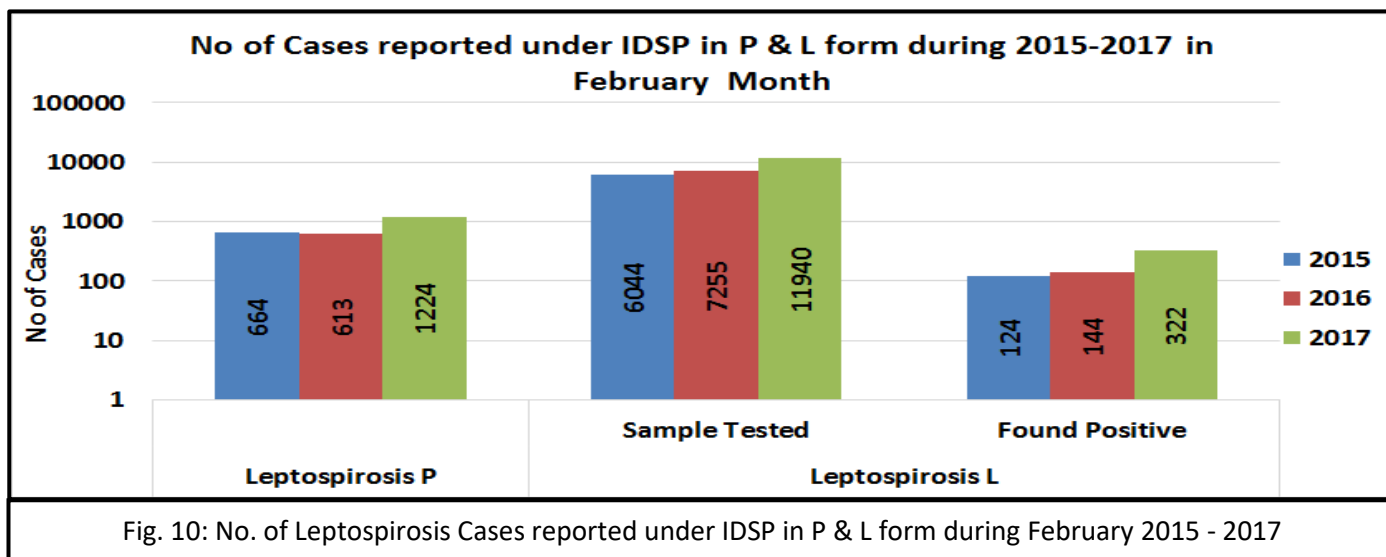

Fig. 9: No. of Dengue Cases reported under IDSP in P & L form during February 2015 - 2017

As shown in fig 9, number of presumptive Dengue cases, as reported by States/UTs in 'P' form was 3176 in February 2015; 5731 in February 2016 and 8733 in February 2017. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in February 2015; 23747 samples were tested for Dengue, out of which 1699 were found positive. In February 2016; out of 33238 samples, 1881 were found to be positive and in February 2017, out of 52919 samples, 2214 were found to be positive.

Sample positivity of samples tested for Dengue has been 7.1%, 5.6% and 4.1% in February month of 2015, 2016 & 2017 respectively.

Fig. 10: No. of Leptospirosis Cases reported under IDSP in P & L form during February 2015 - 2017

As shown in fig 10, number of presumptive Leptospirosis cases, as reported by States/UTs in 'P' form was 664 in February 2015; 613 in February 2016 and 1224 in February 2017. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in February 2015; 6044 samples were tested for Leptospirosis, out of which 124 were found positive. In February 2016; out of 7255 samples, 144 were found to be positive and in February 2017, out of 11940 samples, 322 were found to be positive.

Sample positivity of samples tested for Dengue has been 2.1%, 1.9% and 2.6% in February month of 2015, 2016 & 2017 respectively.

Fig. 11: No. of Chikungunya Cases reported under IDSP in P & L form during February 2015 - 2017
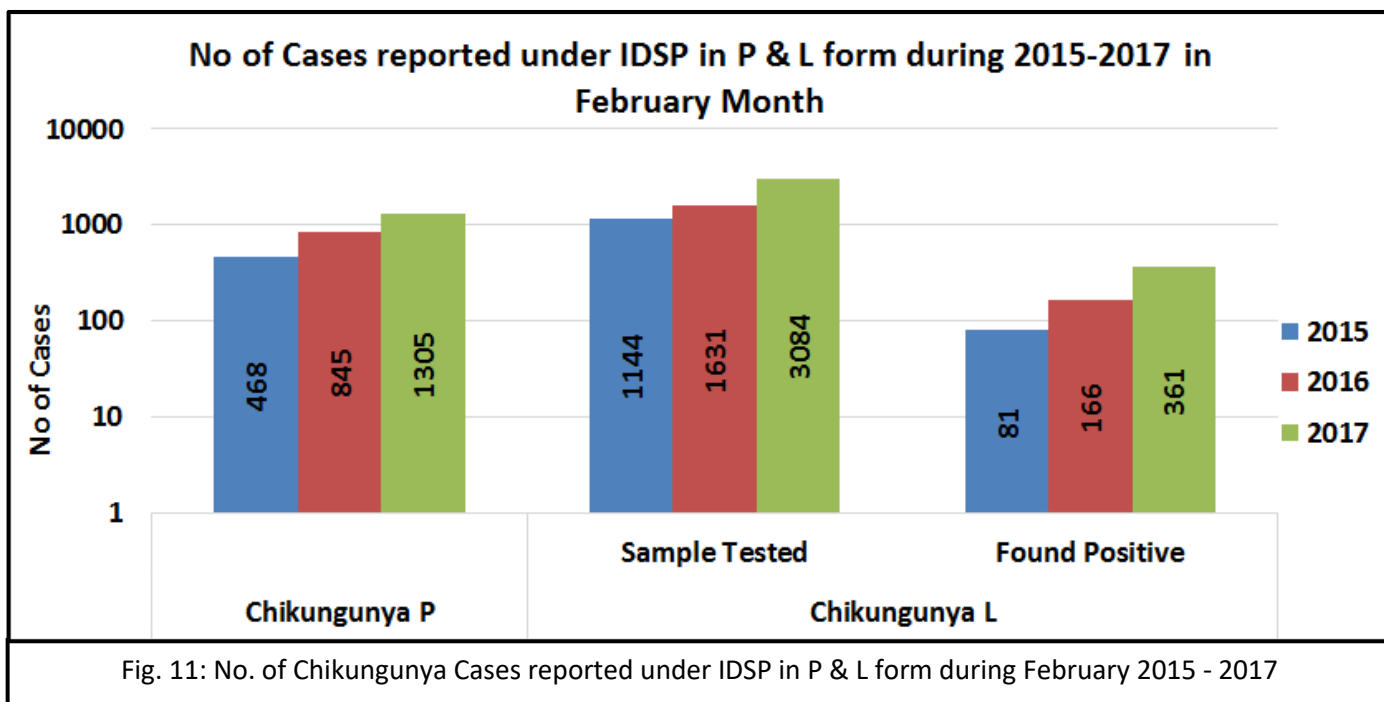
As shown in fig 11, number of presumptive Chikungunya cases, as reported by States/UTs in 'P' form was 468 in February 2015; 845 in February 2016 and 1305 in February 2017. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in February 2015; 1144 samples were tested for Chikungunya, out of which 81 were found positive. In February 2016; out of 1631 samples, 166 were found to be positive and in February 2017, out of 3804 samples, 361 were found to be positive.

