GUIDELINES FOR USE OF THE ETHIOPIAN ANIMAL DISEASE NOTIFICATION AND INVESTIGATION SYSTEM

Veterinary Services Directorate

Ministry of Agriculture

Addis Ababa

February 2014

Guidelines for Use of the Animal Disease Notification and Investigation System (ADNIS)

Contents

List of Tables

List of Figures

List of Annexes

List of acronyms

3G	Third generation (mobile telephony) network
ADNIS	Animal disease notification and investigation system
AHA	Animal health assistant
AHD	Animal Health Department
ANT	Anthrax
AHS	African horse sickness
AHT	Animal health technician
ASF	African swine fever
BT	Bluetongue
CAHW	Community-based animal health worker
CBPP or CBP	Contagious bovine pleuropneumonia
CCPP or CCP	Contagious caprine pleuropneumonia
CP	Camel pox
DBMS	Database management system
DPT	Digital pen technology
DVS	(Federal) Directorate (or Director) of Veterinary Services
EDGE	Enhanced data rates for global evolution – a type of mobile telephony network
ETC	Ethio Telecom
FMD	Foot and mouth disease
GPS	Global positioning system
HPAI	Highly pathogenic avian influenza
IBD	Infectious bursal disease
ID	Identification
HS	Haemorrhagic septicaemia
IMIE	International Mobile Equipment Identity
LSD	Lumpy skin disease
MoA	Ministry of Agriculture
MD	Marek's disease
NADSS	National animal disease surveillance system
NAHDIC	National Animal Health Diagnostic and Investigation Centre
ND	Newcastle disease
NSD	Nairobi sheep disease
ODK	Open data kit – an open-source set of tools used to organize mobile data collection systems
OIE	Office International des Epizooties
PPR	Peste des petits ruminants
RAB	Rabies – depending on context
RAB	Regional Agricultural Bureau – depending on context
RP	Rinderpest
RVF	Rift Valley fever
RVL	Regional Veterinary Laboratory
SGP	Sheep and goat pox
SMS	Short (text) messaging component of 'phones, web, or mobile 'phones.

1. Introduction

ADNIS is an important component of the Ethiopian National Animal Disease Surveillance System. It is a smart phone-based mobile data collection system used by field staff to immediately notify decision makers of the suspected occurrence of one of the target diseases (see Table 4). The purpose of this rapid notification is to promote a quick response in the form of investigation and implementation of appropriate control and preventive measures. As the disease *investigation* part of the system is still under development, these guidelines mainly focus on the Animal Disease Notification System part of the ADNIS. The guidelines for the disease outbreak investigation protocol are still under development. Whist these are being prepared ADNIS piloting can begin.

2. Overview of the system

Upon detection of suspected[1] cases of a target disease a kebele/wereda-based animal health assistant or veterinarian will enter details into an ADNIS-dedicated template installed on his / her smart phone and transmit these details directly over the ETC network to the ADNIS server.

ADNIS aims to detect disease clusters[2] early, before diagnosis is confirmed and to evoke a rapid response ACTION, for example investigation by wereda animal health service, investigation by a laboratory investigation team from NAHDIC or RVL, implementation of communications and public awareness strategies, imposition of disease control measures, implementation of emergency preparedness plans, and so on as appropriate.

The key functions of ADNIS are to:

- **Enable the immediate reporting of a suspected occurrence / outbreak of a target disease;**
- **Stimulate a rapid response to a disease report (investigation and confirmation of the disease outbreak as well as response to the outbreak);**
- **Enable reporting of the clinical absence of a target disease in a defined sub-population – a zero report;**
- **Identify the changing limits of a disease outbreak – whether or not confirmed;**
- **Provide (some) quantitative data related to a disease outbreak.**

