



Disease Alert प्रकोप चेतावनी

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

April 2016

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Use of Geographic Information System (GIS) In Disease Surveillance

Epidemiology is a study of distribution and determinants of health related states or events and application of the study to the control of diseases and other health problems. One of the factor that determine the disease and aids its transmission is environment.

In any disease surveillance system, lot of data for multiple diseases is collected and analysed to prevent occurrence of an outbreak. These analysis are mainly done through table and graphs. Although, tabular and graphical representation represents all of the requested data but, it remains very difficult to fully understand the patterns and trends buried in them or make quick and effective comparisons between the figures. Analysing this information clubbed with other factors like (population density, forests, water bodies, drinking water availability, elevation etc.) makes the situation even more complex.

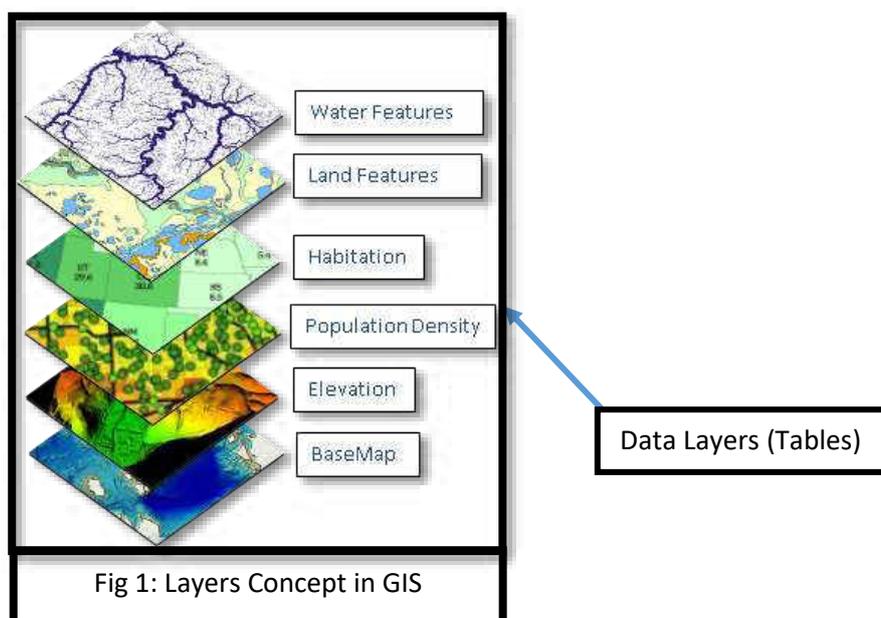


Fig 1: Layers Concept in GIS

Thus, mapping spatial aspects of diseases could help understand some puzzles of disease outbreaks as the information is more easily understood when visualized on a map. Geographic Information System (GIS) has emerged as an innovative, important component of public health and epidemiology. It is an excellent

means for mapping, visualizing and analysing disease data, revealing trends, dependencies and inter-relationships between public health data and environment. GIS integrates, manipulates and displays a wide range of information which creates a picture of an area's geography, environment and socio-economic characteristics. GIS allows users to collate and analyse various types of spatially referenced data and matched disease/outbreak data far more readily than the traditional research techniques. It helps to links geographic locations with characteristics of the phenomena found there (e.g., cases of disease, demographics, water supply and drainage lines, vector breeding sites like ponds, streams, tanks etc. can easily be identified) and thus visually display the spatial associations.

For disease surveillance GIS helps in:

1. Identifying subtle patterns like Spatial Distribution of Disease (Disease Clustering) which may be missed in tabular representation and determine where control and prevention should be focused–

As shown in Fig 2, at all India level for H1N1 disease (declared as pandemic by WHO in 2009 due to its fast spread all over the world) we can easily say that the states reporting maximum number of deaths for H1N1 are Maharashtra, Gujarat, Rajasthan and Madhya Pradesh (all the states have adjoining boundaries). Of all the 4 states Maharashtra reports the maximum number of deaths.

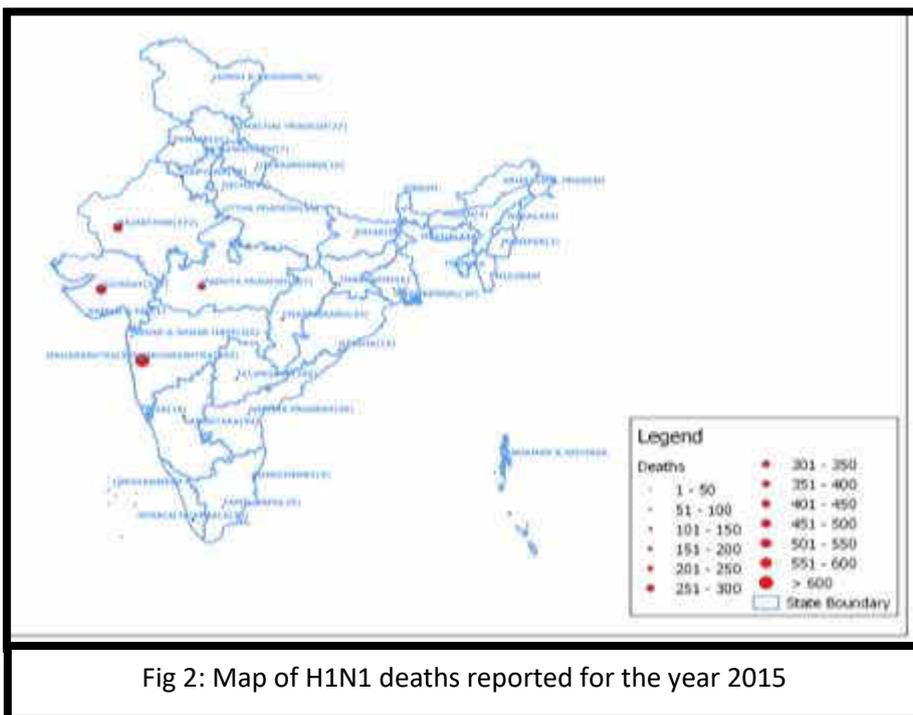


Fig 2: Map of H1N1 deaths reported for the year 2015

On further drill down we see that Pune, Mumbai reports the maximum no of deaths compared to other districts of Maharashtra (Fig 3).

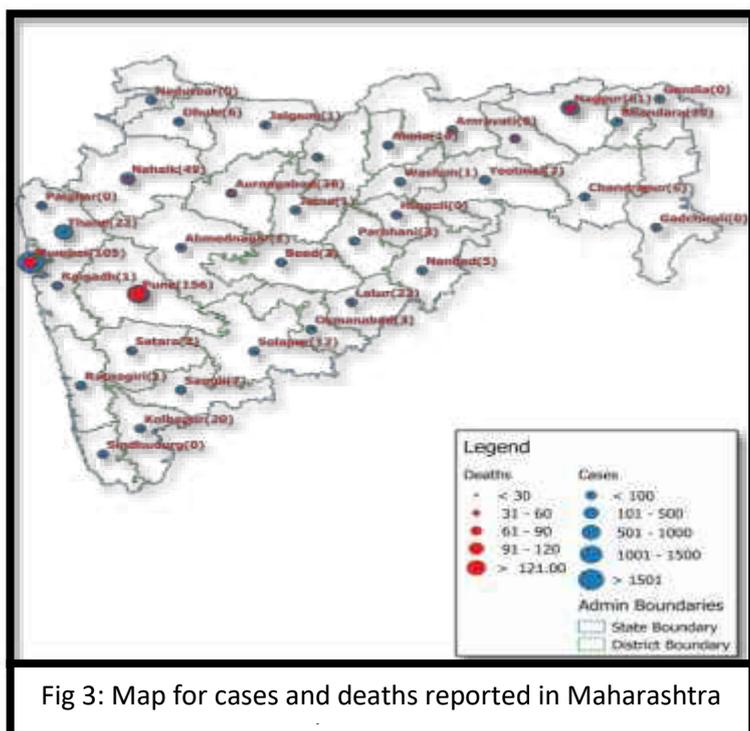


Fig 3: Map for cases and deaths reported in Maharashtra

Also, GIS can be used at individual or aggregate level to identify the etiology of a disease and to understand the association of a disease with environmental variables. Identification of diseases determinants like vector breeding sites (e.g. catchment areas, ponds, streams, tanks etc.), vulnerable groups, location of Health facilities, movement of carriers etc. can instantly be identified by looking at the map. Climate variables (like temperature, relative humidity, saturation deficiency and Rainfall) can also be analysed. Although this association is subject to availability of their respective GIS coordinates.