Sample positivity of samples tested for Chikungunya has been 7.1%, 10.1% and 11.7% in February month of 2015, 2016 & 2017 respectively.

Fig 12: State/UT wise P form completeness % for February 2017

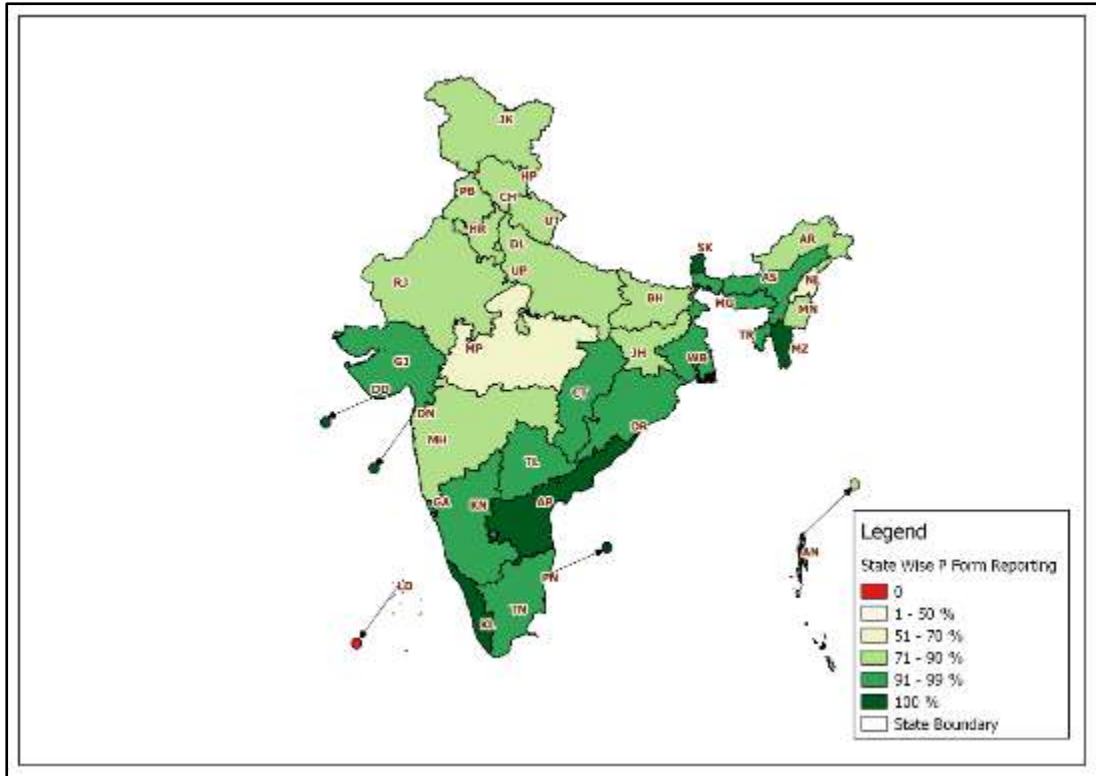## Fig 13: State/UT wise L form completeness % for February 2017
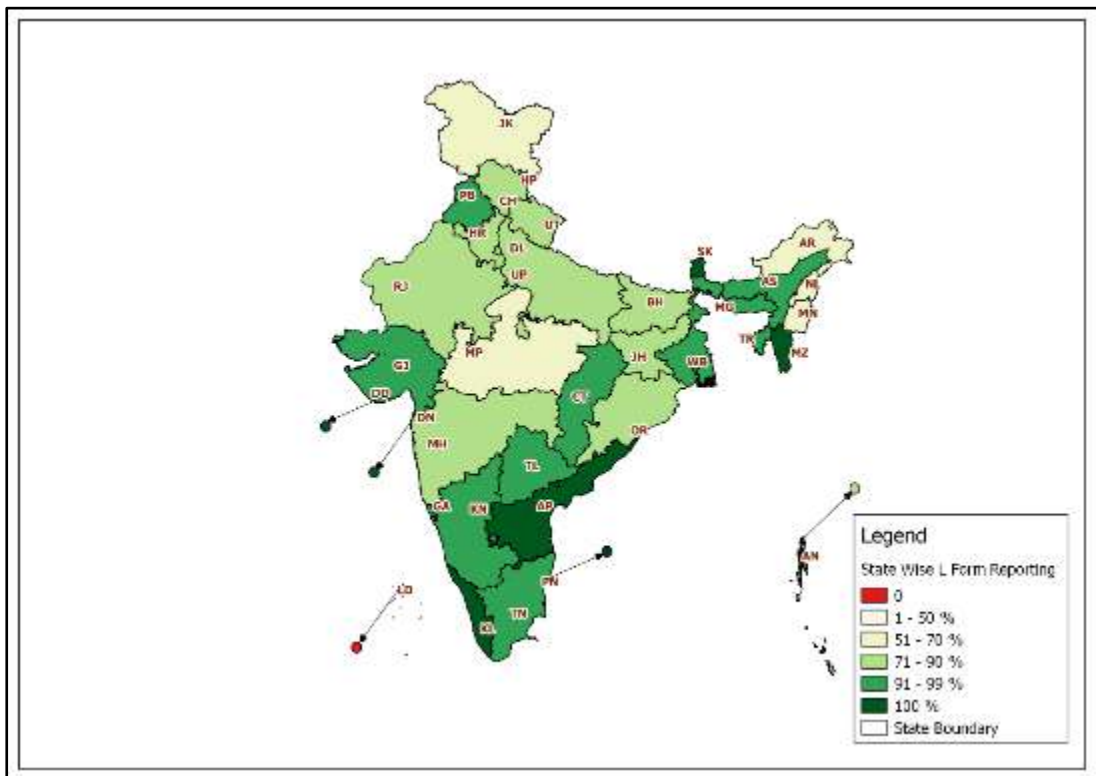
Fig 14: State/UT wise Presumptive Enteric fever cases and outbreaks for February 2017
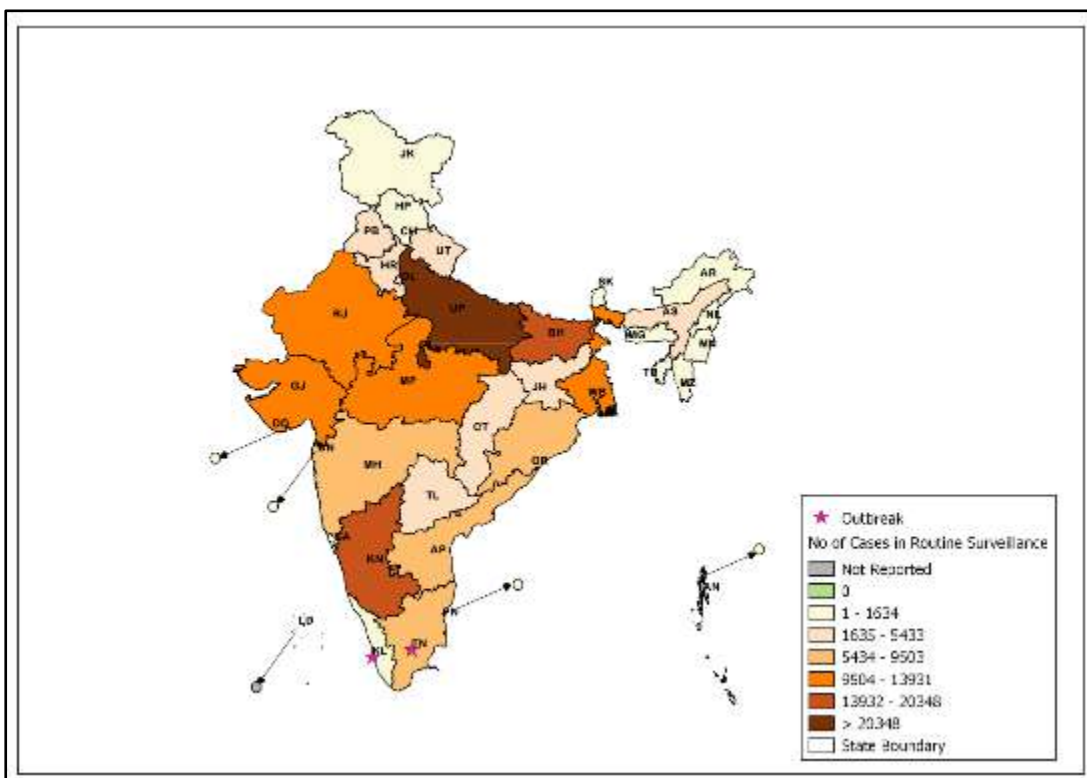