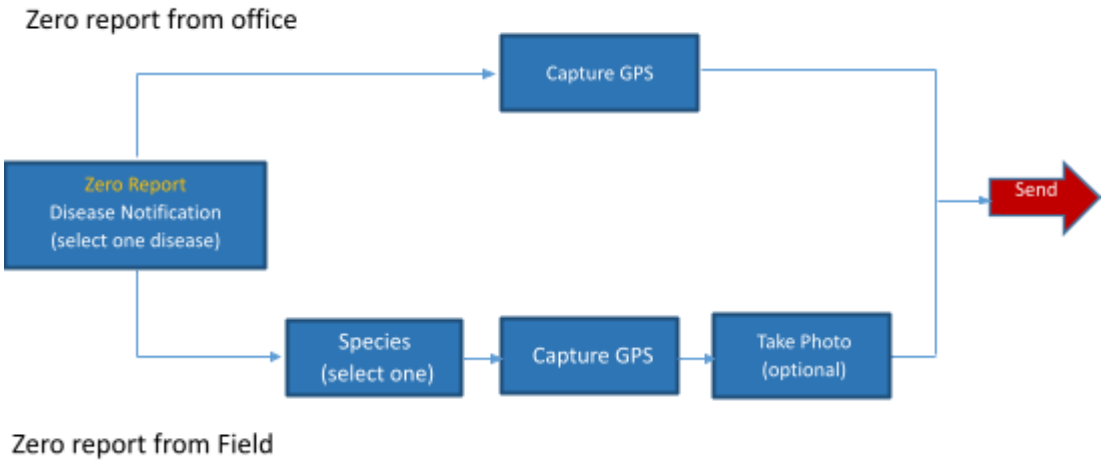
The system is also used to report the absence of (obvious) clinical cases of any of the target diseases in a defined group of animals at a given location – for example a market, feedlot, quarantine facility, watering point, communal grazing area, ranch, etc. Such reports are termed 'zero reports'. When no disease reports are received on a given day from livestock owners or other stakeholders at, say, an animal health post then an office-based zero report should be submitted. This would indicate that there are currently no reports of suspected occurrence of any of the target diseases in, for example, an

[1] Suspected because the initial diagnosis is based upon interpretation of the presented syndrome is therefore tentative and awaits laboratory confirmation. See case definitions.

[2] Cluster can be a number of cases of one syndrome in one notification, or a number of notifications each of which is reporting the same disease syndrome in time and space – as determined by an epidemiologist

animal health post's catchment area – ie 2 or 3 kebeles. The process of submitting zero reports is summarized in Figure 1.

Figure 1: Zero Reporting



The basic idea is that all registered ADNIS users should report at least once per workday. If a participating AHA has not been out of his office on a given day, and did not receive a report of occurrence of any of the ADNIS target diseases then he will submit a zero report from his office. If he made a field visit and did not detect any of the ADNIS target diseases then he submit a zero report from the field. The latter will of course be of a higher value than a zero report submitted from the office.

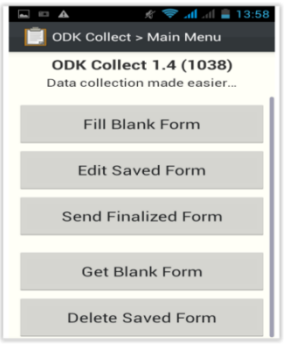
ADNIS consists of four components: N-Collect, N-Server, N-Web and N-Alert. These are described below and depicted in Figure 17.

3. N-Collect

This is the component used by field staff to capture and submit information about a (suspected) outbreak of a target disease. It comprises a form (template) into which data are entered. Once completed the form, plus GPS coordinates (captured automatically by the smart phone) and one photograph (of sick/dead animals, lesions etc) are submitted to a central server over the ETC network.

The template presents a series of question most of which are answered, 'yes' or 'no' by clicking on the appropriate option button (all set to the default of 'no'). N-Collect's main menu is shown in Figure 2.

Figure 2: The Main Menu



The displayed menu options are self-explanatory:

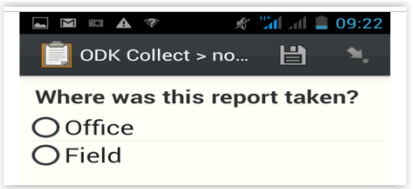
- **Get blank form** – load a blank form ready for data entry, once the form has been loaded the 'Fill blank form' option is selected to enable data entry. Note that the 'Get blank form' option must be selected on the first occasion that a user opens ADNIS on a given smart phone. Thereafter whenever ADNIS is opened a blank form will automatically be displayed.
- **Fill blank form** – this starts the process of entering data. When all data have been entered the user can assign a name to the form and save it. This name is for the convenience of the user as ADNIS has its own method of identifying a form based upon the data content of the form.
- **Edit saved form** – this is to retrieve a saved form and check / change entered data values
- **Send finalized form** – this is used to submit a completed form over the ETC network. Note that a form must be saved before it can be sent to the server. Once a form has been sent it is deleted from the smart phone.
- **Delete saved form**. This would be used if there is no intention to send to send a completed or partially completed form to the server