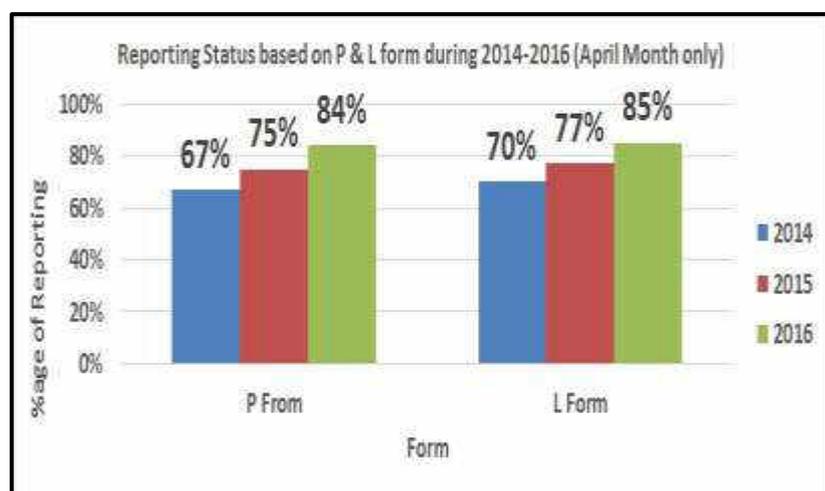
GIS helps us answer following type of questions like: What is it? (What exists at a particular location), Where is it? (Instead of identifying what exists at a particular location we can find a location where certain conditions are satisfied),

trends (seeks to find the differences between the two areas), patterns (like- whether cancer is a major cause of death among residents near a nuclear power station) etc.

Therefore, GIS application provides a common platform for multi-disease surveillance activities, decision support system for real-time monitoring and analysis. To initiate the process of integration of GIS in IDSP, a meeting was held on 16.03.2016 at NCDC under the chairmanship of Director NCDC for development of web-based GIS application for IDSP. Participants from various Government organizations where GIS application have successfully been implemented showcased their running models. Also, discussion on the various issues, technology to be adopted was held. Integration of GIS in IDSP will not only help in dynamically creating thematic maps for cases/deaths reported for multiple diseases at all levels (All India/State/District), but also in the identifying it's relation with other parameters like population density, water-bodies, temperature etc. which may in turn help in identifying the etiology of disease and determine where control and prevention should be focused. Thus, GIS can be of great aid to strengthen health worker's capability for epidemiological analysis and to facilitate the dissemination of data relating to epidemiology and public health.

Surveillance data of Enteric Fever, Acute Diarrhoeal Disease, Viral Hepatitis A & E, Dengue and Leptospirosis During April 2014-2016*

* Data extracted from IDSP Portal (www.idsp.nic.in) as on August 19; 2016.



As shown in fig 4, in April 2014, 2015 and 2016, the 'P' form reporting percentage (i.e. % RU reporting out of total in P form) was 67 %, 75% and 84% respectively across India, for all disease conditions. Similarly, L form reporting percentage was 70%, 77% and 85% respectively across India for all disease conditions, during the same month. The completeness of reporting has significantly increased over the years in both P and L form, thereby improving the quality of surveillance data.

Fig. 4: Reporting Status based on P & L form during April 2014-2016

As shown in fig 5, number of presumptive Enteric fever cases, as reported by States/UTs in 'P' form was 165962 in April 2014; 171679 in April 2015 and 192373 in April 2016. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in April 2014; 271880 samples were tested for Enteric fever, out of which 46046 were found positive (17% positivity). In April 2015; out of 321952 samples, 49258 were found to be positive (15% positivity) and in April 2016, out of 366098 samples, 51167 were found to be positive (14% positivity).

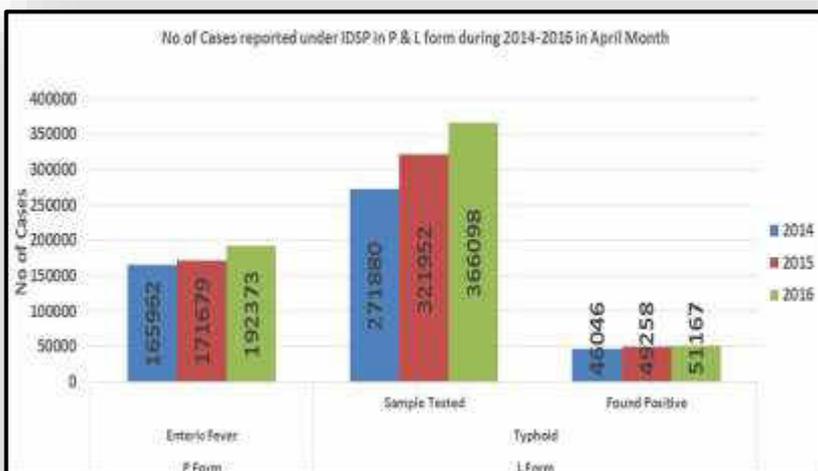


Fig. 5: No. of Enteric Fever Cases reported under P & L form during April 2014-2016

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

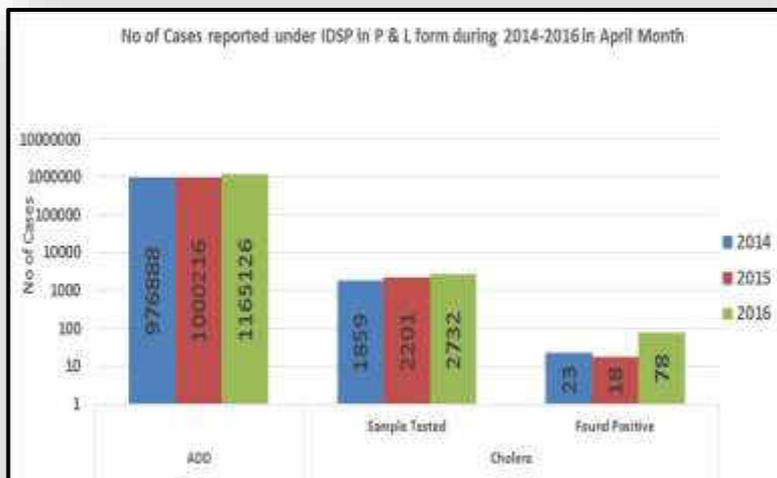


Fig. 6: No. of ADD Cases reported under IDSP in P form & Lab confirmed Cholera cases in L form during April 2014-2016

As shown in fig 7, the number of presumptive viral hepatitis cases was 24133 in April 2014, 19785 in April 2015 and 31547 in April 2016. These presumptive cases were diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form for viral hepatitis A, in April 2014; 13514 samples were tested out of which 747 were found positive (6% positivity). In April 2015; out of 14470 samples, 899 were found to be positive (6% positivity) and in April 2016, out of 15911 samples, 985 were found to be positive (6% positivity).

As reported in L form for viral hepatitis E, in April 2014; 3816 samples were tested out of which 378 were found positive

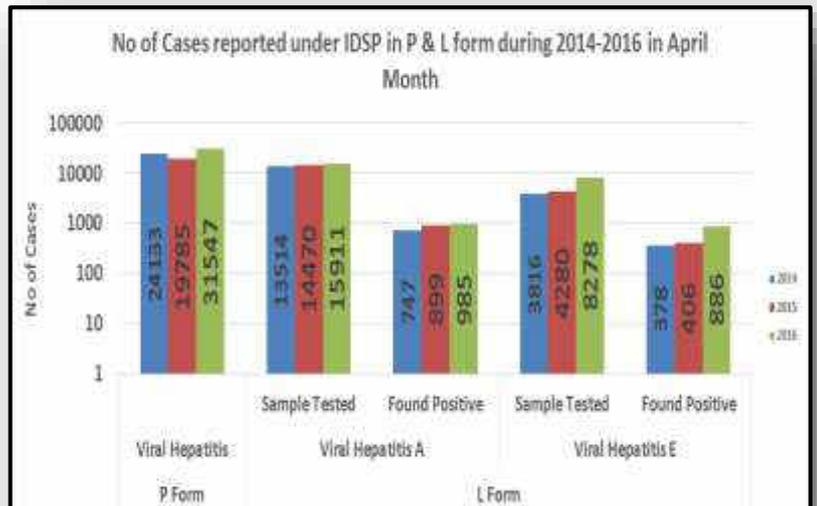


Fig. 7: No of Viral Hepatitis Cases reported under IDSP in P form & Viral Hepatitis A & E cases reported under L form during April 2014-2016

(10% positivity). In April 2015; out of 4280 samples, 406 were found to be positive (9% positivity) and in April 2016, out of 8278 samples, 886 were found to be positive (11% positivity).

