2. Methodology

2.1 Objectives of review

2.1.1 General objectives

- To determine how IDSP is progressing and whether any changes are required in the current model.
- To determine the country's needs with regard to strengthening the surveillance system for indicator based and event-based surveillance.
- To identify gaps and opportunities in performing the core and support functions of surveillance and assessing the resources available.
- To develop a prioritized action plan for strengthening of IDSP based on the findings of the assessment.

2.1.2 Specific objectives

- To assess the achievements of the IDSP, progress made on the Twelfth FYP targets and to review IDSP programme implementation at national, state and district levels.
- Assess achievements against the key performance indicators of IDSP, with special focus on progress made in the Twelfth Plan period.
- To assess the adequacy of various programme inputs such as HR, training, data standards including standardized formats and case definitions, IT equipment/systems at national, state and district (including sub-district) levels and intersectoral coordination.
- To review establishment and functionality of state and district surveillance units; review status of establishment, training and response of district/state/central RRTs and their involvement in outbreak investigation.
- To assess the functionality of the health facilities, both public and private and their role in implementation of surveillance activities.
- To review the extent of development of public health laboratories, assess quality assurance systems and their adequacy during disease outbreaks.
- Assess the laboratory-based, IT-enabled disease surveillance system for epidemic-prone diseases to monitor disease trends and adequately detect and respond to outbreaks.
- To review IDSP routine event-based or indicator-based reporting systems for geographical coverage, completeness and timeliness of reporting; assess systems for analysis and use of IDSP data for early warning, planning, local decision making and taking timely actions.

- To assess availability of funds at various levels, with particular attention to funds flow under the NHM, payment of staff remuneration and other expenses.
- To assess the special surveillance needs of influenza, VPDs and zoonosis for IDSP.
- To, make recommendations based on findings of the review, for improving quality, efficiency and usefulness of the programme, and to identify future opportunities and programme direction.

2.2 Scope of review

With the purpose of developing an action plan for strengthening the integrated disease surveillance in the country, a comprehensive mixed methods strategy was used for the review. The identified strategy included a review of key thematic components of the surveillance system by domain experts, development of an appropriate toolkit, review of the processes and timelines through an internal expert group and a field-led evaluation of surveillance functions and systems attributes. A core group was constituted in the end for consolidating and preparing the final report.

2.3 Thematic reviews

In order to provide more evidence and up-to-date information on core functions, support functions and quality and systems attributes of the IDSP, nine thematic areas were identified and principal investigators identified to collect and document the evidence. The thematic scientific papers were then peer reviewed by experts and a final document was made available to the panel of experts. This provided a comprehensive situation analysis of the key focus areas in the surveillance programme and gave guidance to the field-led evaluations for overall surveillance strengthening.

The following thematic areas were reviewed:

1) Early warning and response (EWAR) event-based surveillance (EBS)
2) EWAR indicator-based surveillance (IBS)
3) Governance and Human Resource (HR)
4) Laboratory
5) Information systems and communication technology
6) Finance
7) Influenza surveillance
8) VPD surveillance
9) Zoonosis.

Table 1: Broad steps followed for conducting the reviews

Sr no	Activities	July 15	Aug 15	Sep 15	Oct 15	Nov 15	Dec 15	Jan 16	Feb 16
1.	Finalization of terms of reference								
2.	Identification of experts and team members								
3.	Identification of chairman of the mission, formation of sub-teams								
4.	Experts meeting to finalize the thematic papers and terms of reference								
5.	Thematic papers								
6.	Experts meeting to review the thematic papers								
7.	Preparation of primary data collection tools								
8.	Finalization of data collection tools								
9.	Organization of field visits, reviews								
10.	Briefing and debriefing								
11.	Submission of recommendations and final report through core group								

2.4 Field evaluationFigure Selected States

The field evaluation was conducted by 59 international and national experts drawn from multiple agencies. The experts included members from MoHFW, World Health Organization (WHO), National Institute of Public Health, Mexico, senior epidemiologist and advisor from Thailand, Centers for Disease Control and prevention (CDC), Public Health Foundation of India (PHFI), National Vector Borne Disease Control Programme (NVBDCP), National Institute of Health and Family Welfare (NIHFW), National Informatics Centre (NIC), Tata Institute of social sciences (TISS), Department of Planning and Evaluation, Department of Zoonosis, NCDC, Rajiv Gandhi Institute for Public Health and Centre For Disease Control, Department of Population Policies and Programmes, All India Institute of Medical Sciences (AIIMS), state surveillance officers, independent epidemiologists, microbiologists and other public health and laboratory experts from medical colleges in India.

2.5 Sampling and site selection

Nine states and 18 districts were selected for field evaluation. A purposive sampling design was adopted for the study. The country was divided into six zones and from each zone, one state was selected through a random approach and additional states were added to balance the average and poor performing states.

The states selected for the review included Assam, Bihar, Delhi, Gujarat, Jharkhand, Madhya Pradesh, Orissa, Punjab, and Tamil nadu. Two district were selected from each state based on geopolitical distribution and performance percentiles of the districts (Table 2).

Table 2. List of states and selected districts

State	District 1	District 2
Assam	Nalbari	Tinsukia
Bihar	Gopalgunj	Jehanabad
Delhi	North Delhi	South Delhi
Gujarat	Navsari	Sabarkanta
Jharkhand	Palamu	West Singhbhum
Madhya Pradesh	Indore	Umaria
Orissa	Khorda	Koraput
Punjab	Mansa	Mohali
Tamil Nadu	Kanchipuram	Theni

2.6 Criteria for selection of facilities for field review

Facilities selected for field review included the following.