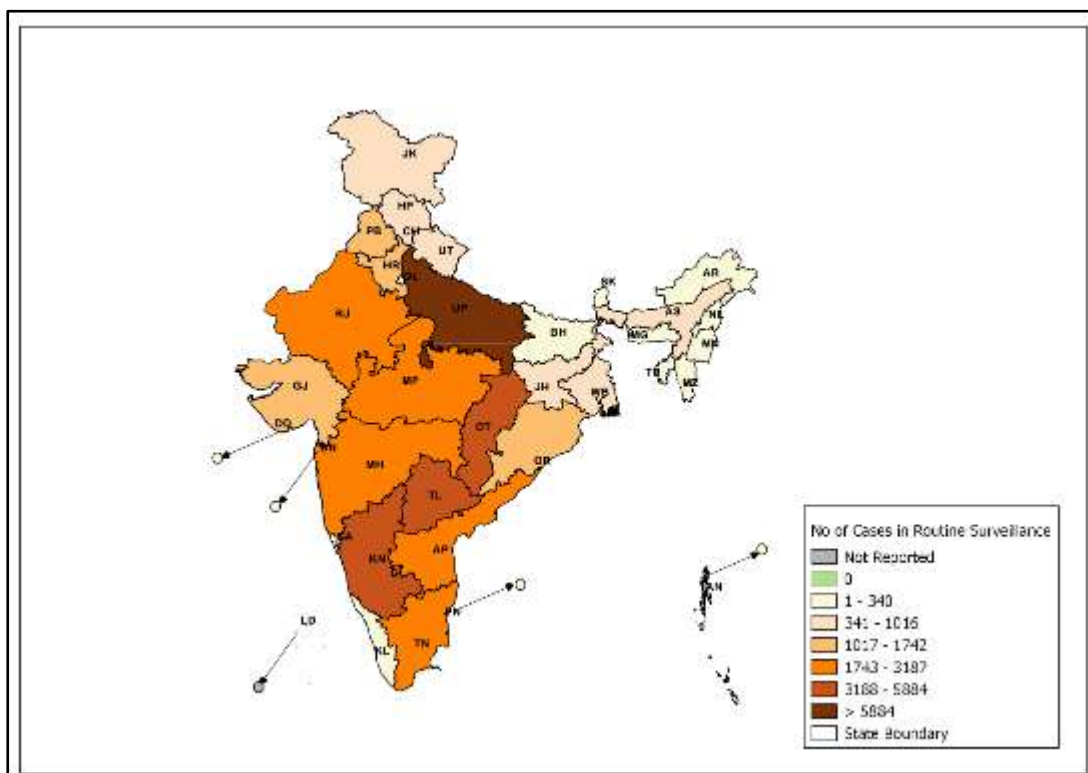**Fig 15: State/UT wise Lab Confirmed Enteric Fever cases and outbreaks for February 2017**

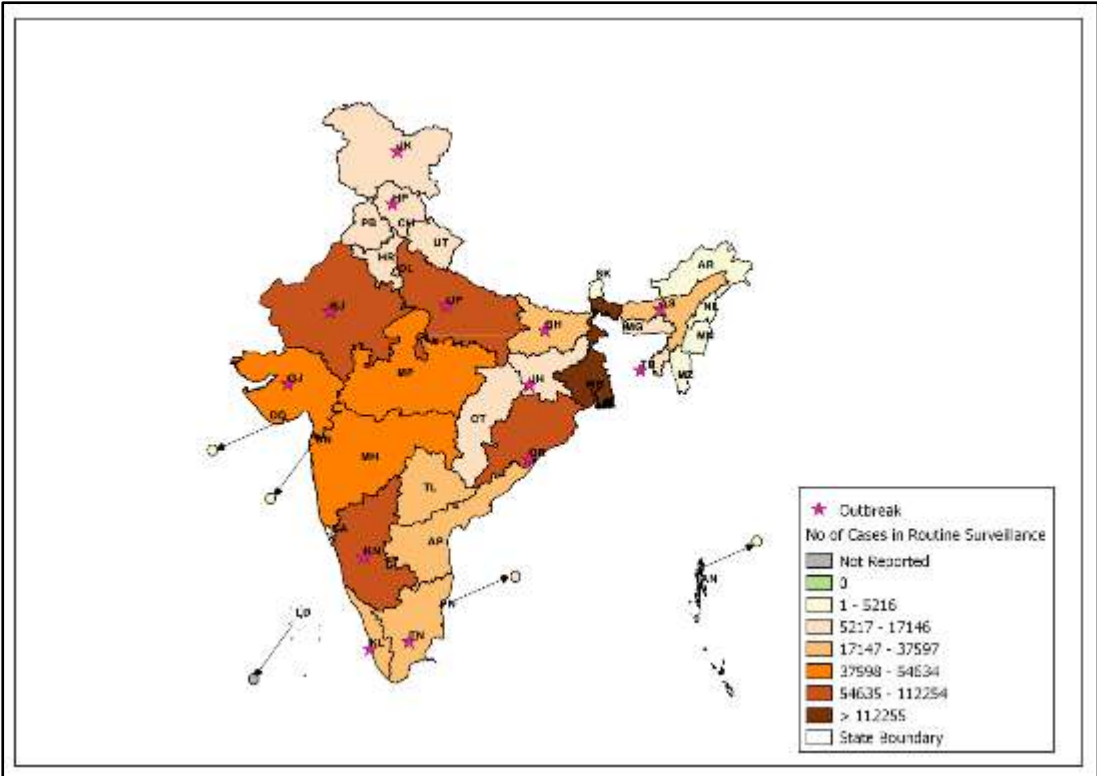**Fig 16: State/UT wise Presumptive ADD cases and outbreaks for February 2017**