3.1. The Process of Data Entry

3.1.1 First stage

The first stage is to indicate the source of the report – office (data collected from a third party, eg livestock owner) or field (data collected first hand).

Figure 3: Data Entry - The First Data Entry Screen

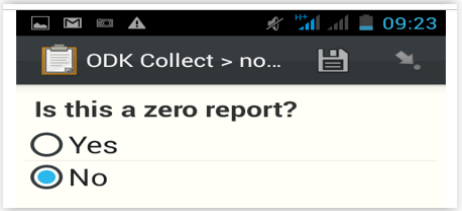


Move to the next screen by swiping from the right 

3.1.2 Zero report?

Is this a Zero report? Select 'Yes' (to report the absence of animals with target disease – an important feature of ADNIS) or 'No' (to report disease occurrence)

Figure 4: Data Entry - The Second Screen



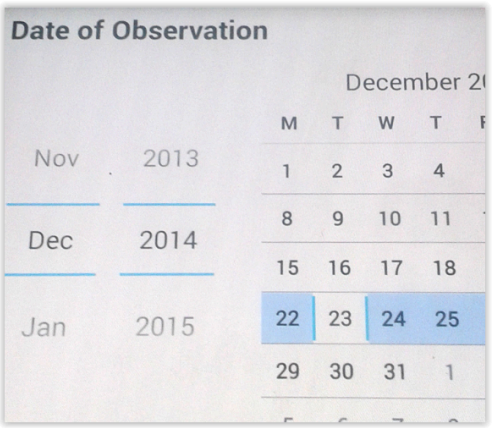
If the zero report option is not selected then the user moves to a series of fields into which disease-related data are entered as follows

Move to the next screen by swiping from the right.

3.1.3 Date

Date – select year, month and date. The default value (current date) is displayed. The user can enter an earlier date if appropriate.

Figure 5: Data Entry - Setting the Date

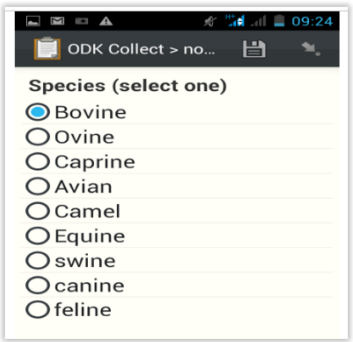


Move to the next screen by swiping from the right

3.1.4 Species

Select <u>one only</u> from the list

Figure 6: Data Entry -- Selecting the Species

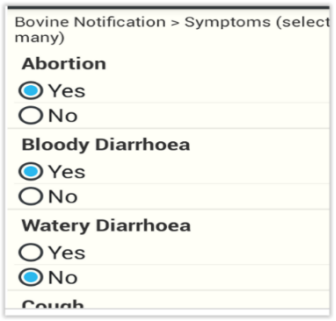


Move to the next screen by swiping from the right

3.1.5 Clinical signs

Possible clinical signs for the selected species are displayed. Scroll though the list and click on the 'yes' option button for each sign presented by the diseased animals. It is important that the user scrolls through all listed clinical signs and ensures that the correct option ('yes' or 'no') is selected for each. Note that the default for each clinical sign is 'No'.

Figure 7: Data Entry - Selecting the Presented Clinical Signs

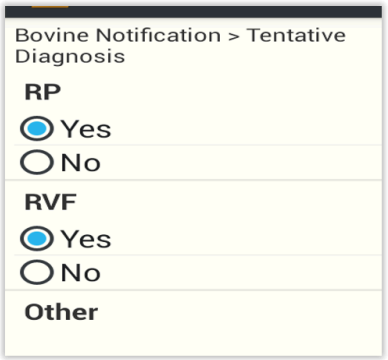


Move to the next screen by swiping from the right 

3.1.6 Possible causal disease(s)

After selecting the presented signs the user swipes to the right and a list of possible diagnoses (for the species and signs selected) is selected by the system and displayed. The most likely diagnosis /diagnoses is / are selected by clicking the appropriate 'yes' option button(s).

