World Health Organization

A National Electronic Disease Surveillance System

CONCEPTUAL NOTE

Electronic DEWS

Electronic DEWS

Disease Early Warning System

According to the World Health Organization (WHO) Surveillance is defined as the "ongoing systematic collection, collation, analysis and interpretation of data; and the dissemination of information to those who need to know in order that action may be taken". To minimize morbidity and mortality due to communicable diseases by detecting epidemics at their earliest possible stages, World Health Organization (WHO) in collaboration with the Ministry of Health and National Institute of Health established the first national weekly reporting based surveillance system called Disease Early Warning System (DEWS) in Pakistan. DEWS is operational at FLCFs of the health system and is an integral part of the district HMIS/DHIS. The DEWS was initially implemented in response to natural disaster and displacement emergencies in Pakistan in 1996, most notably the 2010 floods. However the system has now expanded to cover about 107 million people (57%) of Pakistan's population. The DEWS is effective in its core functions of alert detection and early outbreak containment. Its approaches for outbreak detection include immediate alert reporting, investigation, timely response and weekly data collection on several syndromes from more than 3000 health facilities in five provinces of Pakistan.

National Surveillance Systems in Pakistan:

Currently, national surveillance systems, (including DEWS, District Health Information System (DHIS), Polio/EPI reporting systems, vaccination programs) are isolated from one another due to differing data standards, legacy systems, patient privacy concerns and a lack of tools for information exchange. Most of the public health data is being received by mail, email or in person and then entered in old databases by district health authorities. Such data transfer often occurred long after disease incidences were first reported. Many diseases are underreported, inadequately documented or inaccurately recorded.

Electronic Disease Surveillance System:

The Electronic Disease Early Warning System (eDEWS) is an initiative that promotes the use of data and information system standards to advance the development of efficient, integrated, and interoperable surveillance systems at federal, provincial and district levels. A primary goal of eDEWS is to capture data using mobile software and secure automatic electronic transmission and analysis of data, alert generation and dissemination of information to main stake holders. It will also facilitate identification of national public health threats more promptly, more timely and accurate disease reporting and may provide platform to facilitate integration of disparate reporting system.

Objectives:

1. Automatic capture, secure transmission, validation and analysis of data
2. Identification of national public health threats more promptly
3. More timely and accurate disease reporting
4. May provide platform to facilitate integration of disparate reporting system
5. To provide platform for information management and information sharing on diseases

Idea of Electronic DEWS:

The Electronic Disease Early Warning System (eDEWS) will be a secure online framework that will allow healthcare professionals and government agencies to communicate about disease patterns and coordinate national response to outbreaks. The idea of eDEWS will help in streamlining weekly data collection and better integration with district health information system and parallel surveillance programs such as routine, polio and EPI surveillance, based on a plan to progressively integrate the DEWS with routine surveillance. The data transmission will be simplified by GPRS and web based reporting where possible; importantly, data will be managed more effectively so as to maximize their usefulness, through a new online software application. Alert detection will be enhanced further by including automatic alert detection module in the software that will generate alerts based on thresholds and will send messages to DEWS response team for immediate response within 24 hours of alert notification. Open source based software is being used to develop both web based and mobile based interfaces.

Electronic DEWS Strategy and Structure:

The development of a data management system for electronic DEWS will consist of two phases of application development. Phase I will focus on development of data entry and transmission components of electronic DEWS, and data analytical capabilities in online software that will be used to facilitate weekly disease surveillance using mobile based and web based interfaces in four pilot districts of Pakistan. Phase II will involve providing additional system enhancements that will be weekly based and will be implemented throughout the country. These system enhancements will cover more advanced features, such as sophisticated data analysis, graphing and mapping, and integration of weekly DEWS data with DHIS monthly data.

Electronic DEWS Functions and Specifications:

1. **Validation and Verification of Data for Event Detection and Management:**

   To validate, manage and process information by district health department entered and submitted via a mobile phone at a health facility level.