- District hospitals
- Specialist hospitals (government and private)
- Medical colleges (government and private)
- Laboratory (government and private)
- Primary Health Centres (PHCs)
- Sub-centres (SCs).

Table 3. Total sites visited through the field led evaluation

CSU	1
SSU	9
DSU	18
Hospitals (including private hospitals)	70
PHC	36
SC	72

Figure 1. Team with health workers

2.7 Field evaluation instruments

The field evaluation instruments were developed by a team of national and international experts constituted by the MoHFW with technical leadership through WHO Country Office (WCO) for India.

The IHR (2005) surveillance and response core capacity requirements were considered throughout the process in developing the evaluation instruments. Specific instruments were developed at the level of CSU, SSUs, DSUs, hospitals, PHCs, SCs and laboratory components.

The instruments were piloted and field-tested before finalization. The final evaluation instruments had 26 sub-components grouped in three main categories. core functions, support functions, and quality attributes. A field guide was developed to complement the instruments at each level. (Table 4).

Table 4. Components constituting the evaluation instruments for the review

Core functions	• Predicting outbreaks and epidemic preparedness. • Setting up surveillance mechanisms in different types of health system settings. • Laboratory networking and confirmation of IDSP conditions and implementation of quality system including EQAS. • Case detection and case registration including review of existing capacities for identifying and recording public health events for both IBS and EBS. • Existing capacities to report surveillance data for IBS and EBS and early warning signals. • Data collation from different units . • Data analysis and interpretation for public health actions. • Provision of feedback from various levels.
Support functions	• Administrative requirements, regulations and legislation. • Standards and guidelines. • Training and sensitization of IDSP staff. • Communication tools and modalities at each level of surveillance and between stakeholders. • Resources needed for core activities, including financial resources and HR. • Coordination mechanisms between levels and stakeholders. • Supervision and monitoring. • Advocacy and governance.

Public health surveillance quality attributes

- Simplicity of the surveillance process for various stakeholders.
- Flexibility of the system to changing needs.
- Timeliness of the reported surveillance data.
- Completeness and Consistency in reporting.
- Quality of the data collected and reported.
- Willingness of the stakeholders to provide and use surveillance data.

Figure 2. Debriefing with principal health secretaries

2.8 Data collection

Data was collected using the assessment toolkits, review of existing data and documents, focused group discussions (FGDs), key informant interviews (KIIs) and on-site observations.

Figure 3. Meeting of review members with state officials

2.9 Data entry and analysis

The expert consultation led to thematic analysis and recommendations, based on the identified gaps. Data entry for the evaluation instruments was done using an MS access based database. The state and the district teams entered data in the field.The information in the database was additionally crosschecked with the instruments upon completion of the field evaluation. Descriptive statistics were used to analyse both qualitative and quantitative portions of the data. Consensus was developed by experts during a consultation workshop.

At the end of their review the team members conducted a SWOT (strengths, weaknesses, opportunities and threats) analysis of each thematic area. Medium term (one to five years) and long-term implementations (five to ten years).

Figure 4. Debriefing with Ministry of Health & Family Welfare

3. Observations and discussion-surveillance and response

MoHFW has demonstrated a strong commitment to the development of the Integrated Disease Surveillance Programme (IDSP). Surveillance units are established at all state and district headquarters and are well-connected through an IT network.

The district laboratories are being strengthened for epidemic-prone diseases including the state-based referral laboratory network. Around 91% of districts are reporting weekly data on epidemic prone diseases. The weekly data are shared with SSUs and CSU through the portal system..

Outbreaks are investigated and responded to by district/state/central RRTs. Central compilation of disease outbreaks/alerts is done on a weekly basis by CSU. IDSP proved its worth during:

- Ebola crisis where contact tracing and follow up of suspects for ebola virus disease for 30 days was completed.
- Influenza SARI and ILI surveillance during the influenza pandemic (2009).
- Case detection and surveillance of epidemic-prone disease during disasters such as the Kashmir floods, Hudhud in Andhra Pradesh, Phailin in Odisha and floods in Uttarakhand.

IDSP data capture tools include a Form S for syndromic surveillance, which is filled by the health worker of SCs; a Form P for presumptive surveillance, which is filled up by the medical officer at the PHCs/CHCs, government/private hospitals and by private practitioners; and an Form L for laboratory surveillance which is filled by PHC/CHC laboratories, district/private laboratories, state laboratories and the national laboratory. In addition, a EWS/outbreak report is mandatorily sent.

The portal was finally launched for data reporting on 31 August 2008 and S, P and L forms uploaded for data entry on the portal. P and L forms were modified in end-2008. The new P and L forms were uploaded on the portal in March 2009 for data entry. All states/UTs started started reporting through the portal in 2008–09 except Andaman and Nicrobar, Lakshadweep, Jammu and Kashmir, Daman and Diu and Delhi.

A consistency exercise was completed at CSU for improvement of data reporting in 2010 and a report developed and uploaded on portal (Table 5), so that states/district can identify the reporting units which are not reporting, or reporting irregularly. Data management training for improvement of data reporting through the portal (timeliness and consistency) for data managers and epidemiologists was completed for 16 states by November 2010 and for the 19 other states by June 2011.

Figure 5: Data entry in the Portal system of IDSP

All states are reporting through the portal since 2010, except Lakshadweep. For the purpose of data reporting as well as generation of output reports through the portal, a training manual was prepared and uploaded on the IDSP portal in 2010. Presently, portal reports are being monitored and used for outcome indicators.