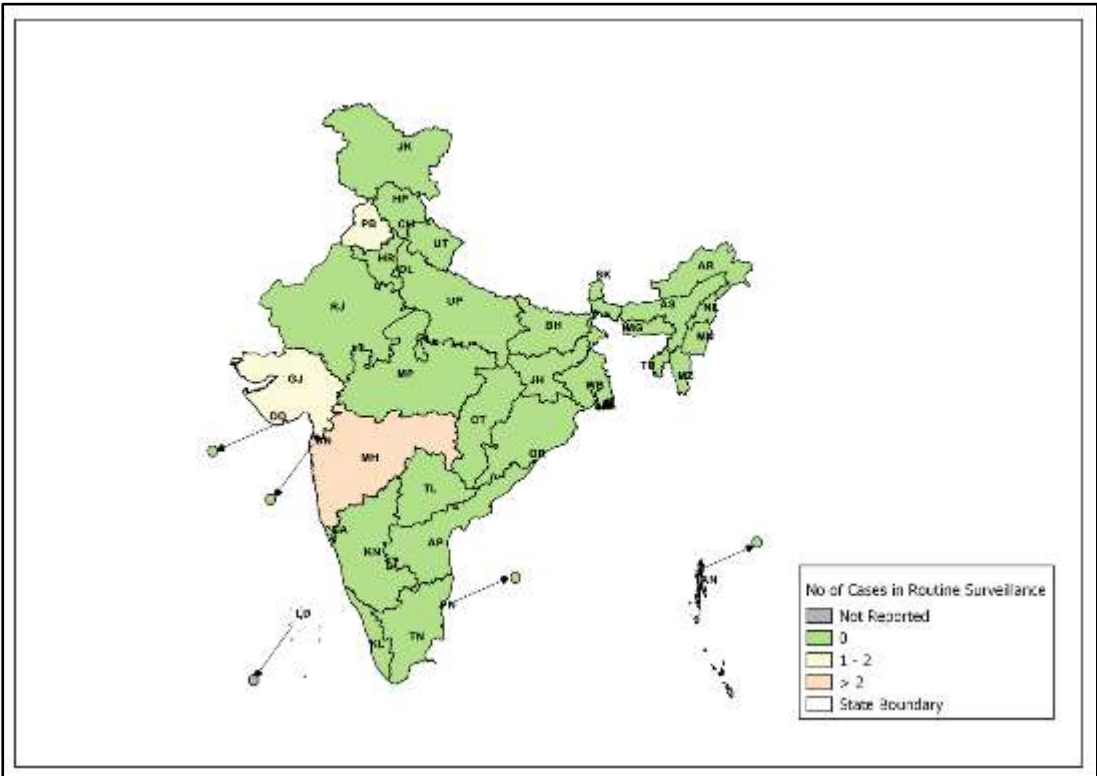**Fig 17: State/UT wise Lab Confirmed Cholera cases and outbreaks for February 2017**

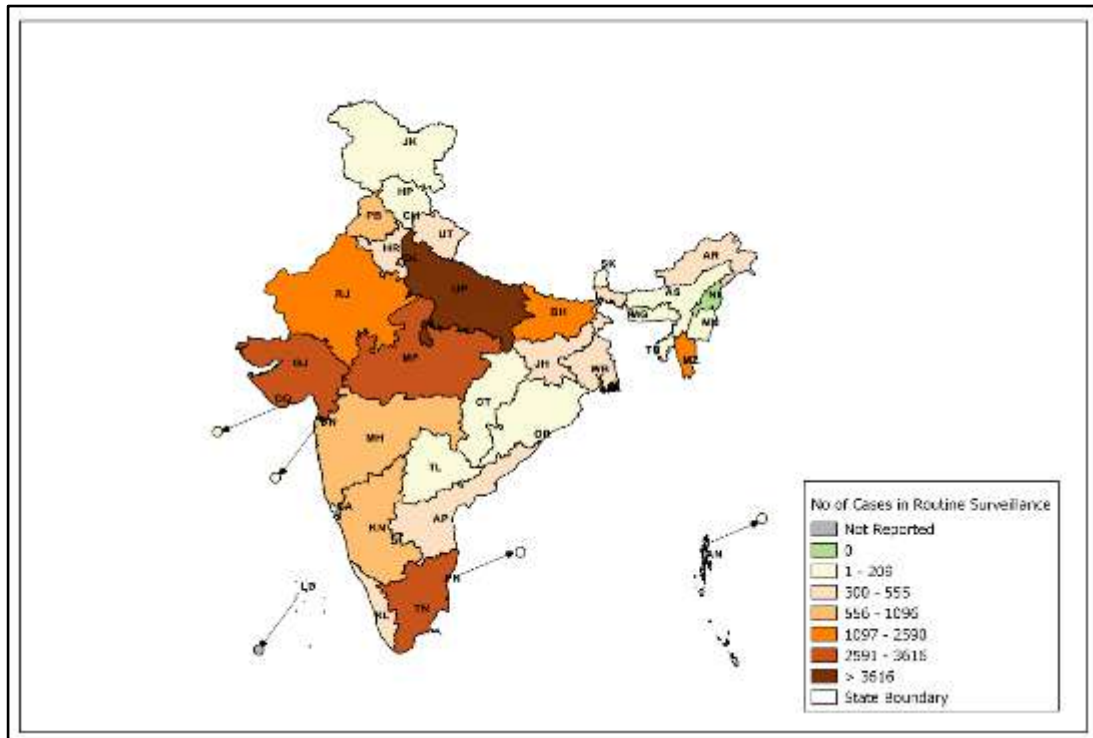**Fig 18: State/UT wise Presumptive Viral Hepatitis cases and outbreaks for February 2017**