As shown in fig 8, number of presumptive Dengue cases, as reported by States/UTs in 'P' form was 3069 in April 2014; 2566 in April 2015 and 4410 in April 2016. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in April 2014; 15666 samples were tested for Dengue, out of which 842 were found positive (5% positivity). In April 2015; out of 14406 samples, 716 were found to be positive (5%

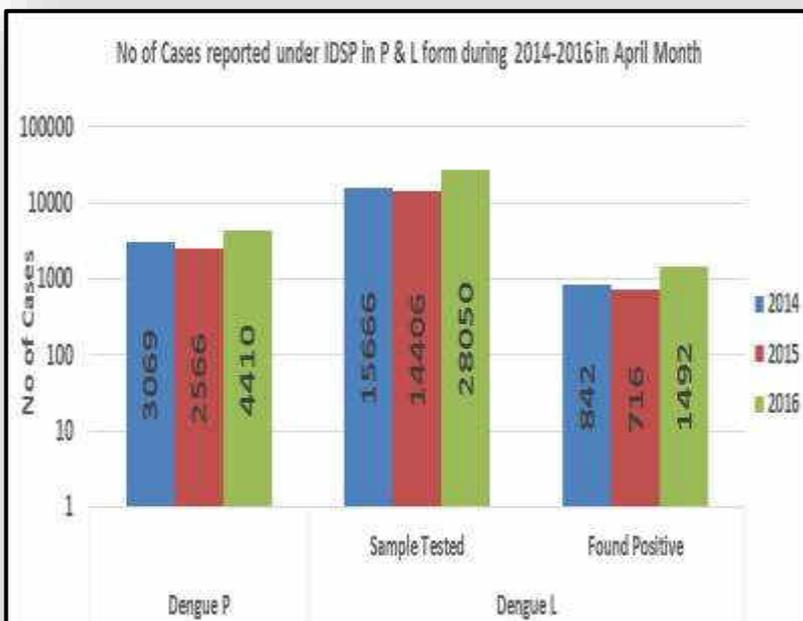
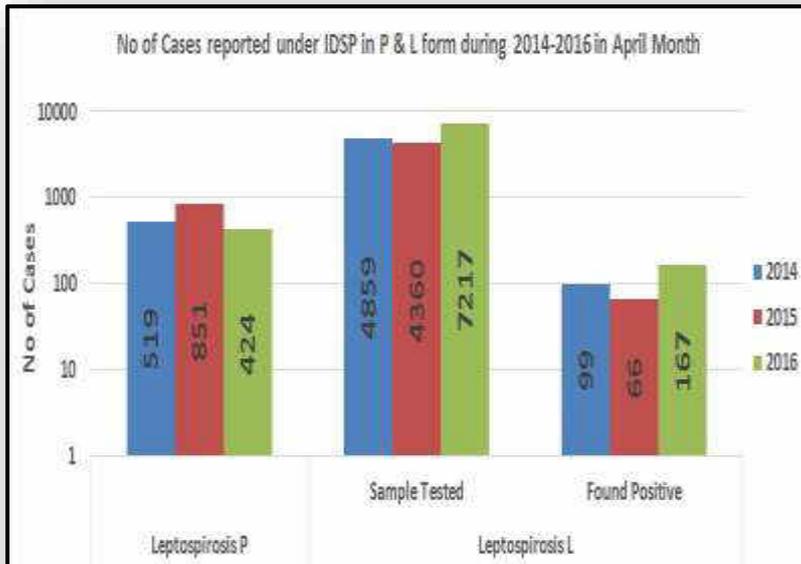


Fig. 8: No. of Dengue Cases reported under IDSP in P & L form during April 2014-2016

positivity) and in April 2016, out of 28050 samples, 1492 were found to be positive (5% positivity).

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



As shown in fig 9, number of presumptive Leptospirosis cases, as reported by States/UTs in 'P' form was 519 in April 2014; 851 in April 2015 and 424 in April 2016. These presumptive cases are diagnosed on the basis of standard case definitions provided under IDSP.

As reported in L form, in April 2014; 4859 samples were tested for Leptospirosis, out of which 99 were found positive (2% positivity). In April 2015; out of 4360 samples, 66 were found to be positive (2% positivity) and in April 2016, out of 7217 samples, 167 were found to be positive (2% positivity).

Fig. 9: No. of Leptospirosis Cases reported under IDSP in P & L form during April 2014-2016

Fig 10: State/UT wise P form completeness % for April 2016

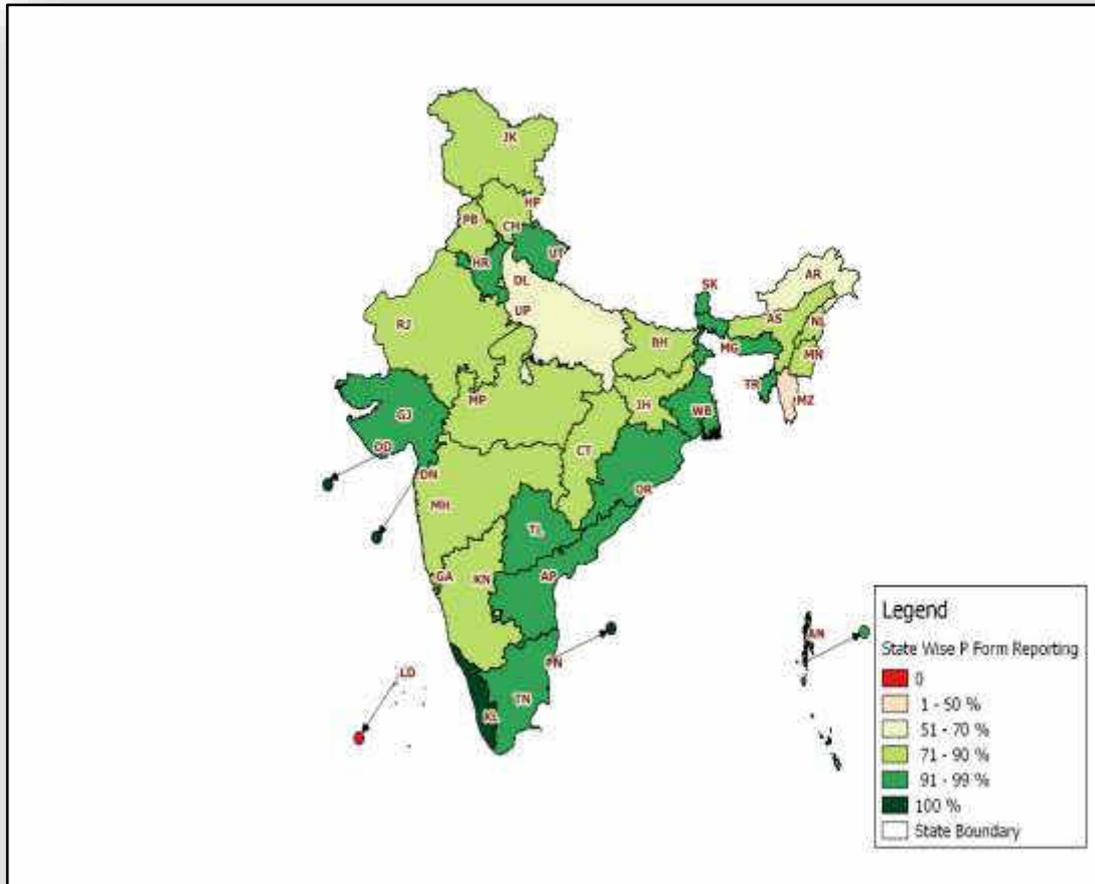


Fig 11: State/UT wise L form completeness % for April 2016

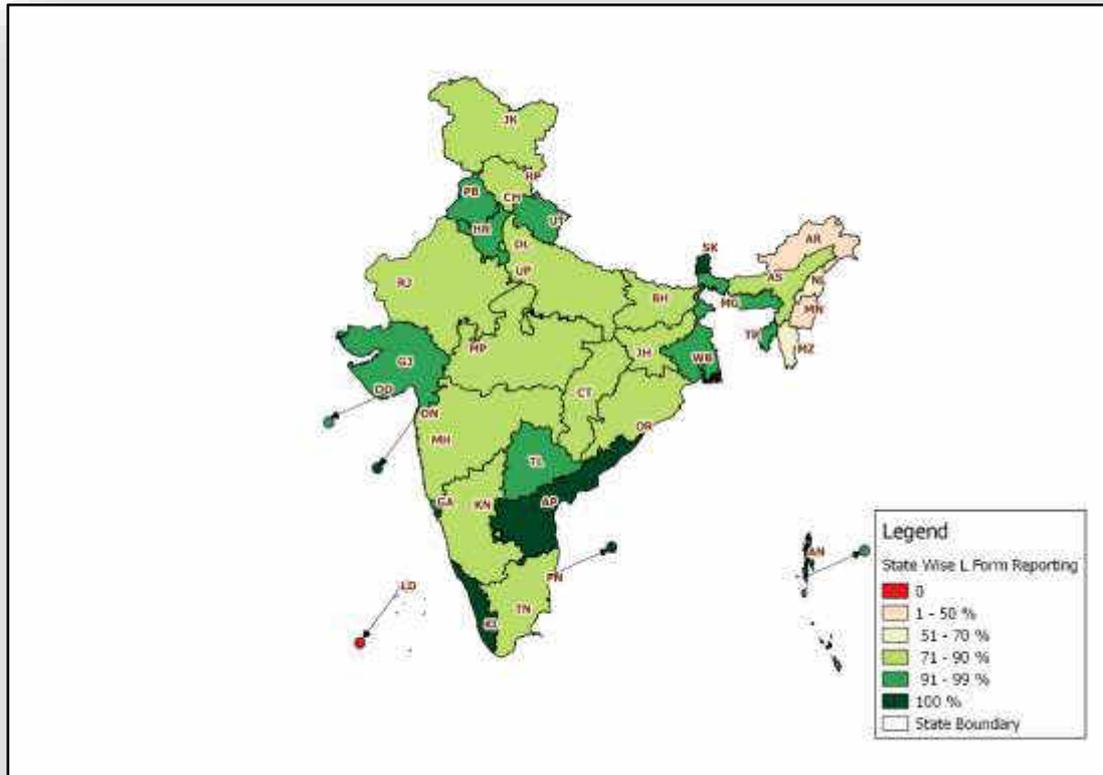


Fig 12: State/UT wise Presumptive Enteric fever cases and outbreaks for April 2016