As per the Twelfth FYP, block level data entry was to be ensured for better disease surveillance and response. A formal communication was sent to all states in this regard in May 2015. Currently block level data entry in portal is being piloted in some blocks of Assam, Rajasthan, Gujarat, Madhya Pradesh, Punjab, and UP.

Table 5: Data coming through the portal system

Weekly reporting forms	% of districts reporting	In time (% of reported units)	Completeness (% of reported units)
S Form	77	52	69
P Form	91	80	81
L Form	90	64	78

Source: NCDC: 2015

3.1 Surveillance and response – indicator-based system

Despite significant improvements, gaps and challenges remain. IDSP collects aggregate data through an Indicator Based System (IBS) on 18 disease conditions. Thus, the available data for epidemiological analysis are restricted to those disease conditions. The system needs to move to a case-based reporting for selected high-priority diseases. Presently, a line listing is available when an outbreak is investigated. The system must explore integrating outbreak data within the portal system.

While key national level leaders have recognized the importance of surveillance for public health, economic and broader policy rationale, surveillance is often seen as a low priority within the state and local governments, as well as among health providers in general. On the strengths, there has been a strong ownership for IDSP which is steered by CSU and a resilient management of capacity building for HR. An oversight of field investigations and some good data analysis by CSU and by some states was noted.

However, more efforts are needed in using the IBS for timely and appropriate response. The private sector integration is poor and data analysis and response capacity was suboptimal at the district level, with few outbreaks getting detected through the IBS system. There is poor supportive supervision and communication at state and district levels and a standard operating procedure (SOP) for a feedback system is not available. The team also noted the frequent transfers of the key officials involved in the system.

The form S that is generated needs to be better utilized for greater efficiency, including its use in urban areas. Computer and phone applications can be used for generating more effective data and for linking response. The review team noticed the lack of revision of the form contents during the past 7 years.

Currently, the system mostly functions as a vertical programme, under control of the directorate of health, with poor interdepartmental and inter-programme district level collaboration. There are also several challenges for the surveillance implementation at the state and district level.

Responsibility for communicable disease surveillance at the national level is currently carried out by several separate organizations, including NCDC, the Indian Council on Medical Research (ICMR), and the Central Bureau of Health Intelligence (CBHI). Multiple disease control programmes, e.g. AFP, TB, HIV and vector-borne diseases also operate vertical surveillance systems, which for the most part provide complete, timely and reliable data for their specific targeted disease. Between the organizations there are overlapping responsibilities, differing capacities and lack of coordination. The IDSP must consider capturing minimum datasets from the other disease control programmes.

There is a lack of understanding standard case definitions, which limit the functioning of effective case detection and registration. The review also identified weak case detection through the private sector hospitals.

The review indicated that there is inadequate departmental participation in the tertiary hospitals. The SSUs and DSUs must review and ensure that hospitals have a structure and mechanism for disease surveillance. It is essential to promote hospital surveillance committees and sensitize internal departments, especially those that have not provided any reports during the past one year. Poor disease detection reporting from hospitals might also be attributed to differential understanding of the programme purpose and the case definitions by the staff.

The field-led evaluation showed that only around 41% of 70 district hospitals visited had a district surveillance committee in place and around two-thirds of the hospitals had appointed a nodal person for IDSP, with less than half of these having any mechanism for coordination. Throughout the JMM review period, feedback from national and state functionaries emphasized on the timeliness and completeness of reports. An indicator for correctness of reports is non-existant, and neither is there any capacity to investigate, intervene and communicate. Most DSUs also had poor participation of private Rus.

The majority of patients seek health care in secondary and tertiary level hospitals, commonly cover a variety of departments. Hence department involvement and ownership becomes critical, especially for early detection of potential outbreaks and effective response. Hospitals do not have nodal officers through IDSP in all departments to allow them to liaise with the district and state surveillance officers. We can learn from successful models in India, such as National Polio Surveillance Project, AFP Surveillance, that have structured active surveillance mechanisms.

The data reviewed through the national sample survey organization (NSSO) 2014 estimates that the share of public providers in treatment of any ailment in the entire country is very minimal. Simultaneously, estimates suggest that 70% (72% in the rural areas and 79% in the urban areas) of those in need sought health care for spells of ailment from the private sector (consisting of private doctors, nursing homes, private hospitals, charitable institutions, etc.).There is great scope to include the private sector in IDSP through emulating several successful strategies adopted by other surveillance programmes in the country.

The successful models in India and elsewhere have adopted sustained feedback loops, using all forms of communication (including Internet and telephone) as the mainstay of their engagement. Along with this, it is assumed that use of a multi-pronged strategy, incorporating public health legislation on mandatory reporting requirements and advocacy with the professional bodies of private practitioners and health establishments might additionally help the successful accomplishment of IBS objectives.

Currently, IDSP does not report mortality. This limits the epidemiological analysis of the outbreaks being investigated. Considering that approximately 40% of people seek health care in public health facilities, of which a varying proportion is being incorrectly diagnosed or illegibly documented by the doctors, only a limited proportion of notifiable diseases are detected by IBS. As a result, a significant amount of patients are lost to follow up.

IBS and EBS must act in synergy and the former should get greater focus for improving the sensitivity of early warning and response (EWAR). It was observed that control activities are often necessitated due to functional EBS and relatively less efficient IBS. This might be attributed to an excessive focus on media reporting.

In 2009, the IDSP in Andhra Pradesh and the Indian Institute of Public Health (IIPH), Hyderabad conducted a competency-based field epidemiology training of all DSU functionaries and RRT members, aiming for increased preparedness for the ongoing influenza A H1N1 pandemic. These training sessions led to greater collaboration between DSUs and the RRTs and more effective outbreak responses. Thus, provision should be established for routinely training all members of the multidisciplinary RRTs, along with DSU staff, for ensuring a strong disease outbreak response capacity.