Fig 19: State/UT wise Lab confirmed Viral Hepatitis A cases and outbreaks for February 2017
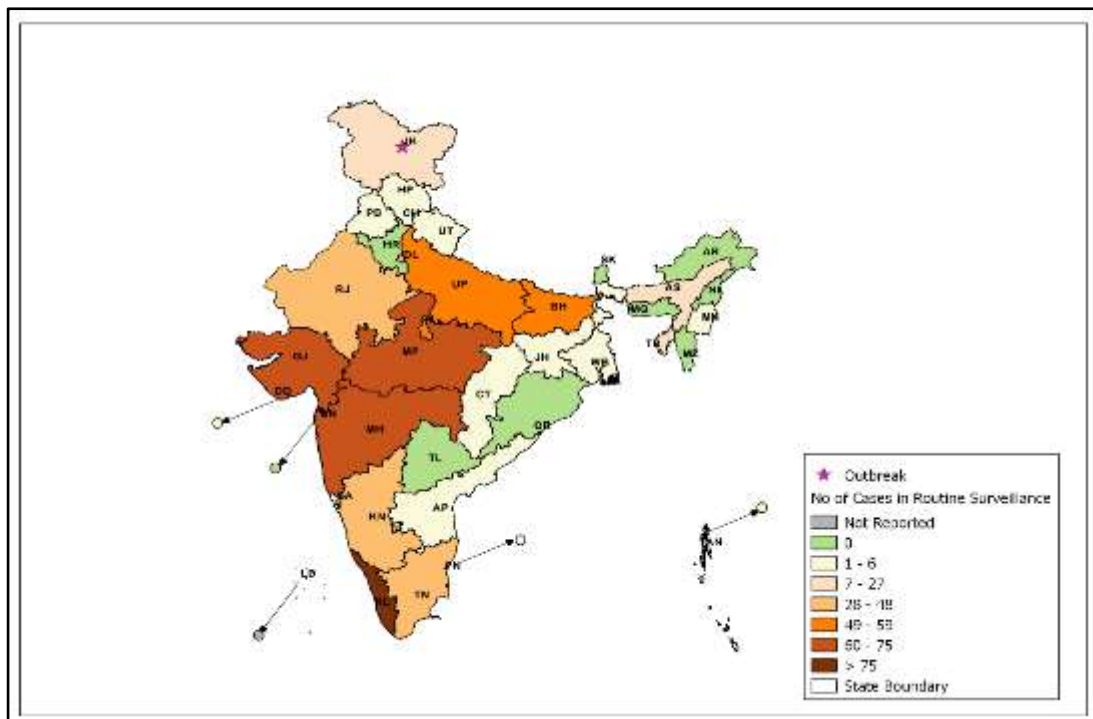
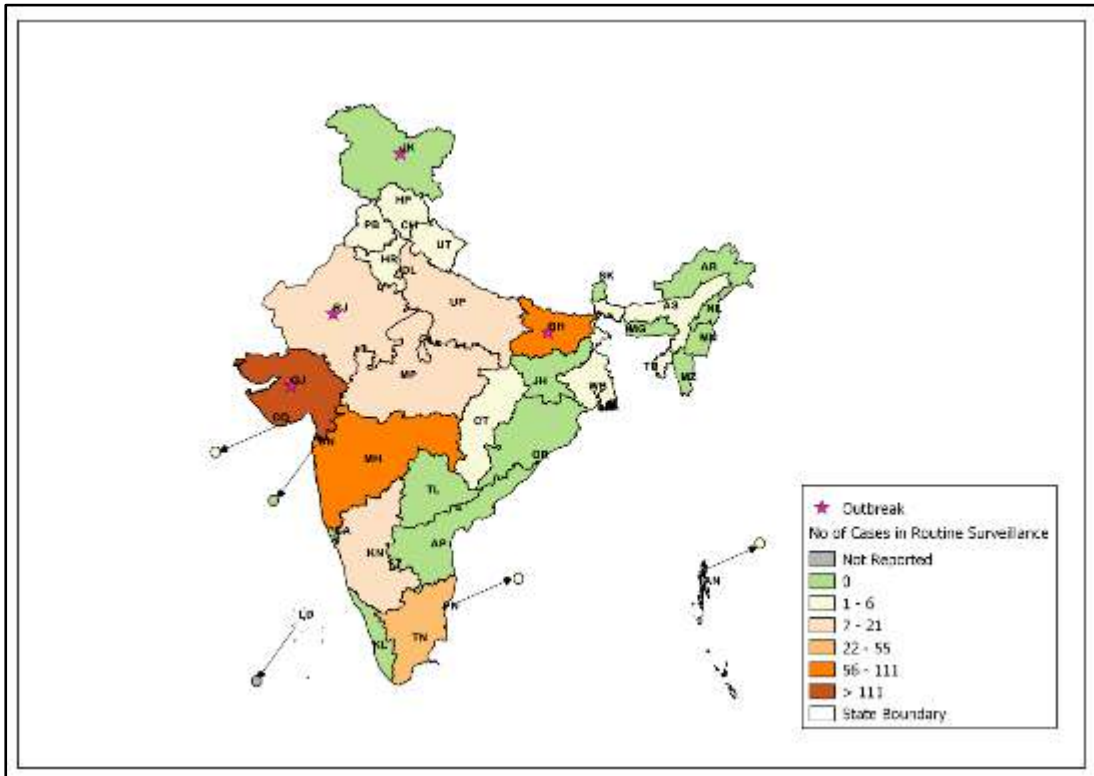**Fig 20: State/UT wise Lab confirmed Viral Hepatitis E cases for February 2017**

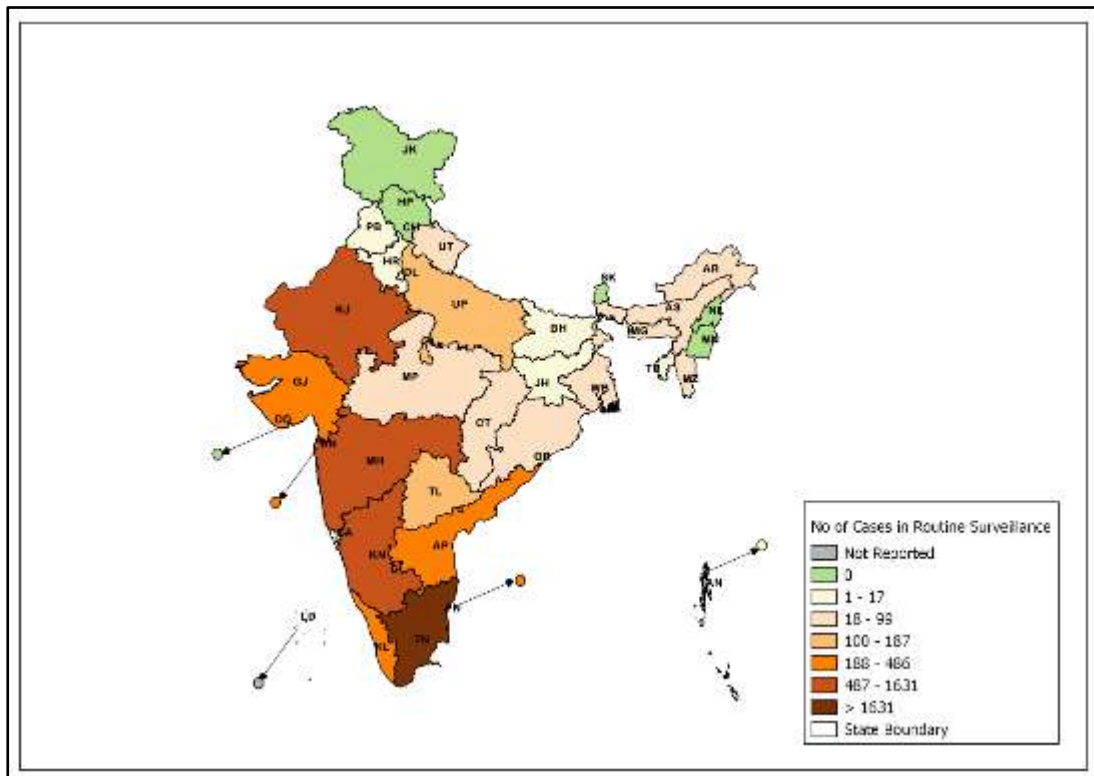**Fig 21: State/UT wise Presumptive Dengue cases & outbreaks for February 2017**