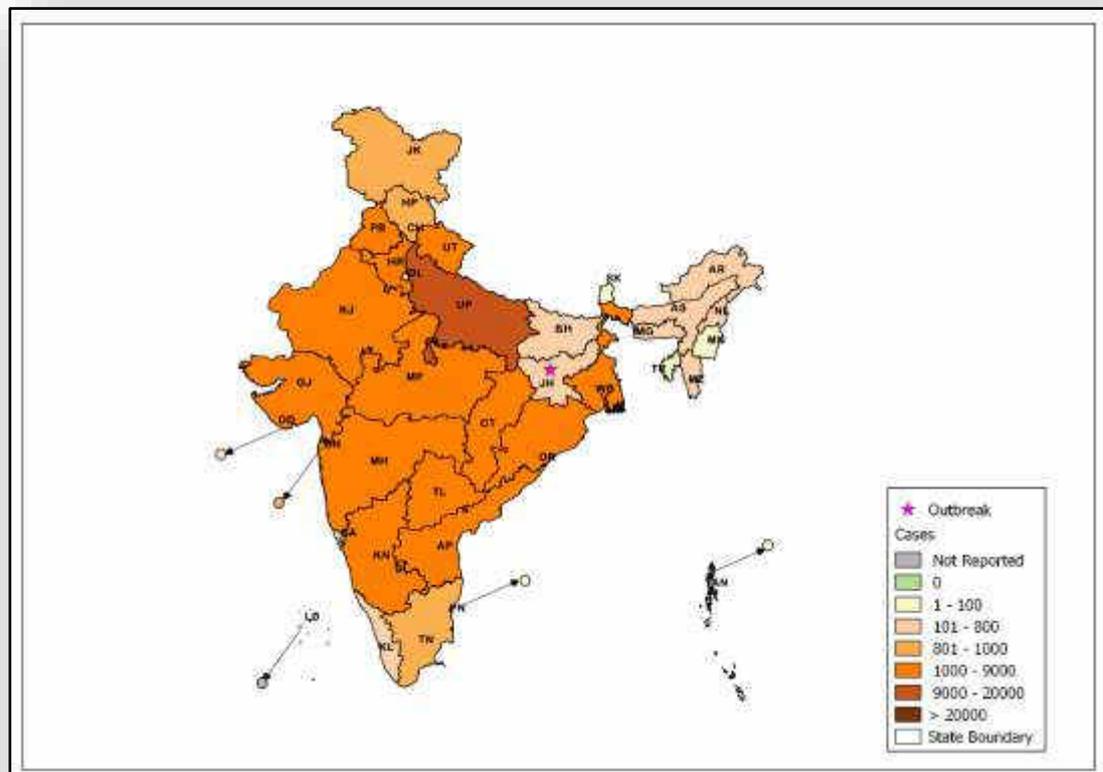


Fig 13: State/UT wise Lab Confirmed Enteric Fever cases and outbreaks for April 2016