The list of core 18 IDSP conditions were last reviewed in 2009. There is a need for reprioritization of the diseases. On the infrastructure, the team noted that the physical space dedicated for IDSP was variable and requires to be provided as per guidelines.

Table 6: SWOT analysis of the Indicator Based Surveillance–IDSP review, 2015–16

Strengths	Weaknesses
1. Strong ownership and steering by CSU. 2. The sustainability of the IDSP is the improved political and bureaucratic response from MoHFW. 3. Management of capacity building for HR. 4. Oversight of field investigations. 5. Good data analysis by CSU and some states. 6. Timely reporting has progressively increased.	1. Inadequate efforts in using the IBS for timely and appropriate response. 2. Lack of integration of private sector in surveillance activity. 3. Lower number of outbreaks detected through IBS 4. Insufficient data analysis by some states and many districts. 5. Limited capacity to undertake analysis and response at the district level. 6. Poor urban infrastructure for surveillance. 7. Lack of data on mortality. 8. No SOPs for feedback at the district level. 9. Varied quality of reporting system . 10. Poor supportive supervision and communication at district and state levels. 11. Absence of strong monitoring and evaluation system. 12. Frequent transfers of key officials. 13.Duplication and multiplicity of data collection and reporting from the level of SCs, districts and states.
Opportunities	**Threats**
1. Mobile phone based applications, such as Apps, can be used to develop and sustain universal reporting (including from private health facilities). 2. Greater potential for generation of inbuilt warning signals within the system.	1. The entire system works with contractual staff. The system can collapse at any time if the funding dwindles or the political will continues to fade off. 2. Funding is barely enough to manage salaries of contractual staff (vacancies), and needs to be made available.

3. Form S can be used for greater efficiency including use in urban areas. Apps can use form S for generating effective data. 4. Linking response to IBS data analysis is needed. 5. A dashboard comprising of several surveillance platforms is needed. 6. Strengthening the SSUs and DSUs to be done.	3. Disease burden at local levels to be monitored. 4. Importance of data-driven or evidence-based policy making is not realized.

3.2 Surveillance and response – event based system

The purpose of strengthening EBS is to enhance the system´s sensitivity by collecting information before an event is detected and/or reported through conventional recording and reporting systems. The EBS component is required to capture most of the unusual events in the non-conventional mechanisms.

The process of weekly reporting of disease alerts/outbreaks through IDSP by states/UTs was initiated in September 2007 (week 37 of year 2007). Compilation of EWS reports at CSU on weekly basis was initiated in November 2007. The weekly summary of outbreaks reported through IDSP is being shared with the stakeholders and high officials including the Prime Minister's Office (PMO) since June 2008.

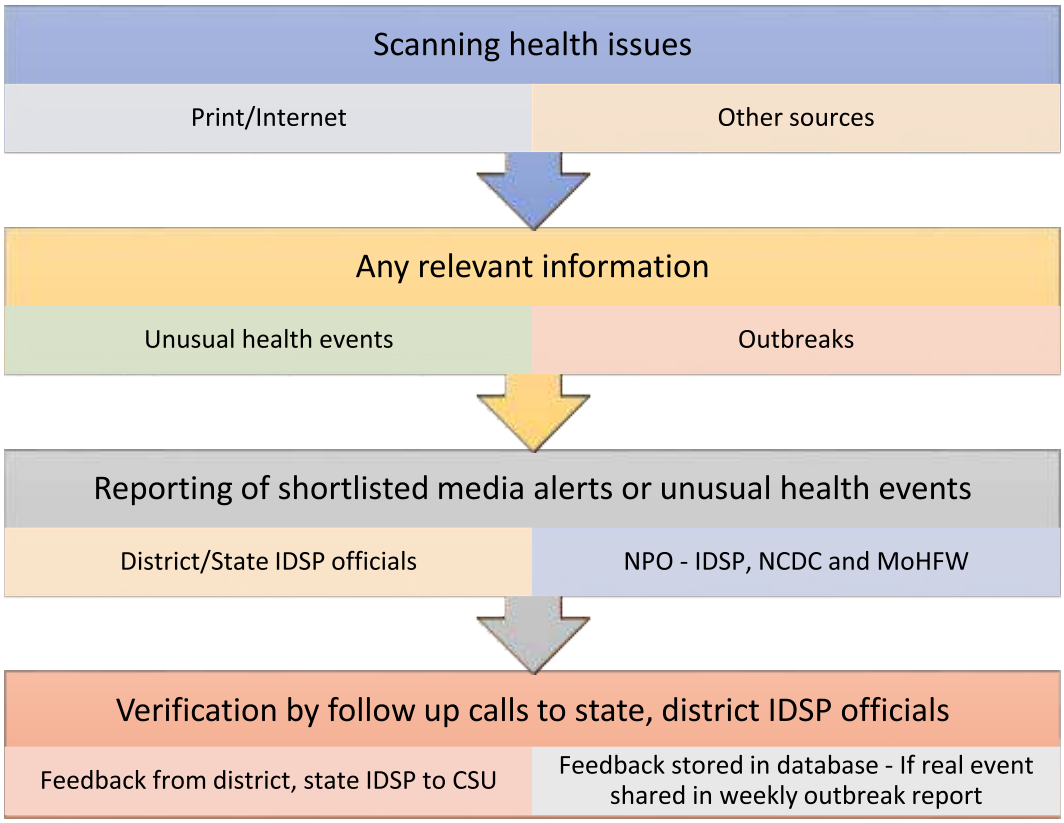
Disease alert/suspected outbreak identified by RUs to include data from SCs/PHCs/community health centres (CHCs) on each disease alert/outbreak is recorded by the DSU on a standardized EWS/outbreak reporting format. The finally compiled disease alert/outbreak report is transmitted to the CSU every Monday for the preceding week. “NIL” weekly reporting is also mandated.