Figure 8: Data Entry - Selecting Probable Causal Disease(s)



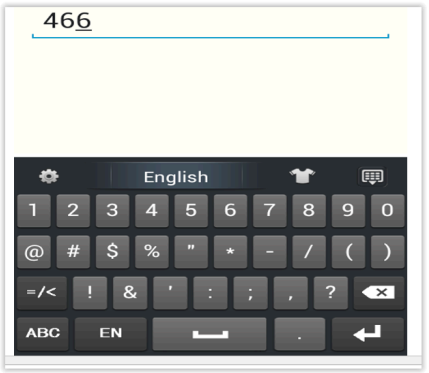
Move to the next screen by swiping from the right 

3.1.7 Quantitative data

Enter the number of NEW cases and deaths and the size of the population at risk using the keyboard in the following 3 screens. Note that the N-Collect template (ie the form) has built-in data checking to

capture logical errors – for example if the reported number of cases exceeds the reported number of animals in the population at risk, or the reported number of deaths exceeds the reported number of cases. If such an error is detected then an error message is displayed and the user cannot proceed with data entry until amended data that satisfy all validation rules have been entered. The system will not save an incomplete form, for example a form with zero values for number of cases, number of individuals in the population at risk, and so on.

Figure 9: Data Entry - Entering Quantitative Data Using the Keyboard

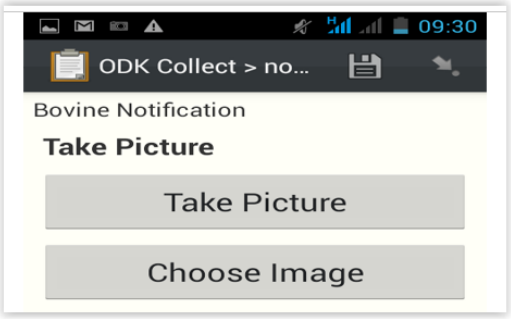


Move to the next screen by swiping from the right 

3.1.8 Option to take a picture

An image can be included in the data package submitted to the ADNIS server. The screen shown in Figure 9 is used by the user to choose if a photograph (taken using the smartphone camera) will be included in the data package. If images have been taken earlier and stored in the phone's gallery then these can be viewed and the best image selected for inclusion in the N-Collect data package.

Figure 10: Data Entry - The Picture



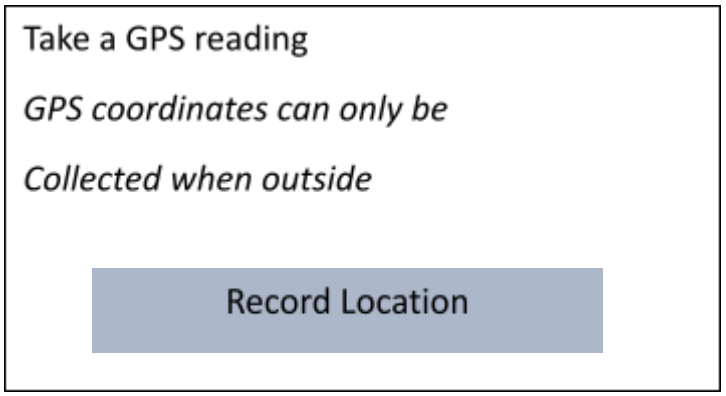
Move to the next screen by swiping from the right 

3.1.9 Capture location

Capture GPS – this must be selected to instruct the smartphone to capture and record the GPS coordinates of the reporting location. Recording GPS coordinates is mandatory as these are required to enable mapping of notifications and are further used by N-Web (see below) to identify the source wereda.

Note that the accuracy of the GPS reading is displayed together with the coordinates. This accuracy is indicated in meters and should be less than 100 meters to enable the system to identify the source wereda. If the user waits then the accuracy tends to improve with time.