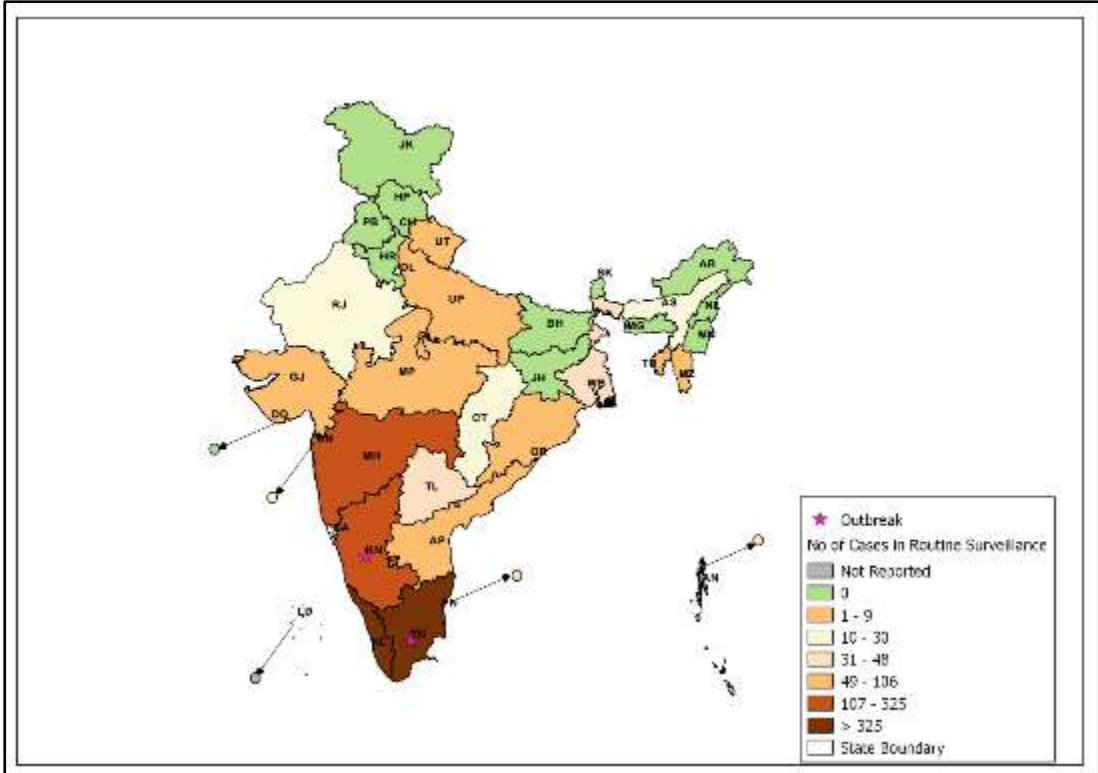**Fig 22: State/UT wise Lab confirmed Dengue cases & outbreaks for February 2017**

★ Outbreak

No of Cases in Routine Surveillance
- Not Reported
- 0
- 1 - 9
- 10 - 30
- 31 - 48
- 49 - 106
- 107 - 325
- > 325
- State Boundary

Fig 23: State/UT wise Presumptive Leptospirosis cases for February 2017

No of Cases in Routine Surveillance
- Not Reported
- 0
- 1 - 4
- 5 - 15
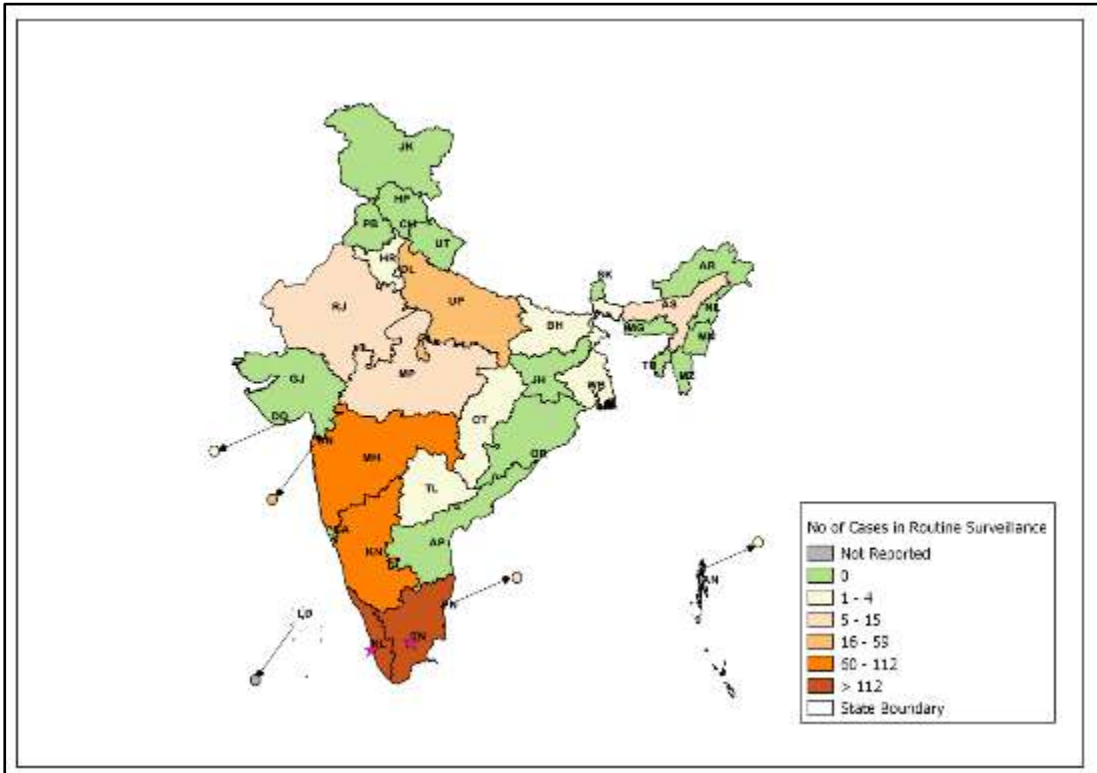- 16 - 59
- 60 - 112
- > 112
- State Boundary

Fig 24: State/UT wise Lab Confirmed Leptospirosis cases & outbreaks for February 2017
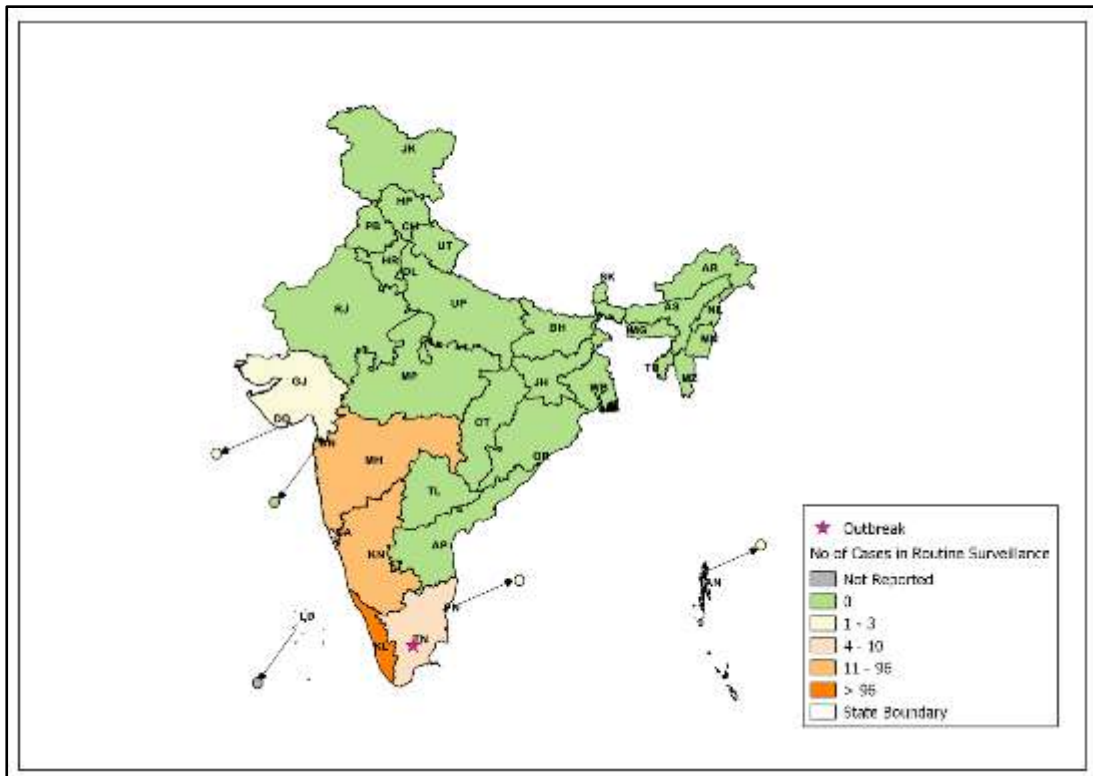