Reporting of disease alerts/outbreaks occurs on a weekly basis through the EWS format and is supplemental through information about health events through the Media Scanning and Verification Cell. The data transmission is through the ICT Network (IDSP portal and e-mail) and the feedback on outbreak reports is sent to the respective reporting state/district for laboratory confirmation of outbreaks.

Weekly summary of outbreaks reported are being uploaded on the IDSP portal (www.idsp.nic.in) since June 2009. Majority of the outbreaks include acute diarrhoeal diseases including cholera (39%) and food poisoning (16%). Others include measles (8%), dengue (6%), viral hepatitis (5%), chickenpox (5%), chikungunya (4%) and malaria (4%).

A competency assessment tool for monitoring the quality of outbreak investigations was uploaded to the IDSP portal in 2009 for implementation at the state/district levels. A unique ID (code) was assigned to each outbreak. Coding was done by the reporting district before any outbreak/alert was uploaded to the IDSP portal. Some states have used this tool effectively for outbreak documentation and outbreak analysis. The use of this tool should be enhanced in all states.

Table No: 7 Flow chart of the Media scanning and verification cell



A Media Scanning and Verification Cell (MSVC) was established on 24 July 2008 at CSU for detection of unusual health events through media and other unconventional sources. This provides supplemental information of unusual events/outbreaks on a real-time basis for timely and appropriate action to generate early warning signals for outbreaks.

News sources include print media Internet news sites, visual media, television news channels, news aggregators, press monitors, google alerts, automatic systems, healthmap, pro-med mail and global public health intelligence network.

Table 8: Report generated from the media scanning and verification cell, IDSP

Government of India

Media Scanning & Verification Cell

Media alert from the Media Scanning & Verification Cell, IDSP-NCDC.

Alert ID	Publication Date	Reporting Date	Place Name	News Source/Publication Language
2980	25.05.2015	26.05.2015	Bankura West Bengal	www.dnaindia.com/English http://www.dnaindia.com/india/report-40-persons-suspected-of-contracting-anthrax-in-west-bengal-district-2089642
Title:	**Forty persons affected due to suspected anthrax in district Bankura, West Bengal**			
Action By CSU, IDSP -NCDC	Information communicated to DSU-Bankura, SSU-West Bengal			

Forty persons were suspected to have contracted anthrax in West Bengal's Bankura villages following which teams of dermatologists were rushed there, official said on Monday.

The Chief medical officer, health, Prasun Kumar Das, today said that forty persons were affected in Simplipal block of Bakura district and two teams of dermatologists were being sent to Bamunpal and Ramakunda villages of the block from where villagers have reported death of cattle. The teams will collect samples and send them to Kolkata for examination, he said.

Meanwhile, Superintendent of Bankura Sammilani medical college hospital, Panchanan Kundu, dismissed media reports about anthrax that had claimed two lives in the state-run hospital. 40-year-old Lakshikanta Soren, who was admitted to the hospital on May 19, died of complications, arising out of convulsion after which he was admitted on the following day, he said.

Save a tree. Don't print unless it's really necessary!

Disclaimer:-This is a Media Alert and pending verification.

Integrated Disease Surveillance Programme (IDSP), National Centre for Disease Control, Ministry Of Health & Family Welfare, Government of India

22-Sham Nath Marg, Delhi – 110 054

For more information please contact: Media Scanning & Verification Cell: - Phone: (011)23946029,

Email: - idsp.mcc@nic.in, idspmediaalert@gmail.com

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https://twitter.com/MSVC1

The source and collection process is an important determinant of the quality of the required data. Data collection is additionally influenced by available resources in the surveillance units. For example, attempting to monitor local press via Internet in a unit with limited Internet access is of little benefit. The selection criteria for events to be monitored are defined in procedures concerning PHEICs of IHR(2005).

The team noted that eight out of nine states visited had some mechanisms in place for media scanning and verification and the portal system was being used for data entry. The MSVCs at the CSU and SSUs are currently selecting events based on the epidemiological competencies of the staff, rather than using any published criterion for selection. Strengthening the system's EBS component will require the establishment of general and also region-specific selection criteria for events, while including EBS-related training for surveillance unit staff.

Considering that event characterization and risk assessment is a continuous process, it is essential that surveillance unit staff gathers together for a formal daily briefing in order to examine ongoing events and newly-received signals, using a listing of events and a standard classification format.

Early detection of health risks is the EBS chief objective, and therefore timeliness, i.e. measuring the time interval between the onset of symptoms to notification is its

main attribute. Currently, outbreak indicators only review the timeliness of response, defined as action to an event/outbreak within 48 hours of reporting. Timeliness can be applied to the estimation of the time interval between the detection of an event and the occurrence of the first case. This provides a reference value, a baseline through which EBS's progress can be compared. Although not applicable to all events, it is a simple and straightforward method that can easily be applied retrospectively and should be included in monitoring timeliness of response to outbreaks. Data analysis of EWS and outbreak reports collected at the CSU through the portal and e-mails, indicate that some districts have not reported any EWS or outbreak between 2011 and 2014.