Figure 11: Data Entry - Capturing GPS Coordinates

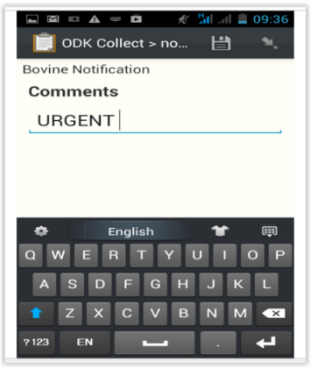


Move to the next screen by swiping from the right 

3.1.10 Comment

Enter comment as appropriate – a comment is not mandatory.

Figure 12: Data Entry - Entering a Comment

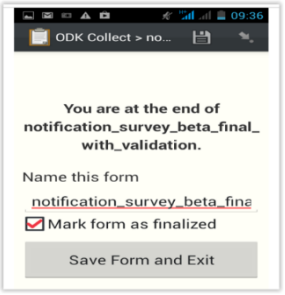


Move to the next screen by swiping from the right 

3.1.11 Finalising the form

The user can now choose to mark the form as finalized in which case it is saved.

Figure 13: Data Entry - Finalising



Alternatively, the user can press the smart phone's cancel button. The user is then asked whether he / she wishes to save the changes made to the form, or to cancel the form. In either case the user is returned to the main ADNIS menu.

3.1.12 Submit a finalized and saved form

Submit the form – if within network range the form can be submitted using the main menu option 'Send finalized form', if not the user can wait until he is in a location within range of an ETC Network signal. Then using the main menu option 'Send finalised form" the form can be submitted. Once the form is sent it is automatically deleted from N-Collect, but the data can accessed via N-Server by users with the required permission.

3.1.13 Make a zero report.

If the zero report option is selected (see Figure 3 above) then:

1. The user selects the species involved
2. The GPS option is selected
3. The form is named and saved and submitted if within signal range. If not then wait until within range and using the main menu option 'Send finalized form'.

3.2. When to use N-Collect?

3.2.1 To report disease occurrence

Field-based participants (wereda level veterinarians and AHAs, kebele-level AHAs, private service providers and their staff) should collect, record and submit data whenever one or more (suspected) cases of one of the target diseases (see Annex I) is detected. Efforts must be made by AHAs to visit the location and collect data on-site and not merely rely upon a verbal report from a livestock owner, development assistant etc.

3.2.2 To make a zero report

During the normal course of work a field-based participant will encounter groups of animals at home steads, markets, common grazing areas, watering points, feedlots, quarantine facilities etc. etc. These groups should be visually examined for clinical signs of any of the target diseases. If none is seen then a zero report should be submitted. N-Server

Incoming data packages from N-Collect are received and (permanently) stored in the ADNIS server. The administrator will be able to download notifications and archive these for later 'data mining'.