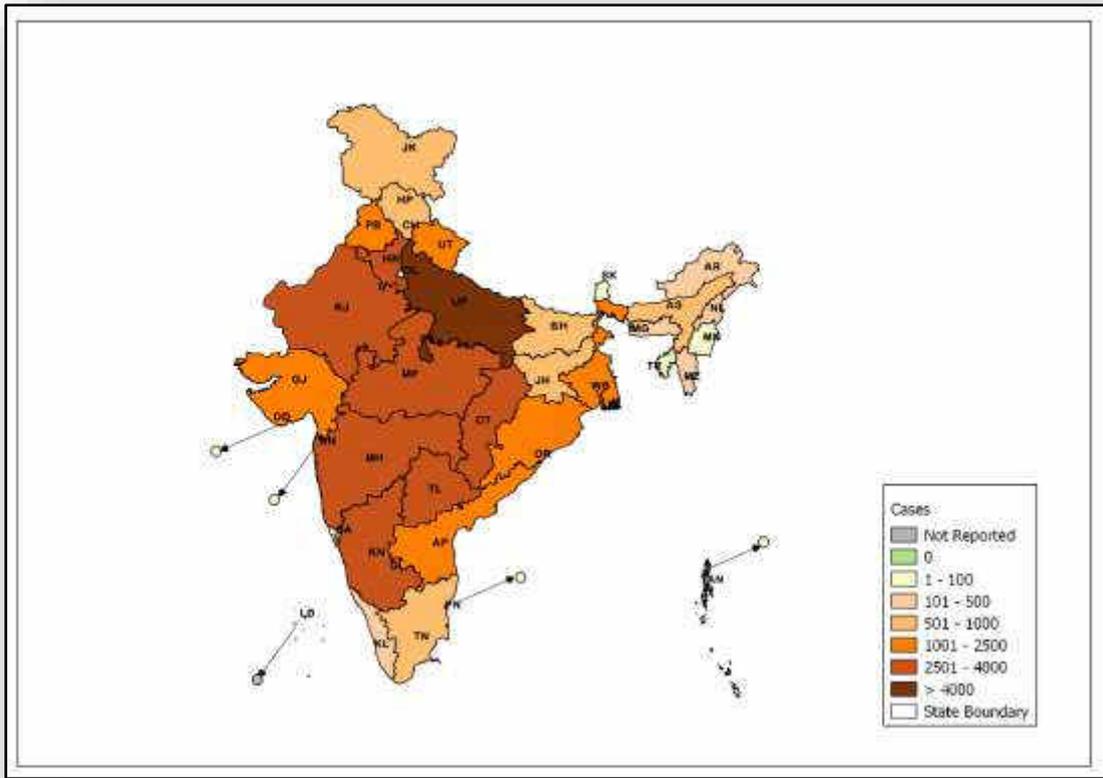


Fig 14: State/UT wise Presumptive ADD cases and outbreaks for April 2016

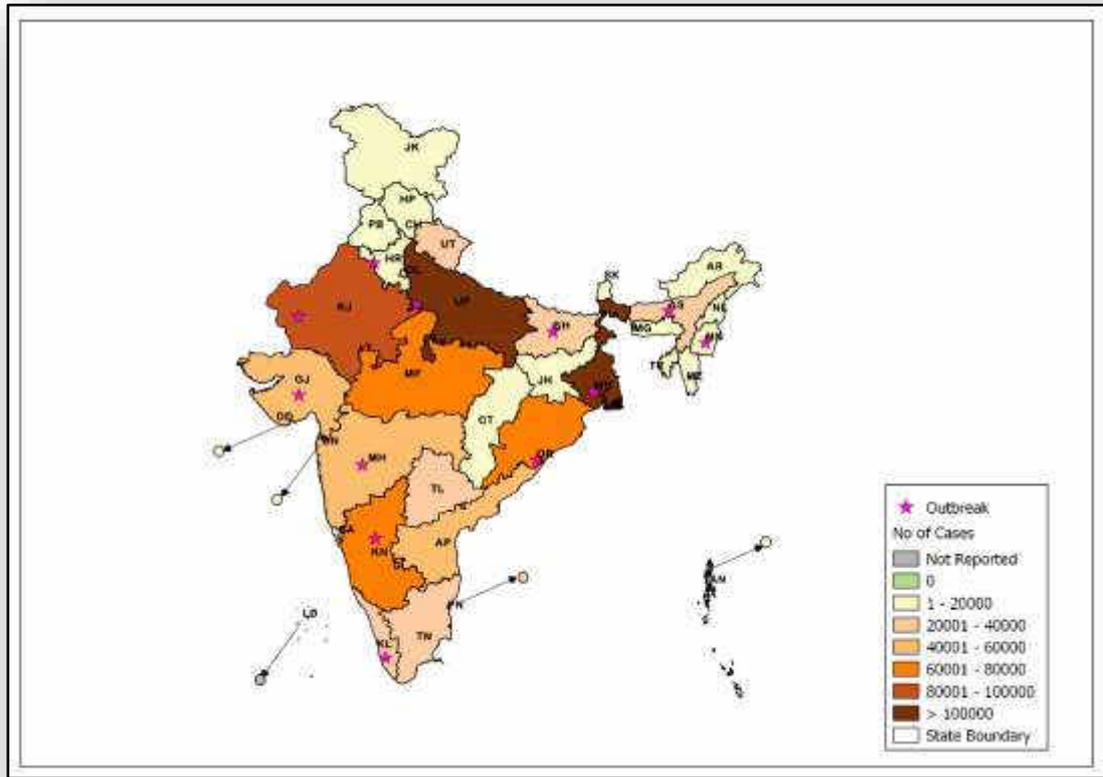


Fig 15: State/UT wise Lab Confirmed Cholera cases and outbreaks for April 2016

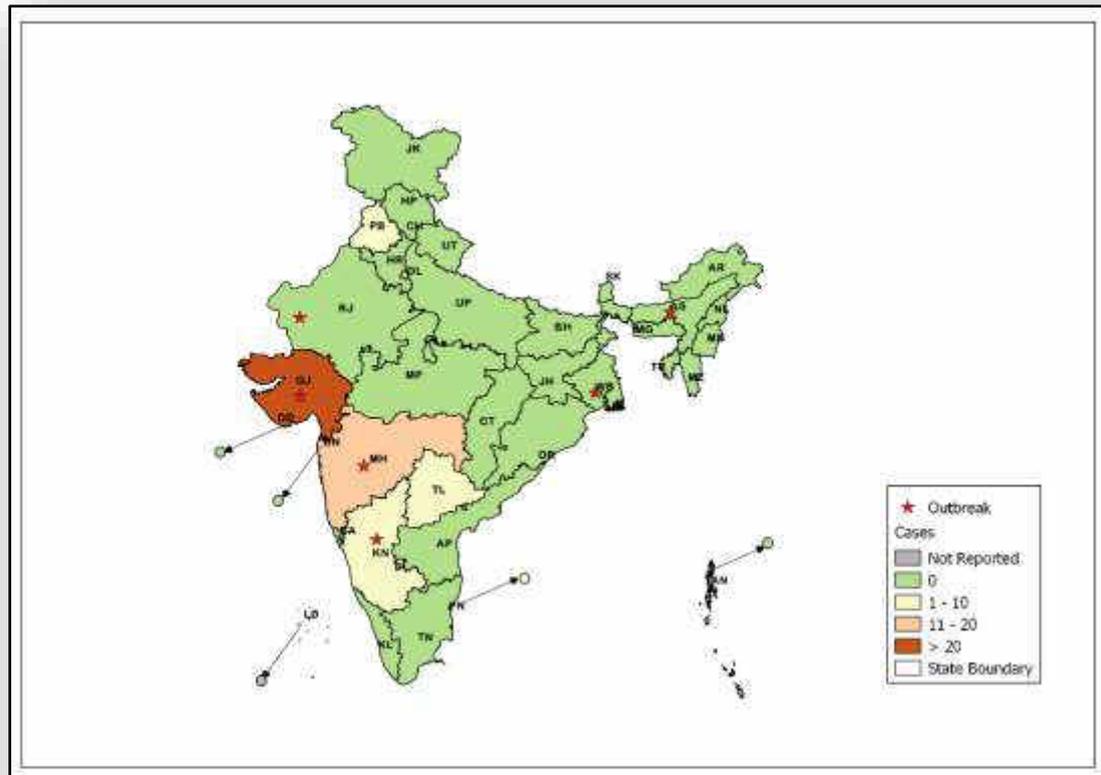


Fig 16: State/UT wise Presumptive Viral Hepatitis cases and outbreaks for April 2016