To estimate representativeness, EBS requires geographical coverage. According to this characteristic, a representative EBS system would be able to detect health risk evenly across the geographical area of reference, according to objectives. However, there were limited implementations of this approach through surveys by the health workers. The review team observed similar surveys carried out for health contact tracing of AFP cases in the NPSP.

A Strategic Health Operations Centre (SHOC) is available at the CSU since 2013. This is being used for strengthening disease surveillance and response with connectivity to multiple sites at a time. There is technical consultation through video conferencing with national and international experts simultaneously. This is also used for disease outbreak/public health emergency response by acting as a 24x7 command centre.

Table 9: SWOT analysis of event based surveillance – IDSP review, 2015-16

Strengths	Weaknesses
1. Surveillance functions started in 1998 in the country. 2. Functional surveillance units are present in each districts of the country. 3. Regular and continuous media scanning and monitoring at the CSU since 2009. 4. Strategic Health Operations Centre (SHOC) in place since 2013 – emergency operations plan and SOPs being developed by the SHOC. 5. Entomologists and veterinary consultants posts for state surveillance units.	1. Media scanning and verification function concentrated at CSU. 2. Quality of events/outbreak identification, reporting, response and data analysis at the state and district levels. 3. Competence of epidemiologists and data managers in event/outbreak information management. 4. EWS/outbreak reports information management is HR intensive. 5. Discontinuity in 24x7 toll free number for EBS reporting.

6. IDSP has participated in health event monitoring of disasters such as the J&K floods and Andhra Pradesh cyclone.	
Opportunities	**Threats**
1. Strengthen media scanning and verification at state and district level. 2. Strengthening of information collection from all possible sources, including the community. 3. Strengthening of portal entry of Events/EWS/outbreak data and web analytics features. 4. Integration of veterinary and entomological information with human health information. 5. To expand the training for EBS with other partner agencies, e.g. Food Safety and Standards Authority India (FSSAI), National Disaster Management Authority (NDMA), etc. 6. To include EBS indicators in key surveillance quality indicators 7. Operationalization of the 24x7 toll free number.	1. India is one of the global hot spots for emerging and re-emerging zoonotic diseases. 2. High frequency of travel of population to ongoing foci of transmission of ebola, Middle Eastern respiratory syndrome coronavirus (MERS-CoV) and other emerging pathogens. 3. Long porous borders with neighbouring countries where formal points of entry (PoE) surveillance and screening is not possible. 4. Diversity of health systems capacity across the country and within states and districts .

3.3 Special surveillance and response

3.3.1 Influenza surveillance

Until 2008–09, the requisite data to estimate influenza-associated disease burden were scanty or absent throughout India. The first case of influenza A (H1N1) was reported in Mexico on 12 May 2009, one month after its outbreak cases spread quickly and widely.

The IDSP laboratory network for influenza was planned and strengthened in a phased manner via a network of 12 laboratories; all the laboratories are linked to the national laboratory (NCDC). There are three identified sentinel hospitals for each of the 12 laboratories for the collection of data. Under the Twelfth FYP, four more labs is being strengthened in areas not covered by the existing laboratories.

With the onset of influenza A (H1N1) pandemic, the entire system was quickly put into action with immediate actions taken for ensuring training and proficiency testing to maintain quality. The key role of the IDSP influenza laboratory network during the influenza A (H1N1) pandemic was in the collection and testing of samples with sequencing and monitoring of circulating strains. In the post-pandemic period, the IDSP influenza laboratory network continued to provide national estimates for emergency preparedness, planning and response. It captured severe influenza outcomes as a primary measure through designated sentinel sites.

Surveillance methodology by the influenza laboratory network

The hospital sentinel sites for influenza surveillance are mostly selected by the laboratories, leading to the loss of opportunities for consultation with the IDSP state surveillance units. Each sentinel site is visited once in a week by a field worker/technician, who collects samples and epidemiological information from OPD and IPD patients. The samples are maintained under cold chain and brought to the laboratory for further processing and testing through real-time polymerase chain reaction (PCR).

The first influenza testing was initiated in April 2009. The National Institute of Virology at Pune under ICMR is the reference laboratory for influenza testing. NCDC national laboratory has also been providing influenza diagnostic service to all states as and when required.

A more effective integration of the influenza network with IDSP could be achieved by shifting the process of surveillance sites selection to a process involving consultations between laboratories and SSUs. This process would ultimately consider relevant epidemiological factors. Collection of information needs to be expanded on ILI cases and the selection of protocols requires to be revised and properly disseminated to ensure validity of the results. Additionally, denominator data need to be routinely collected from the sentinel sites for calculation of proportions of ILI, acute respiratory infection (ARI) and SARI cases.

Although sentinel surveillance as a stand-alone system may not accomplish obtaining of the complete disease burden in India, it has value in establishing the infrastructure necessary to respond to a pandemic in future due to influenza viruses, as well as responding to threat of infections due to other respiratory group of viruses. The current sentinel surveillance is mainly documenting seasonal influenza. One reason cited was the lack of kits and reagents supplied to the laboratory.

Protocol-based analysis and timely dissemination of information with IDSP remain limited, although the IDSP influenza surveillance network collects data routinely. Feedback from the laboratories to the involved clinicians and hospitals is satisfactory, especially when considering that information is also shared with

the state surveillance officers on a daily basis. However, in most states and districts, epidemiological information in the form of a weekly bulletin of clinical- and laboratory-confirmed cases is not being adequately disseminated to all stakeholders.

The system additionally needs to develop and disseminate protocols for audits of sampling procedures, sample collection and epidemiological data collection. Opportunities exist for the existing sentinel surveillance reporting mechanisms to use existing public health communications systems and augment other reporting mechanisms such as FluNet net through WHO Global Influenza Surveillance Network. Monitoring, evaluation and supportive supervision require strengthening.