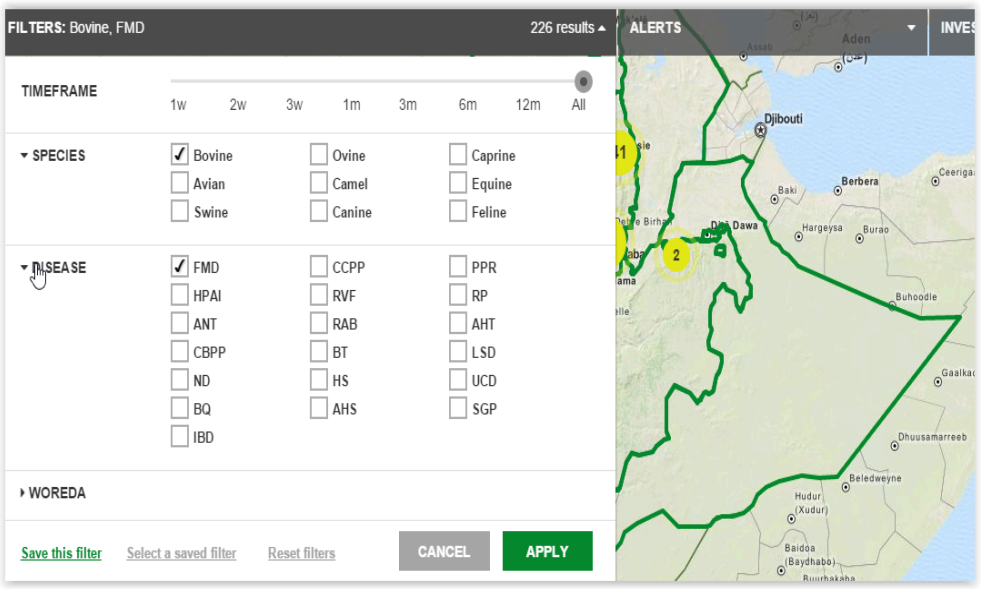
4. N-Web

4.1. Function

This component carries out all data processing tasks: analyses, processing and reporting as follows:

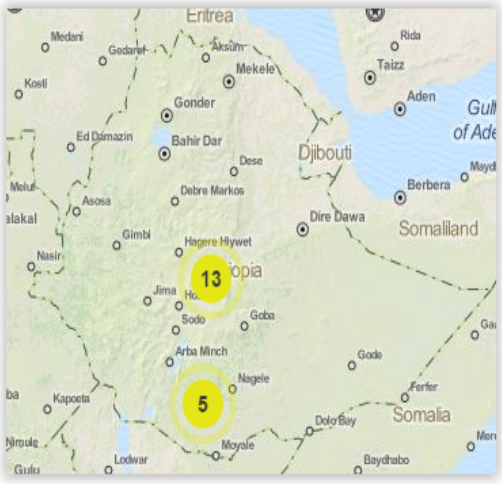
- Generates the packages of data (N-Alert) that are promptly sent to stakeholders as described in section 6 below.
- Users with the requisite permission can log on to the ADNIS site http://notification.systems/ and request maps, reports and tables for a given disease, over a given time period, and in a given location. This is done by applying filters as shown in the figure below.

Figure 14: Applying Filters



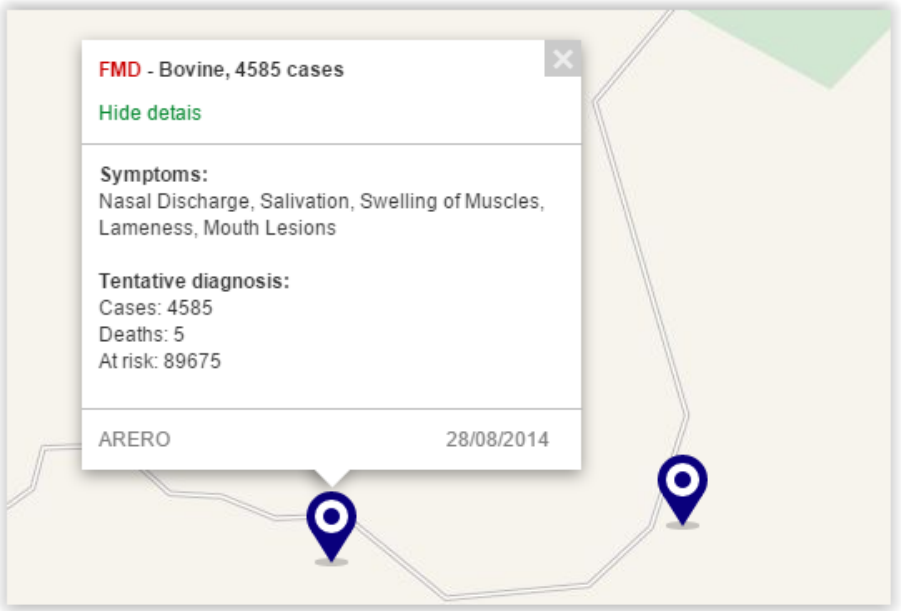
A map generated using N-Web filtering for species Bovine and disease FMD (as an example) is shown in Table 14.