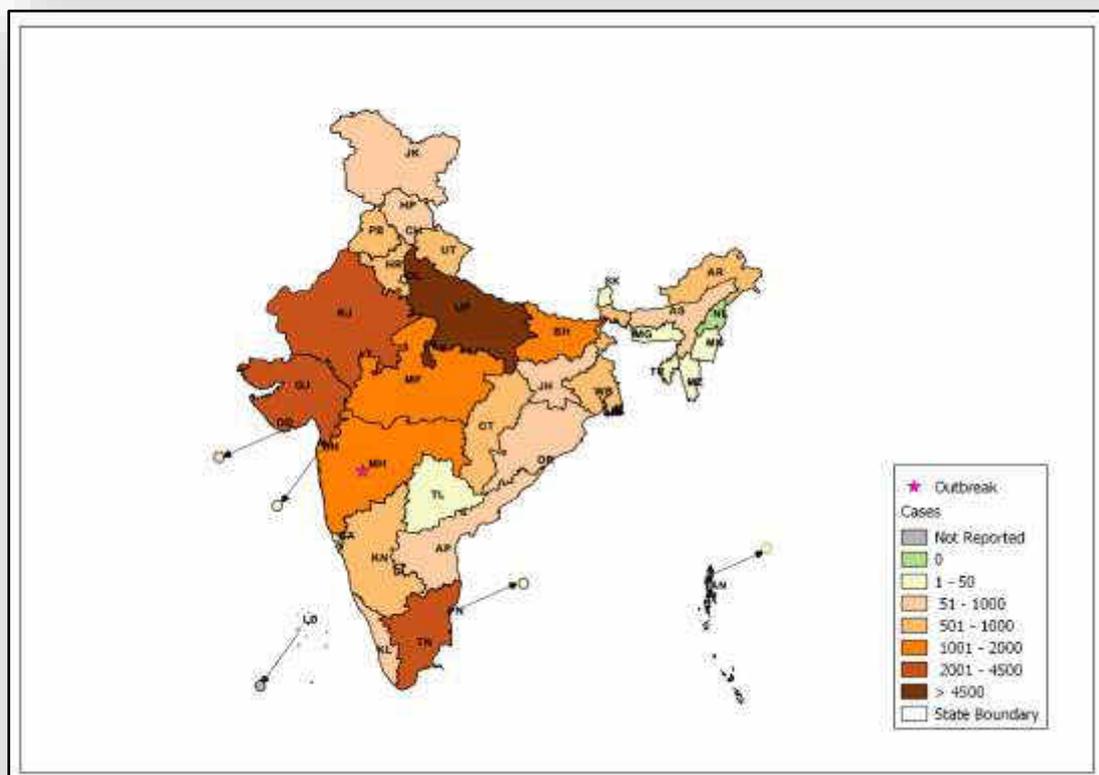


Fig 17: State/UT wise Lab confirmed Viral Hepatitis A cases for April 2016

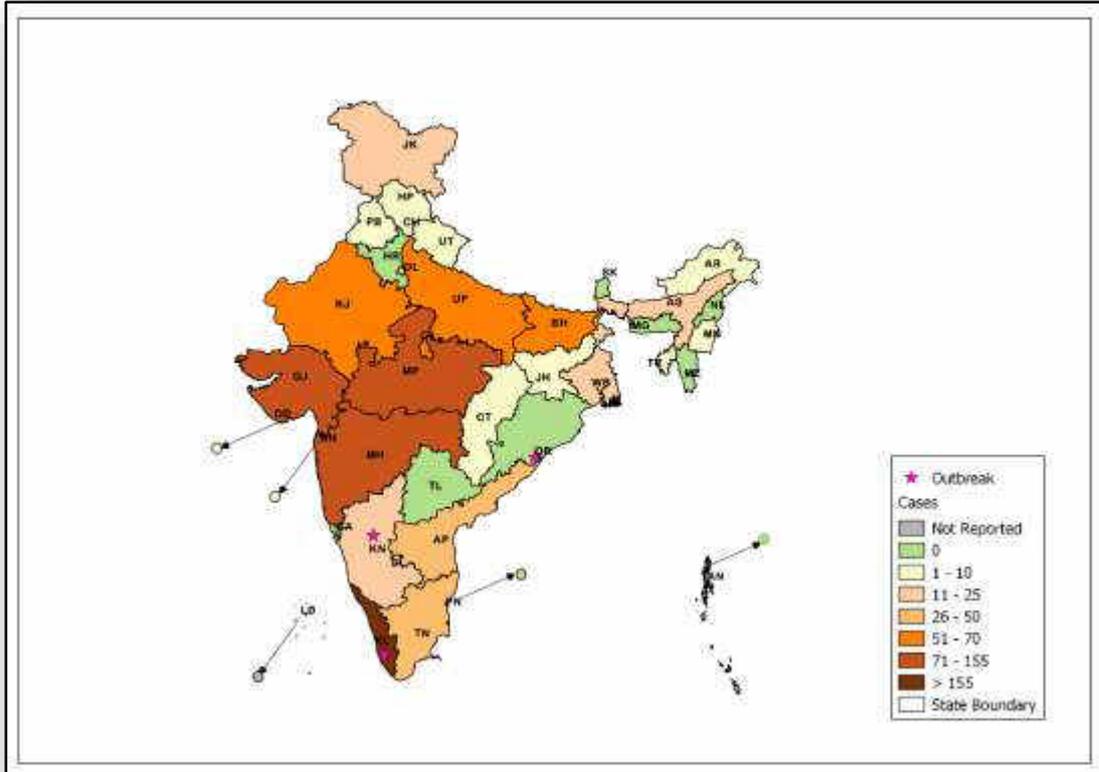


Fig 18: State/UT wise Lab confirmed Viral Hepatitis E cases for April 2016

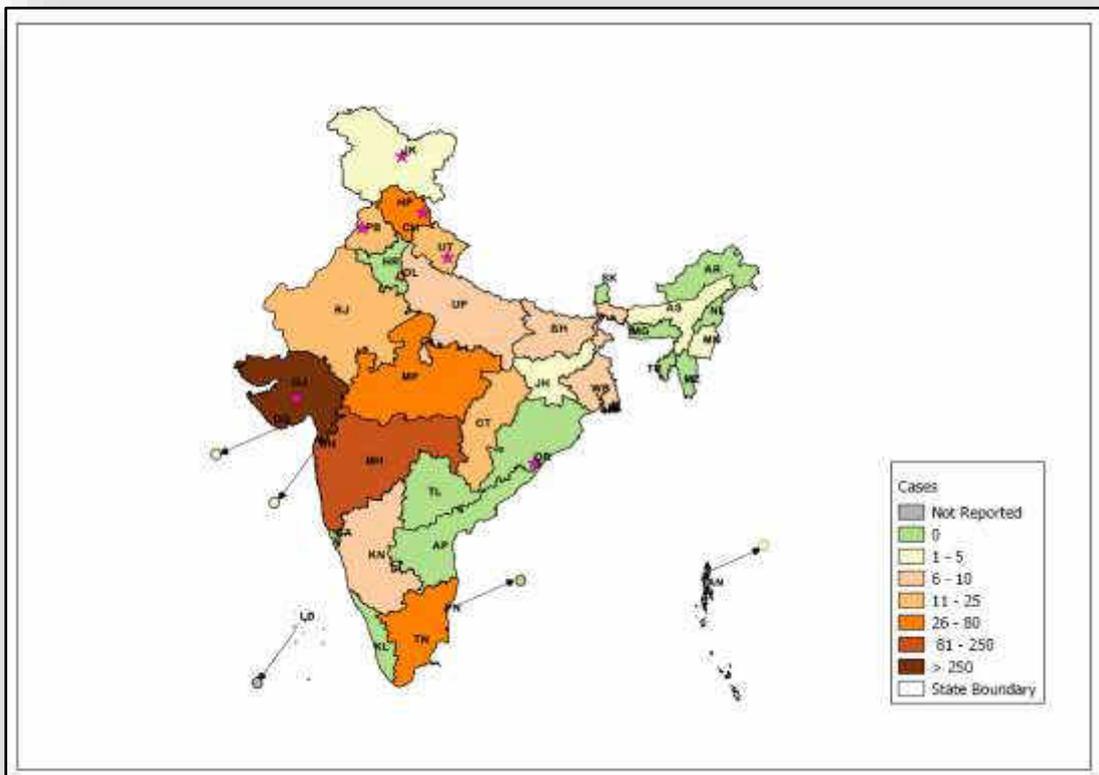


Fig 19: State/UT wise Presumptive Dengue cases & outbreaks for April 2016

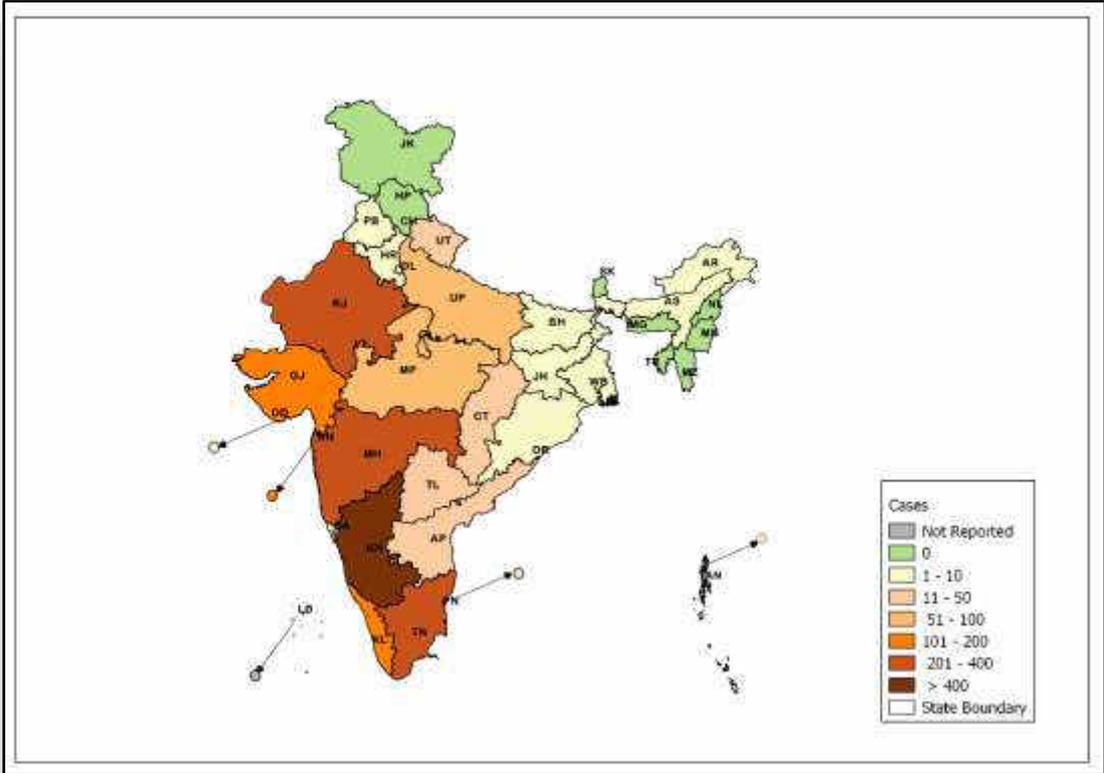


Fig 20: State/UT wise Lab confirmed Dengue cases for April 2016

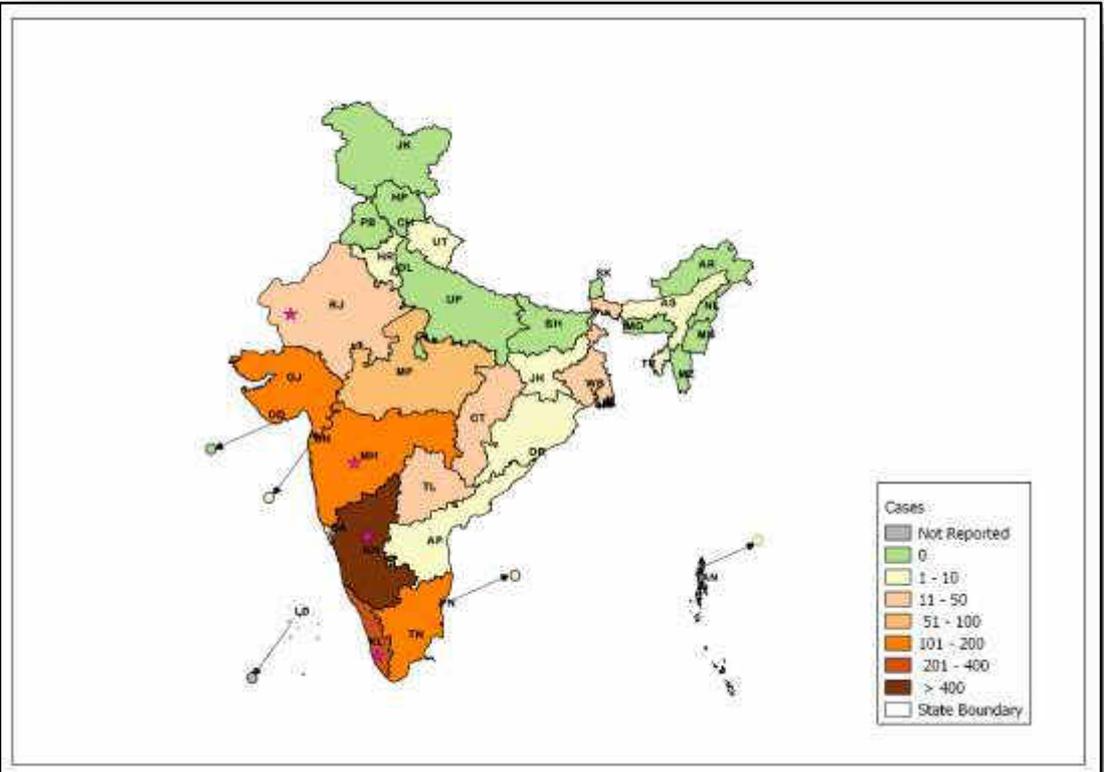


Fig 21: State/UT wise Presumptive Leptospirosis cases for April 2016

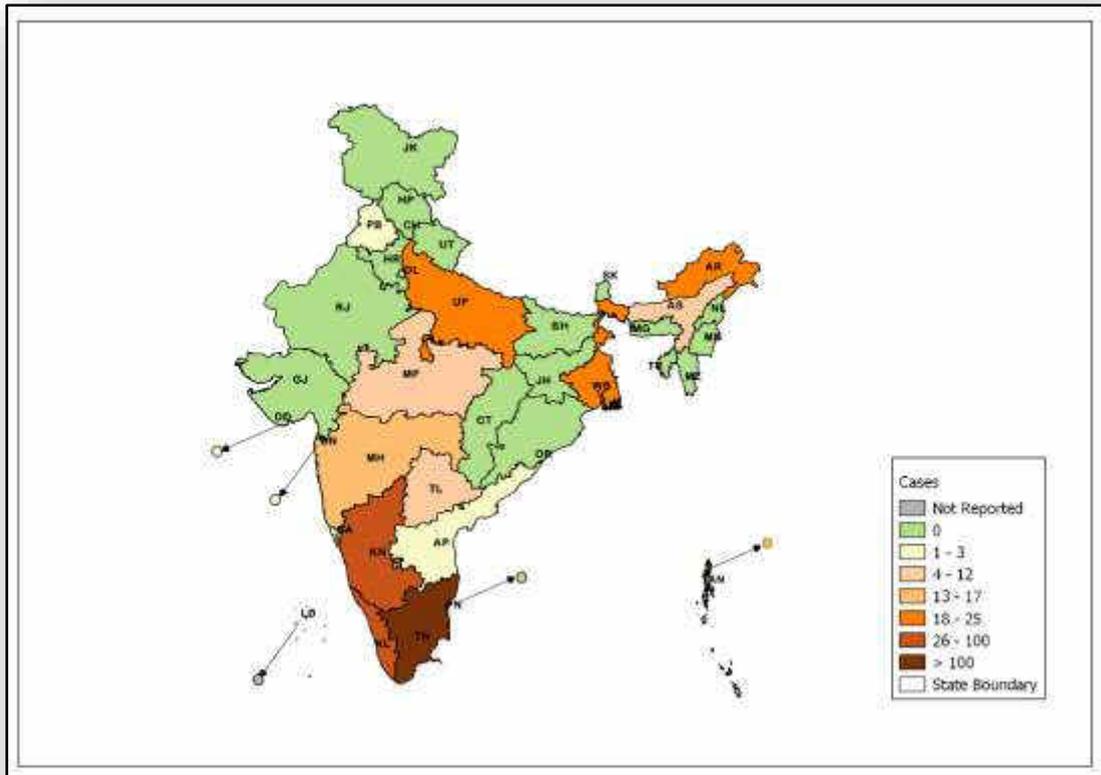
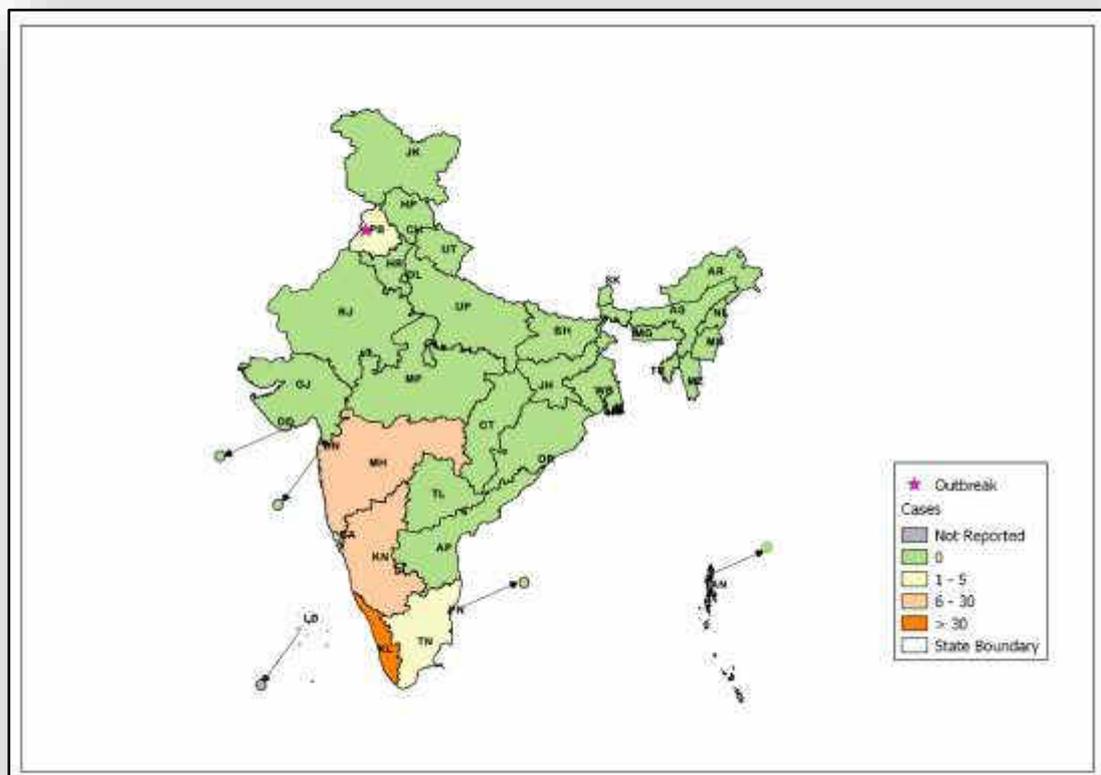


Fig 22: State/UT wise Lab Confirmed Leptospirosis cases & outbreak for April 2016



Outbreak Investigation of Viral Hepatitis, Ramnagar, Nainital District, Uttarakhand, April, 2016

Introduction

In 2nd week of April 2016 suspected cases of viral hepatitis (58 in number) were reported in IDSP "P" Form (week No. 14, 2016) by Govt. Combined Hospital, Ramnagar to District surveillance Unit Nainital. Alert was generated for suspected viral hepatitis outbreak because the trend of Viral Hepatitis cases suddenly rises in week 14, 2016. RRT investigated the outbreak on 11/04/2016 with the objective of describing the outbreak, confirming the etiology and providing recommendation to control.