Although network laboratories are regularly sending samples for sequencing and reconfirmation this procedure requires increased systematization and standardization as per agreed protocols. The influenza network is collecting information, but remains under-utilized for preparedness, planning and response, primarily due to inadequate epidemiological analysis and dissemination.

ICMR also collects influenza data from its network of laboratories across the country with the National Institute of Virology (NIV) Pune as a referral laboratory; however, the two networks, IDSP and ICMR, do not share influenza surveillance data on a routine basis. The review team discussed the need to have better synergies for data collection processes and minimum data sharing which could be streamlined between the two institutions. The NCDC laboratory has to comply with NABL standards and can be considered for upgradation to be a reference laboratory for the country.

The influenza surveillance network also plays a crucial role in diagnosis and surveillance of other respiratory viruses. During the event of the outbreaks of the MERS-CoV in Saudi Arabia and South Korea, IDSP was carrying out surveillance at airports and in communities. SARI surveillance carried out by the laboratory network was utilized to incorporate testing for MERS-CoV.

Table 10: SWOT analysis of special surveillance – IDSP review, 2015-16

Strengths	Weaknesses
1. Sample collection and transport system in place. 2. Integration of influenza surveillance in national reporting system. 3. Good intersectoral coordination with department of animal husbandry for containment of avian influenza. 4. Demonstration of Manipal hospital in Karnataka as a successful public-private partnership in influenza surveillance. 5. Initiation of sentinel surveillance through IDSP laboratory network.	1. Epidemiological data analysis needs to be strengthened. 2. Quality of testing needs to be maintained at all laboratories. 3. Influenza subtyping algorithm must be standardized. 4. Delay in supply of consumables. 5. Quality of training to be improved. 6. Quality of data collected needs improvement. 7. Limited capacity of the system to detect emergence of new subtypes of influenza virus A in human populations unless the transmission is sustained.
Opportunities	**Threats**
1. Aligning with the global health security agenda and expediting IHR-2005 core capacity requirements for laboratory surveillance. 2. Collaboration with CDC, transfer of technology and sharing of sequences for seasonal flu viruses. 3. The influenza network can be utilized to monitor other emerging/re-emerging infections and viruses such as MERS and Zika. 4. Strengthening training components and support from WHO and partners in capacity building.	1. India is a global hot spot for emergence and re-emergence of zoonotic diseases. 2. States and districts have weak health systems and poor laboratory network.

3.3.2 Zoonosis surveillance and response

The world is facing the threat of emerging and re-emerging zoonotic diseases with more recent outbreaks of zoonotic in origin; thus, mapping and measuring the burden of zoonosis in the country is of paramount importance. Additionally, surveillance for zoonosis has been a concern due to the fact that human and animal surveillance systems are organized and run parallel to each other. There is need for more harmonization between the various ministries such as Ministry of Health and Family Welfare, Department of Animal Husbandry Dairying and Fisheries and Ministry of Agriculture and Farmers Welfare.

Pathogens circulating in animal populations can threaten both animal and human health, and thus both the animal and human heath sectors have a stake in, and responsibility for their control. While the integration of control systems across animal, food and human sectors has been attempted, control systems are generally non-integrated and with limited collaborative work.

However, the recent efforts to control highly pathogenic avian influenza (HPAI) and contributions towards pandemic preparedness have re-emphasized the need for enhanced concentration on reducing risks associated with zoonotic pathogens and diseases of animal origin through cross-sectoral collaboration. Successful and sustained results are possible when functional collaborations are established, as has been shown in many countries.

IDSP under the MoHFW is responsible for the surveillance and response for epidemic-prone diseases; and National Animal Disease Reporting System (NADRS) (Ministry of Agriculture) and National Animal Diseases Referral Expert System (NADRES) (Indian Council of Agricultural Research) are responsible for the surveillance of animal diseases. There is a lack of information sharing and joint response for zoonoses. There is little exchange and no linkage between veterinary disease control and human data. Additionally, the surveillance systems lack action plans for trigger levels for initiation of response to diseases and events of common concern. Avian flu, which is covered by a protocol and procedures, can be considered as an exception. In fact the linkages made for avian influenza response are not being optimally utilized for joint surveillance and response for other diseases.

The NVBDCP under Directorate General of Health Services, MoHFW, GoI is the nodal agency for implementation of programmes for prevention and control of vector-borne diseases in the country under the aegis of the NHM. NVBDCP deals with six vector borne diseases— malaria, dengue, chikungunya, Japanese encephalitis/acute encephalitis syndrome (JE/AES), lymphatic filariasis and kala-azar, while IDSP also collects data on malaria, dengue, chikungunya and AES. These programmes must work in synergy with each other with better intersectoral coordination.

The MoHFW must explore options of the present role of an entomologist at the state level IDSP surveillance units with the NVBDCP for acting on early warning signals, such as increase in density of vectors and increase in breeding site of vectors, which require more regular coordination for averting outbreaks. The convergence of IDSP and NVBDCP for surveillance, risk assessment, risk communication and rapid response is highlighted, given the cyclic re-emergence of dengue as a major yearly public health challenge in urban areas, as well as the other emerging threats like the Zika virus, which is spread through the same mosquito vector.

However, India does have institutional mechanisms to carry forward the agenda for zoonotic diseases surveillance and response. There is a standing committee on zoonosis, which is in existence since 2006 under the chairpersonship of Director General of Health Services (DGHS). The committee needs to meet more frequently to advice on various facets of the work on zoonosis in India, ensuring intersectoral coordination between medical, veterinary and other allied institutes, strengthening of laboratories in health and veterinary sectors and formulation of projects on priority problems.