Fig 25: State/UT wise Presumptive Chikungunya cases & outbreaks for February 2017
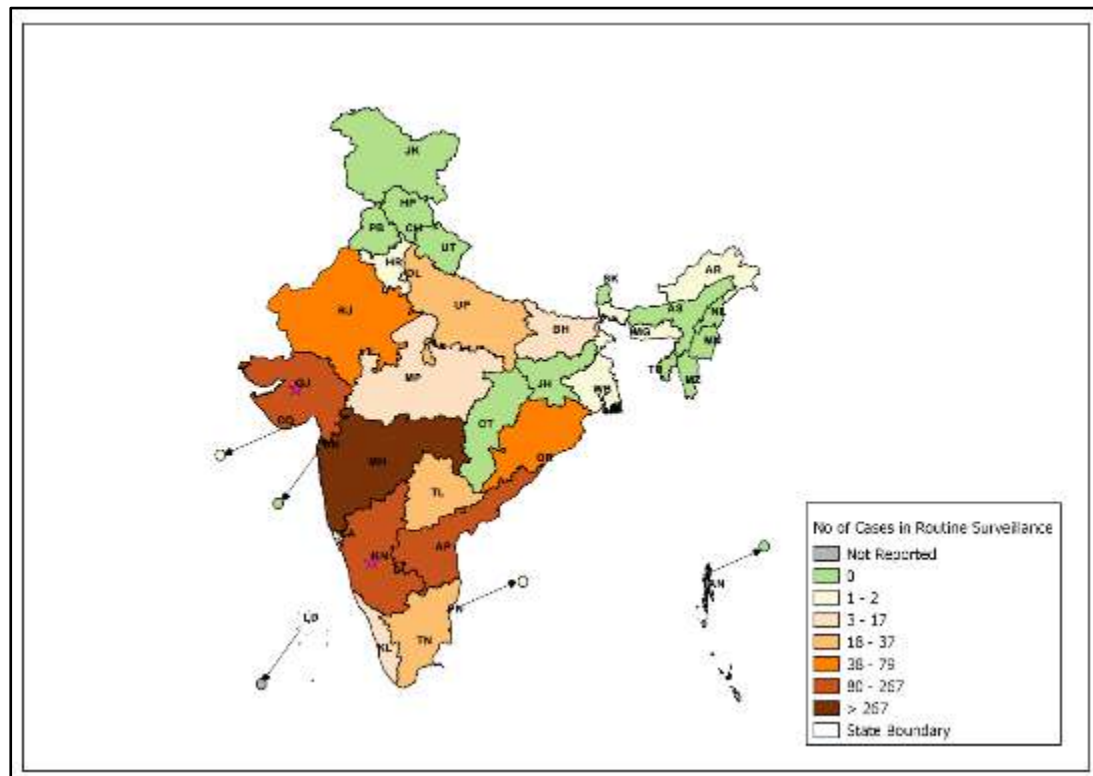
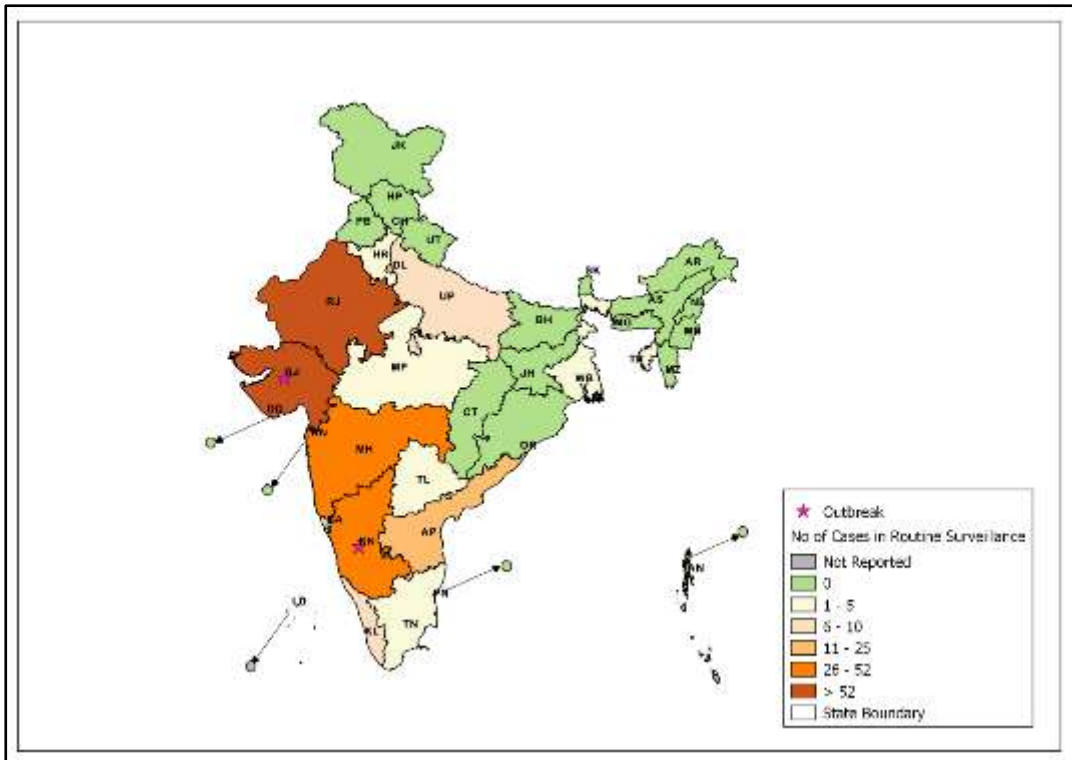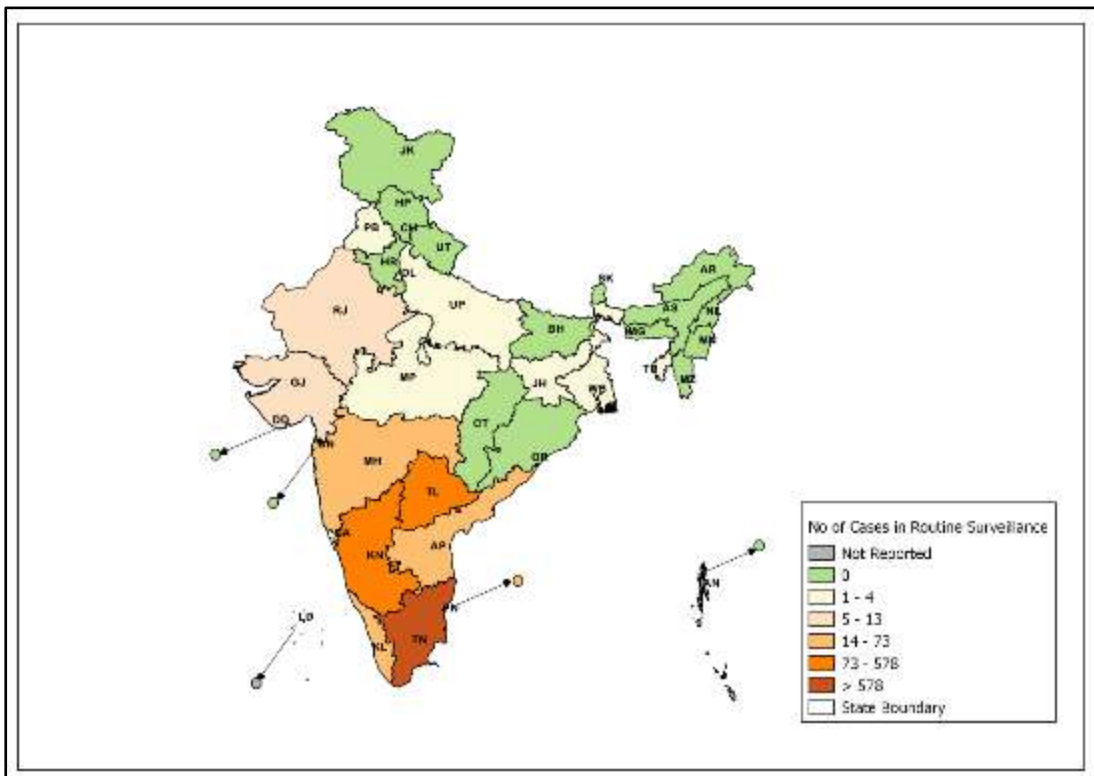**Fig 26: State/UT wise Lab Confirmed Chikungunya cases & outbreak for February 2017**