   To design logic and validation rules in electronic DEWS software which prevent many common erroneous entries (55 deaths due to upper respiratory infection, skipped questions, etc) in the field.

2. **Automated Analysis and Visualization, GIS mapping:**

To analyze, display, report and map accumulated data and share data and technologies for analysis and visualization with other public health partners.

3. **IT Security and Critical Infrastructure Protection:**

To ensure that sensitive or critical electronic information and systems are not lost, destroyed, misappropriated or corrupted.

To securely transmit data to DEWS servers for validation by district and provincial authorities. Only authorized personnel whom access has been granted can view the data (there are other very granular permissions as well). Authorized people will have access to raw data for analysis.

4. **Reduce latency:**

To collect data using eDEWS software on handsets. Data is then available for analysis and export in excel format once it has uploaded from the handset and validated by district and provincial authorities, typically within few hours to a day. This allows for faster analysis, near real-time data cleaning (automated or manual) and the opportunity to pick up anomalies while the study is in progress rather than weeks or months afterwards.

5. **Increase Flexibility:**

To modify reporting forms very easily online. Software design errors can be corrected, missed questions/variables may be added, confusing questions rephrased, etc. That's very expensive and logistically taxing with paper.

6. **Improve data integrity:**

To maintain a full audit trail once data has been captured using eDEWS software, recording modifications to data (if they even have permission to do so). To ensure data is able to be cleaned without being incorrectly altered is more challenging on paper.

7. **Reduces burden:**

To incorporate eDEWS weekly data into monthly DHIS reports in national health information database that will facilitate health care providers by reducing burden of parallel reporting.

To facilitate DEWS response teams and authorities by automatically generation of alerts for timely response by DEWS response teams and automatic analysis of data.

8. **User friendly interface:**

To make eDEWS software user friendly at all levels from health facility to DEWS central level where no technical expertise is required. The special care has been taken to keep it as simple as possible and to make such application that could automatically detect and notify errors for immediate correction, generate

alerts and notify to response teams/district authorities, analyze data and to generate reports based on weekly submitted data.

9. The Automated Exchange of Data Between Main Stake Holders:

To securely and automatically exchange information, as appropriate, among main stake holders using a “live” network. With eDEWS software, the data is captured once in the health facilities. It is then available for export as an Excel file (for example) in a form of raw data or report once it has uploaded from the handset and validated by district and provincial authorities.

Generation of weekly and monthly epidemiological bulletin application is included. It also includes application to export of graphs, figures and reports in various formats such .jpg, .pdf, .png, .gif etc

Information will be shared with department of health and other main stake holders as soon as data is submitted and authorized by district/provincial/national authorities.

10. The Use of Electronic Clinical Data for Event Detection:

To receive, manage and process electronic data from healthcare facilities, hospitals and private clinics. Alerts will be generated based on threshold levels set in software for priority diseases. SMS module will generate notification sms for DEWS response team for timely response for public health threat.