There is also a mechanism of a Joint Monitoring Group under the DGHS, MoHFW which was set up during avian influenza and is now facilitating the monitoring of other zoonotic diseases of public health importance. The frequency of meetings can be increased as per need. The zoonosis coordination cell at NCDC in Delhi coordinates the activities of the standing committee. A zoonosis task force, including members from the health, animal husbandry, wildlife, environment and forests, ministry of agriculture and food safety departments and state surveillance committee under IDSP has also been established.

In the Twelfth FYP, the MoHFW approved a programme for establishment of an intersectoral coordination mechanism for control of zoonotic diseases with the following objectives:

- Establish an intersectoral coordination mechanism at national, state and district level;
- Utilize the existing IDSP surveillance system to detect early warning signals of impending outbreaks for timely and effective public health actions;
- Capacity building to respond to zoonotic diseases of public health importance;
- Information, education and communication (IEC) to create awareness among community professionals.

Joint surveillance of zoonotic infections becomes important in animals and humans because the presence of diseases such as avian influenza, rabies, brucellosis, anthrax, leptospirosis, etc. in animals indicates the risk of transmission to human hosts. Hence, sharing of data of human and veterinary diseases is even more important and vital.

There are other activities that can also benefit from coordinated response, in addition to surveillance—implementing biosecurity/bio-containment measures, conducting risk assessments, implementing control measures, communicating/disseminating outbreak investigation, strengthening diagnostic capacity and supplies, personnel protective equipment (PPE) and logistic support.

Realizing this importance, existing SSUs under IDSP are being strengthened to undertake zoonotic activities. Provision of appointment of 36 veterinary officers, one for each state/UT, has been made under IDSP in the Twelfth FYP, while joint surveillance of animal and human diseases will be carried out as a “One Health” approach up to district levels.

IDSP receives weekly disease surveillance data and outbreak alert from each state in the country. The NADRS receives animal disease data linking each block of veterinary hospitals, district and the state animal husbandry headquarters to the central disease reporting monitoring unit in the Department of Animal Husbandry, Dairying and Fisheries (DADF) and Ministry of Agriculture, New Delhi. The NADRES receives monthly animal disease data from four Indian Council of Agricultural Research (ICAR) institutions, 12 veterinary colleges and 10 regional research units of the National Institute of Veterinary Epidemiology and Informatics (NIVEDI).

Attempts have been made to share human and animal disease data of identified priority zoonotic diseases, primarily conducted through the national NADRES, the NADRS under control of the Ministry of Agriculture, and IDSP in public health. However, this requires much greater participation and involvement of the sectors to give results.

Thus, veterinary consultants appointed at SSUs have a major role in collection and consolidation of data on zoonotic diseases, analysis and interpretation of this data, as well as feedback to DSUs. They may be required to investigate and confirm the outbreaks, while taking necessary action if the capacity of districts is overwhelmed.

The state veterinary consultant's main task is monitoring of all these activities, while additionally offering state-level assistance for their successful implementation. India demonstrated a mechanism for intersectoral coordination for the control of avian influenza. Further, the timely initiation of investigation activities on the Crimean Congo Haemorrhagic Fever (CCHF) cases highlighted further surveillance improvements for India, and is likely to have averted a bigger outbreak. However, much more intersectoral coordination needs to be done. A holistic "One Health" strategy, is capable of recognizing the vital interconnectedness of microbes and the environment through convergence and collaboration of human, animal and environmental health.

The NCDC has realized the importance of the “One Health” approach and is planning joint training courses for health and veterinary professionals, aiming to improve understanding of the diseases, transmission, prevention and control. The scope of the course in the current context is limited and needs to be expanded rapidly, in order to train HR in all districts across the country.

The health and veterinary sector also collaborates for preparation of IEC material, aiming to achieve awareness and knowledge in the general community on how to control the spread of avian influenza, rabies and leptospirosis under the pilot projects.

For effective prevention and control of some zoonotic diseases, outbreak investigations are carried out jointly such as for avian flu, anthrax, CCHF and Japanese encephalitis. The outcomes indicate that the same should be extended institutionally by the RRTs for response to all diseases of zoonotic origin.

For certain zoonotic diseases such as rabies, anthrax, brucellosis, trypanosomiasis, plague and leptospirosis, laboratories should undertake diagnosis of both human and animal samples. While not everything can be integrated, there needs to be periodic dialogue and information sharing on zoonoses.

For laboratory diagnosis, bio safety level BSL-2, BSL-3 and BSL-4 facilities are available. There are also public health laboratories under IDSP and also facilities available at the Indian ICMR/ICAR/medical colleges/veterinary colleges.

There is some collaboration with other ministries, e.g. MoHFW, which collaborates with the Ministry of Agriculture and Farmers Welfare for laboratory diagnosis of zoonotic infections (avian influenza, rabies and emerging infectious diseases) and the Ministry of Drinking Water and Sanitation for water testing laboratories. However, these laboratories lack continuous coordination, diagnostic standardization, data sharing, inventory and roster of experts.

In addition to surveillance, response and institutional infrastructure, ICMR and ICAR have a joint task force for development of research projects and prioritizing zoonotic diseases. In addition to collaboration and convergence for laboratory surveillance, serological surveillance, reservoir surveillance and vector surveillance, the animal and veterinary sectors also have a crucial role in microbial surveillance for antimicrobial resistance, which is one of India's major health security threats. Currently, IDSP has little or no involvement in the country's antimicrobial resistance surveillance.