Fig 27: State/UT wise Influenza A (H1N1) cases & outbreak for February 2017

- Dr Sanket Kulkarni Deputy Director IDSP was in Bhopal, Madhya Pradesh for Laboratory Supported Vaccine Preventable Diseases Surveillance Launch from 27 February 2017 to 2 March 2017.

Glossary:

- **P form:** Presumptive cases form, in which cases are diagnosed and reported based on typical history and clinical examination by Medical Officers.
- **Reporting units under P form:** Additional PHC/ New PHC, CHC/ Rural Hospitals, Infectious Disease Hospital (IDH), Govt. Hospital / Medical College*, Private Health Centre/ Private Practitioners, Private Hospitals*
- **L form:** Lab confirmed form, in which clinical diagnosis is confirmed by an appropriate laboratory tests.
- **Reporting units under L form:** Private Labs, Government Laboratories, Private Hospitals(Lab.), CHC/Rural Hospitals(Lab.),
- HC/ Additional PHC/ New PHC(Lab.), Infectious Disease Hospital (IDH)(Lab.), Govt. Hospital/Medical College(Lab.), Private Health Centre/ Private Practitioners(Lab.)
- **Completeness %:** Completeness of reporting sites refers to the proportion of reporting sites that submitted the surveillance report (P & L Form) irrespective of the time when the report was submitted.

Case definitions:

- **Enteric Fever: Presumptive**: Any patient with fever for more than one week and with any two of the following: Toxic look, Coated tongue, Relative bradycardia, Splenomegaly, Exposure to confirmed case, Clinical presentation with complications e.g. GI bleeding, perforation, etc. AND/OR Positive serodiagnosis (Widal test)
  Confirmed: A case compatible with the clinical description of typhoid fever with confirmed positive culture (blood, bone marrow, stool, urine) of *S. typhi*/ S paratyphi.
  ARI/ ILI**:-**An acute respiratory infection with fever of more than or equal to 38° C and cough; with onset within the last 10 days.
- **Acute Diarrheal Disease: Presumptive Acute Diarrheal Disease (Including Acute Gastroenteritis):** Passage of 3 or more loose watery stools in the past 24 hours. (With or without vomiting).
- **Confirmed Cholera**: A case of acute diarrhoea with isolation and identification of Vibrio cholera serogroup O1 or O139 by culture of a stool specimen.
- **Viral Hepatitis**: **Presumptive**: Acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue, and right upper quadrant tenderness.
  Confirmed: Hepatitis A: A case compatible with the clinical description of acute hepatitis with demonstration of anti-HAV IgM in serum sample.
  Confirmed: Hepatitis E: A case compatible with the clinical description of acute hepatitis with demonstration of anti-HEV IgM in serum sample.

- **Dengue**: **Presumptive**: An acute febrile illness of 2-7 days duration with two or more of the mentioned manifestations:
  - Headache, Retro-orbital pain, Myalgia, Arthralgia, Rash, haemorrhagic manifestations, leukopenia, or Non-ELISA based NS1 antigen/IgM positive. (A positive test by RDT will be considered as probable due to poor sensitivity and specificity of currently available RDTs.)

  Confirmed: A case compatible with the clinical description of dengue fever with at least one of the following:

  - Demonstration of dengue virus NS-1 antigen in serum sample by ELISA.
  - Demonstration of IgM antibodies by IgM antibody capture ELISA in single serum sample.
  - IgG seroconversion in paired sera after 2 weeks with fourfold increase of IgG titre.
  - Detection of viral nucleic acid by polymerase Chain reaction (PCR).
  - Isolation of the dengue virus (virus culture +ve) from serum, plasma, leucocytes.

- **Leptospirosis Case Definition**: **Presumptive Leptospirosis**: Acute febrile illness with headache, myalgia and prostration associated with a history of exposure to infected animals or an environment contaminated with animal urine With one or more of the following:
    - Calf muscle tenderness
    - Conjunctival suffusion
    - Oliguria or anuria and/or proteinuria
    - Jaundice
    - Haemorrhagic manifestations (intestines, lung)
    - Meningeal irritation
    - GI symptoms (Nausea/ Vomiting/ Abdominal pain/Diarrhoea)
- And/or one of the following:-
    - A positive result in IgM based immune- assays, slide agglutination test or latex agglutination test or immunochromatographic test.
    - A Microscopic Agglutination Test (MAT) titre of 100/200/400 or above in single sample based on endemicity.
    - Demonstration of leptospires directly or by staining methods

Lab Confirmed Leptospirosis: A case compatible with the clinical description of leptospirosis with at least one of the following:

- Isolation of leptospires from clinical specimen.
- Four fold or greater rise in the MAT titre between acute and convalescent phase serum specimens run in parallel. (Source: -National Guidelines on Diagnosis, Case Management Prevention and Control of Leptospirosis NCDC 2015).

- **Chikungunya case definition: Presumptive Case Definition**: An acute illness characterised by sudden onset of fever with any of the following symptoms: headache, backache, photophobia, severe arthralgia and rash.
    - Lab confirmed: A case compatible with the clinical description of chikungunya fever with at least one of the following: Demonstration of IgM antibodies by IgM antibody capture ELISA in a single serum sample.
    - Detection of viral nucleic acid by PCR.
    - Isolation of chikungunya virus from clinical specimen. (Source – Mid Term Plan Guidelines, NVBDCP 2013.

Data shown in this bulletin are provisional, based on weekly reports to IDSP by State Surveillance Unit. Inquiries, comments and feedback regarding the IDSP Surveillance Report, including material to be considered for publication, should be directed to: Director, NCDC 22, Sham Nath Marg, Delhi 110054. Email: dirnicd@nic.in & idsp-npo@nic.in

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