Methods

RRT visited the reporting Unit (Govt. Combined Hospital, Ramnagar) and used IDSP case definition-

"Acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue, and right upper quadrant tenderness" for identifying the cases. Review of records and registers was conducted to prepare the line list and conducting descriptive epidemiology.

05 blood samples were collected for lab confirmation of etiology and tested at IDSP referral lab Govt. Medical College Haldwani, Nainital. Patients were interviewed and affected areas were visited by local health teams to identify other cases in community.

Results

20 cases of Viral Hepatitis were identified, admitted at Govt. Combined Hospital, Ramnagar. Of those 08 cases belong to Khatiyari area and others were from different areas. RRT visited the affected areas which are located under semi urban settings, the population lives in unhygienic and poor sanitary conditions. During investigation no new case was found. The epi-curve of the outbreak is as below:

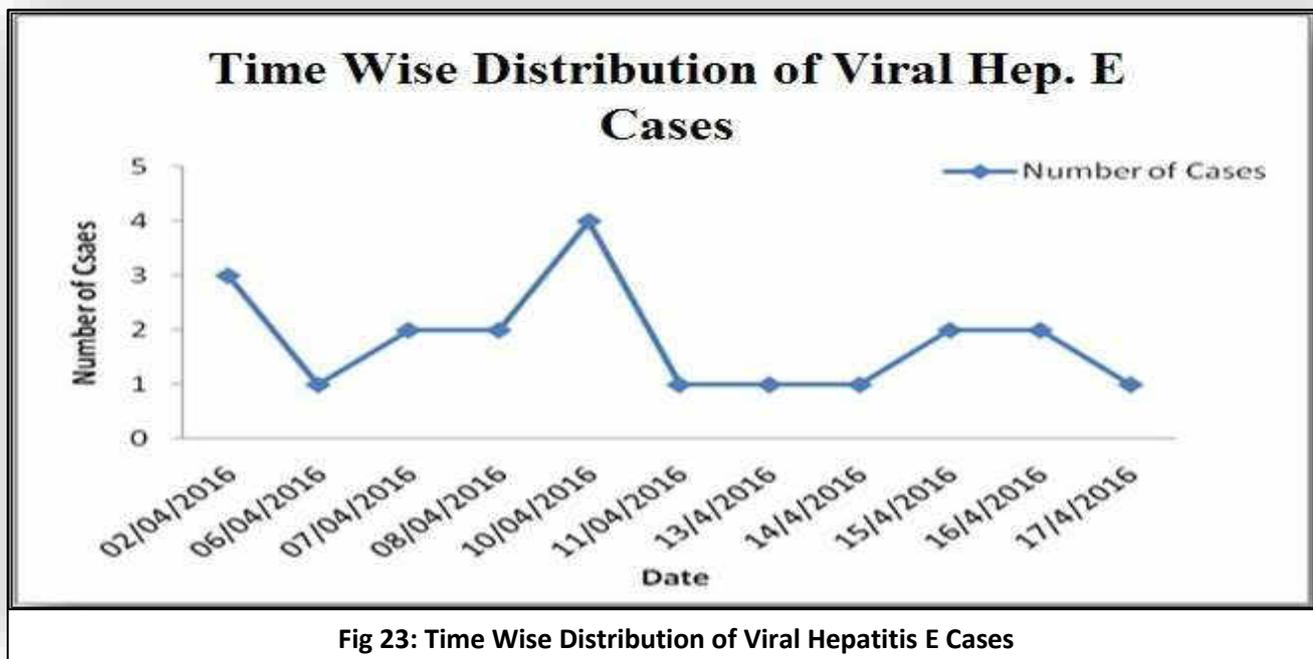


Fig 23: Time Wise Distribution of Viral Hepatitis E Cases

Index case was a 06 Yrs/F, R/o Khatiyari, in which symptoms started on 02/04/2016.