11. Specimen and Lab Result Information Management and Exchange:

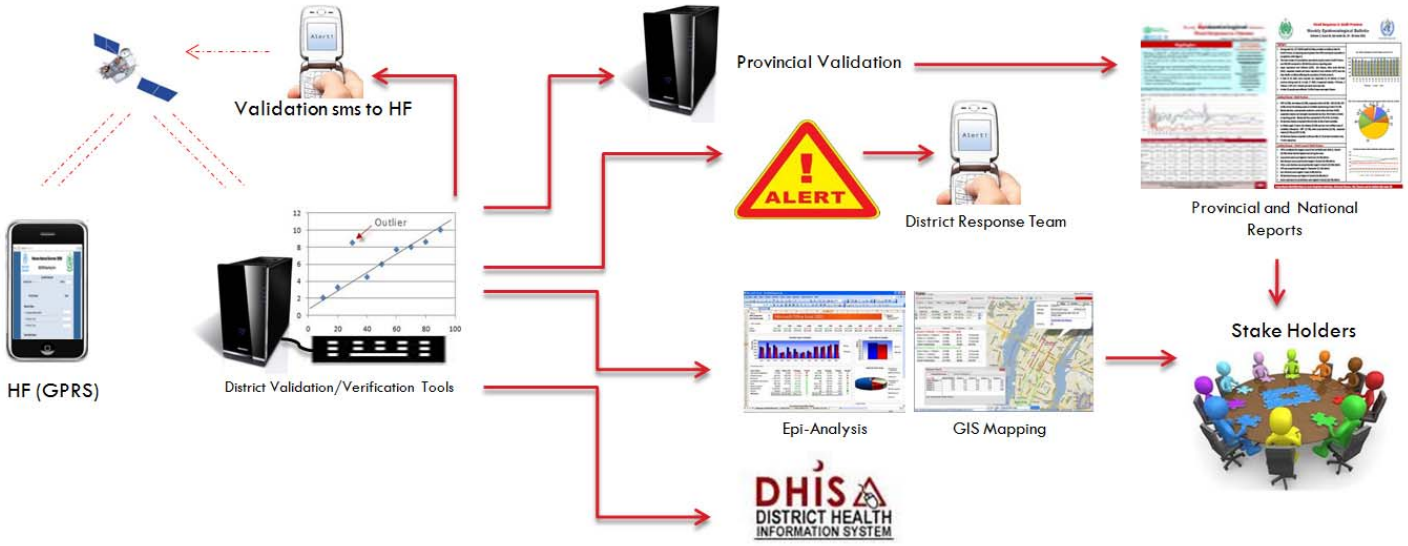
For laboratories accepting specimen sent from the field for testing and sample data, manage these data and immediately report electronic results to public health partners.

12. Management of Alerts/Outbreaks Data:

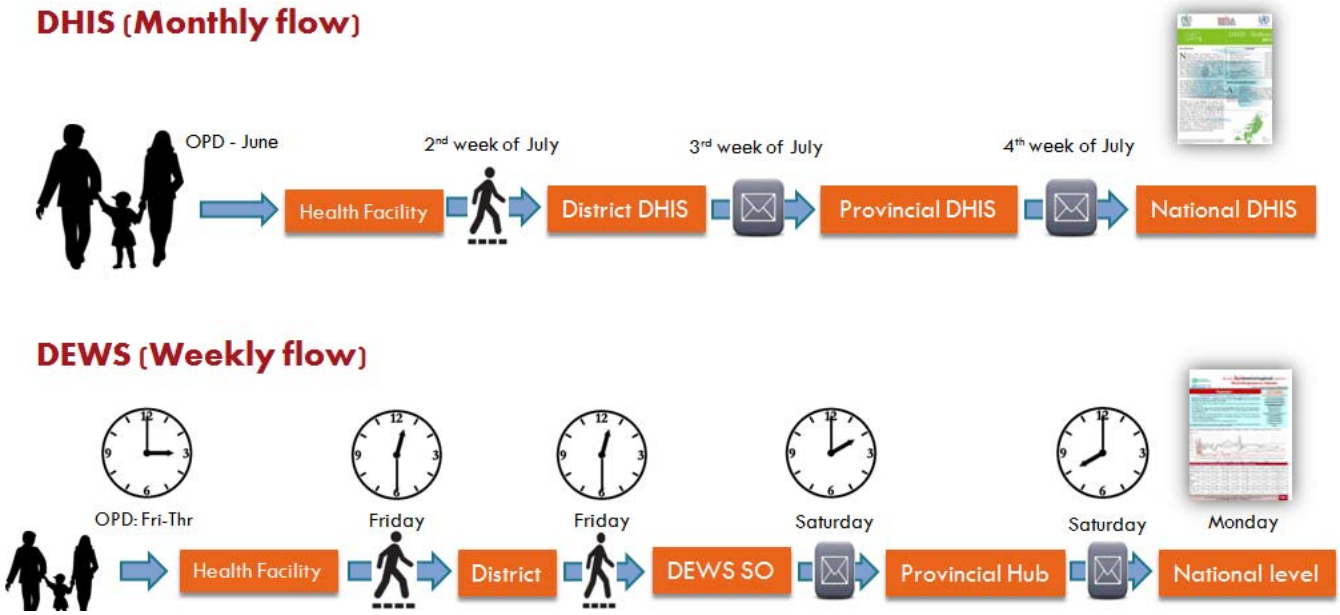
To electronically manage, link and process the different types of data (Suspected cases from detection, Epilinks, reporting health facility, lab results of alert/outbreak, routine immunization status of case/family/affected area, adverse events monitoring and follow-up). Also includes online generation of line list for investigated epidemic prone diseases. Alert investigation analysis will be possible and Investigation report can be exported in .pdf format for specific disease for specific place for specific time or consolidated reports.