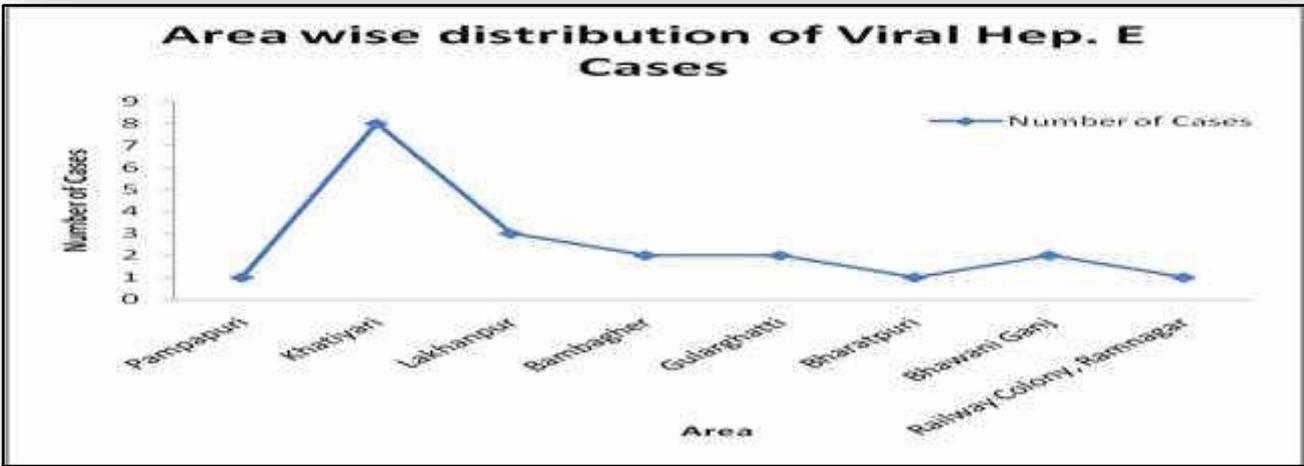


Fig 24: Area Wise Distribution of Viral Hepatitis E Cases

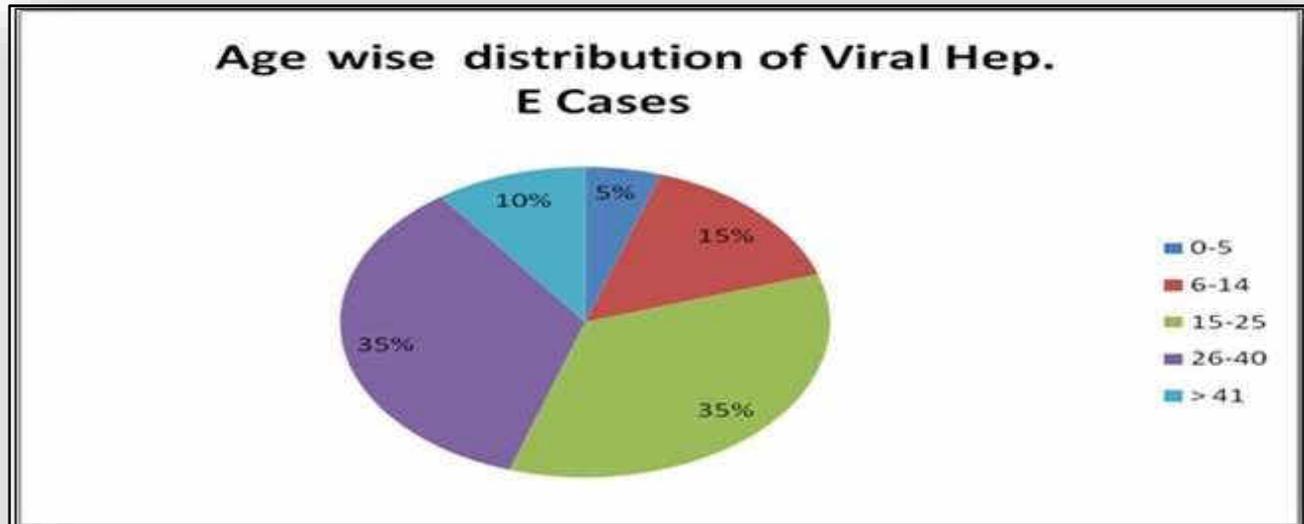


Fig 25: Age Wise Distribution of Viral Hepatitis E Cases

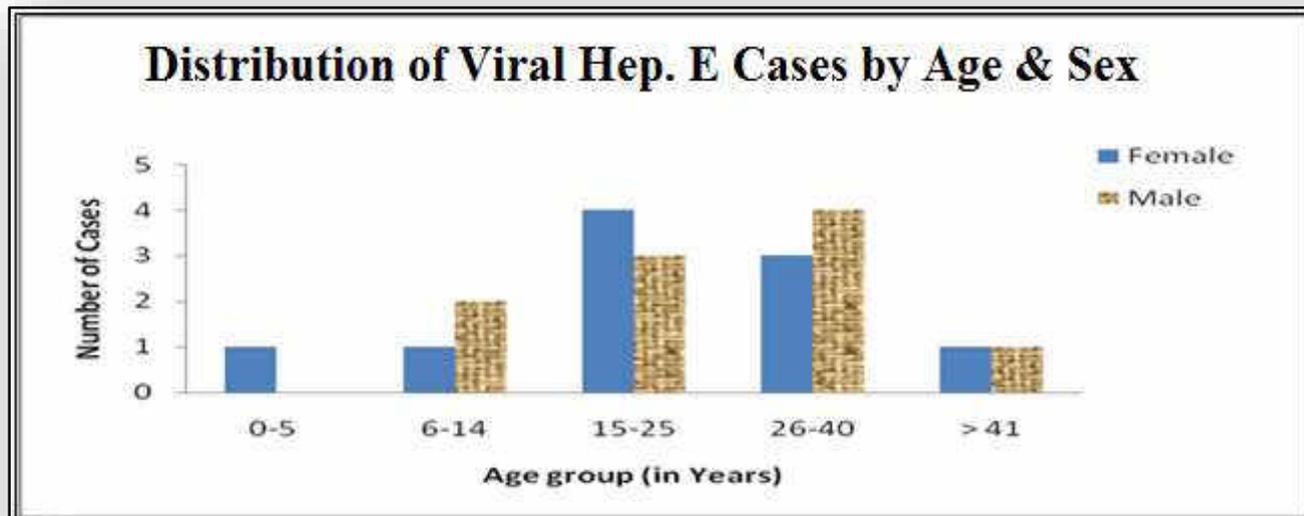


Fig 25: Distribution of Viral Hepatitis E Cases by Age & Sex

Most affected age group was 15-25 yrs and 26-40 yrs. Both the genders were equally affected (50% each).

Laboratory findings

All samples collected tested positive for HEV IgM ELISA at IDSP referral lab at Govt. Medical College Haldwani.

Conclusion

The outbreak was confirmed to be due to Hepatitis E. It may have occurred due to unhygienic and poor living standard/lifestyle.

Recommendations

- Timely identification, treatment and reporting of cases
- Provision of safe water, chlorination of drinking water sources
- Boiling of drinking water before consumption
- Health education and IEC among the population
- Regular water quality testing
- Inter-sectoral coordination between Health department, Jal Sansthan and Municipality is required.
- Daily reporting till outbreak subsides.

Control measures undertaken

- Symptomatic treatment of all cases.
- Health education and IEC.
- Coordination with Jal Sansthan for chlorination of water sources/tanks.
- Communicated to Municipal Dept. for sanitation and hygiene.

Contributed by:

- Dr. Kiran Bisht, SSO & Additional Director (IDSP), Uttarakhand
- Dr. Pankaj Kumar Singh, Assistant Director (IDSP), Uttarakhand
- Dr. Akhilesh Tripathi, Epidemiologist IDSP, Uttarakhand

Action from the field

Preparatory activities for Epidemic Intelligence Services during Simhastha, 2016 under IDSP.

HOD Epidemiology NCDC & NPO IDSP NCDC visited the Ujjain, Madhya Pradesh between 11 April to 13 April, 2016 for preparation of epidemiological intelligence activity and to establish the surveillance system at Simhastha, Ujjain.



A Meeting at DSU (Ujjain) chaired by Principal Secretary Health, Madhya Pradesh to set up the surveillance system during mass gathering.



Discussions among officials for strengthening disease surveillance under IDSP during Simhastha, 2016

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.
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- **State Code:**
Andaman & Nicobar Islands AN; Andhra Pradesh AP; Arunachal Pradesh AR; Assam AS; Bihar BH; Chandigarh CH; Chhattisgarh CT; Dadra & Nagar Haveli DN; Daman & Diu DD; Delhi DL; Goa GA; Gujarat GJ; Haryana HR; Himachal Pradesh HP; Jammu & Kashmir JK; Jharkhand JH; Karnataka KN; Kerala KL; Lakshadweep LD; Madhya Pradesh MP; Maharashtra MH; Manipur MN; Meghalaya MG; Mizoram MZ; Nagaland NL; Odisha OR; Puducherry PN; Punjab PB; Rajasthan RJ; Sikkim SK; Tamil Nadu TN; Telangana TL; Tripura TR; Uttar Pradesh UP; Uttarakhand UT; West Bengal WB.

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.
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.
(Source – Dengue National guidelines, NVBDCP 2014)
- **Leptospirosis case definition: Presumptive:** 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 leptospire directly or by staining methods

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

- Isolation of leptospire 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)

Acknowledgement:

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The data shown in the IDSP Surveillance 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

Prepared by: Central Surveillance Unit, IDSP under the guidance of Director, NCDC