ANNEX A

How Electronic DEWS Surveillance System works

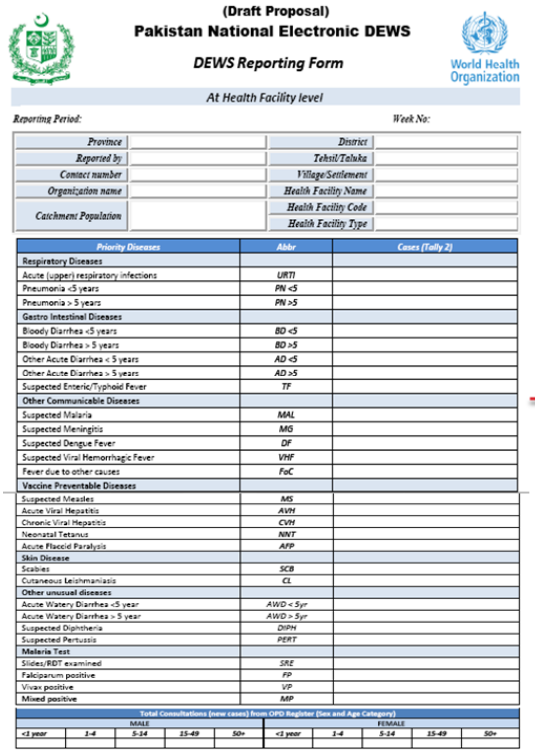


Flow of Current National Disease Surveillance System



Flow of Electronic DEWS (eDEWS) Surveillance System (Weekly Reporting System)

Conversion of paper based DEWS reporting form into mobile phone and web based applications



(Draft Proposal)

Pakistan National Electronic DEWS

DEWS Reporting Form

World Health Organization

At Health Facility level

Reporting Period: *Week No:*

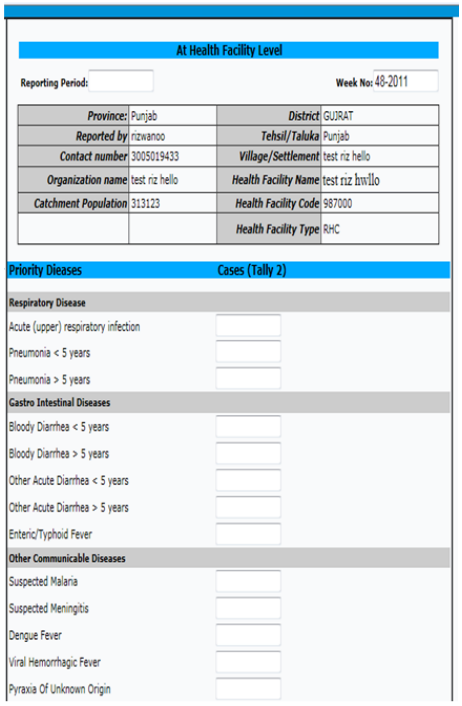
Province		*District*	
Reported by		*Tehsil/Taluka*	
Contact number		*Village/Settlement*	
Organization name		*Health Facility Name*	
Catchment Population		*Health Facility Code*	
		Health Facility Type	

Priority Diseases	*Abbr*	*Cases (Tally 2)*
Respiratory Diseases		
Acute (upper) respiratory infections	*URTI*	
Pneumonia <5 years	*PN <5*	
Pneumonia > 5 years	*PN >5*	
Gastro Intestinal Diseases		
Bloody Diarrhea <5 years	*BD <5*	
Bloody Diarrhea > 5 years	*BD >5*	
Other Acute Diarrhea < 5 years	*AD <5*	
Other Acute Diarrhea > 5 years	*AD >5*	
Suspected Enteric/Typhoid Fever	*TF*	
Other Communicable Diseases		
Suspected Malaria	*MAL*	
Suspected Meningitis	*MG*	
Suspected Dengue Fever	*DF*	
Suspected Viral Hemorrhagic Fever	*VHF*	
Fever due to other causes	*FoC*	
Vaccine Preventable Diseases		
Suspected Measles	*MS*	
Acute Viral Hepatitis	*AVH*	
Chronic Viral Hepatitis	*CVH*	
Neonatal Tetanus	*NNT*	
Acute Flaccid Paralysis	*AFP*	
Skin Disease		
Scabies	*SCB*	
Cutaneous Leishmaniasis	*CL*	
Other unusual diseases		
Acute Watery Diarrhea <5 year	*AWD < 5yr*	
Acute Watery Diarrhea > 5 year	*AWD > 5yr*	
Suspected Diphtheria	*DIPH*	
Suspected Pertussis	*PERT*	
Malaria Test		
Slides/RDT examined	*SRE*	
Falciparum positive	*FP*	
Vivax positive	*VP*	
Mixed positive	*MP*	

Total Consultations (new cases) from OPD Register (Sex and Age Category)									
MALE					FEMALE				
<1 year	*1-4*	*5-14*	*15-49*	*50+*	*<1 year*	*1-4*	*5-14*	*15-49*	*50+*

MOBILE BASED INTERFACE

WEB BASED INTERFACE



At Health Facility Level

Reporting Period: Week No: 48-2011

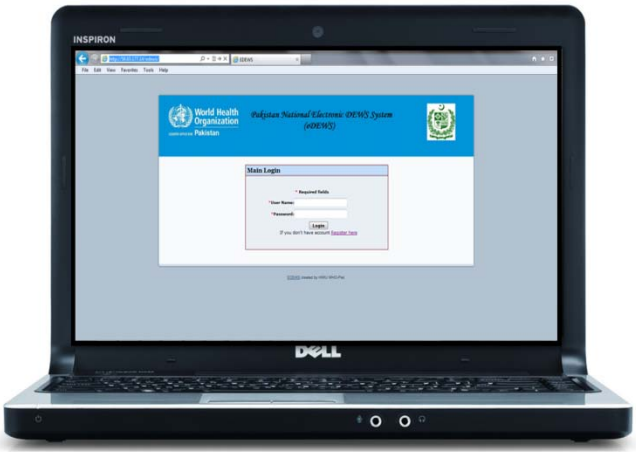
Province:	Punjab	*District*	GUJRAT
Reported by	nizwanoo	*Tehsil/Taluka*	Punjab
Contact number	3005019433	*Village/Settlement*	test riz hello
Organization name	test riz hello	*Health Facility Name*	test riz hwllo
Catchment Population	313123	*Health Facility Code*	987000
		Health Facility Type	RHC

Priority Dieases	Cases (Tally 2)
Respiratory Disease	
Acute (upper) respiratory infection	
Pneumonia < 5 years	
Pneumonia > 5 years	
Gastro Intestinal Diseases	
Bloody Diarrhea < 5 years	
Bloody Diarrhea > 5 years	
Other Acute Diarrhea < 5 years	
Other Acute Diarrhea > 5 years	
Enteric/Typhoid Fever	
Other Communicable Diseases	
Suspected Malaria	
Suspected Meningitis	
Dengue Fever	
Viral Hemorrhagic Fever	
Pyraxia Of Unknown Origin	

Developed Interfaces for eDEWS

Mobile based interface - eDEWS

Web based interface - eDEWS



Data submission using eDEWS application