Figure 15: A Map After Source Data have been filtered



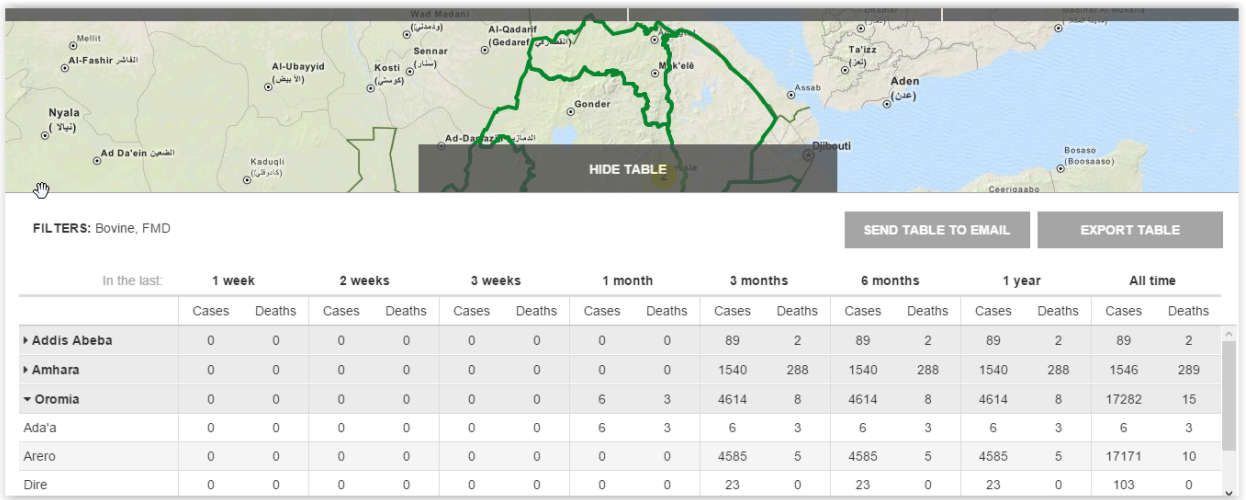
Double clicking on one of the notification points will reveal detailed data as shown below. The data displayed are fictitious and for the purposes of demonstration only.

Figure 16: Zooming in to a Single Notification Point



A data table can be generated as shown below.

Figure 17: A Table Showing Filtered Data and Options – Email or Export the Table



In the last:	1 week		2 weeks		3 weeks		1 month		3 months		6 months		1 year		All time	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
▸ Addis Abeba	0	0	0	0	0	0	0	0	89	2	89	2	89	2	89	2
▸ Amhara	0	0	0	0	0	0	0	0	1540	288	1540	288	1540	288	1546	289
▾ Oromia	0	0	0	0	0	0	6	3	4614	8	4614	8	4614	8	17282	15
Ada'a	0	0	0	0	0	0	6	3	6	3	6	3	6	3	6	3
Arero	0	0	0	0	0	0	0	0	4585	5	4585	5	4585	5	17171	10
Dire	0	0	0	0	0	0	0	0	23	0	23	0	23	0	103	0

4.2. Permissions

A proposed protocol for controlling access to information is given in Table 1, below. It should be noted that only approved[3] and registered users can gain access to N-Web

[3] Approved by the system administrator

Table 1: Proposed Criteria for Granting Access to the website http://notification.systems

Level		N-Alert	Access to information – rules set and imposed by system administrator
Public sector			
Federal	DVS	All, filtered	All filtered by user
	Epidemiology unit	All, filtered	All filtered by user
Regional	RVL	All, filtered	All filtered by user
	RAB	All, filtered	All filtered by user
Zonal	Zonal animal health office		Outbreaks identified in region and, as indicated, adjacent regions
Wereda	Wereda Animal Health Service		Outbreaks identified in zone and, as indicated, adjacent zones
	Kebele level AHAs	Wereda and contiguous weredas	Outbreaks identified in wereda and, as indicated, adjacent weredas
Private sector			
Private veterinary service providers		Wereda and contiguous weredas	Outbreaks identified in wereda and, as indicated, adjacent weredas

4.3. Other functions of N-Web

N-Web comprises other important features including:

- Authorised users will be identified using their IMEI (International Mobile Equipment Identity), the unique 15 digit identification code embedded in each mobile telephone. Users must register with N-Web and N-Alert giving details including name, mobile telephone number, and the phone's IMIE.

  The administrator will determine who can access what part of ADNIS –depending upon seniority, sector and location as shown in Table 1.

  The system administrator can view all alerts, filter them, map them, export them to an Excel worksheet, or email them to any email address.

- Monitoring the activity of each user (the field data collectors and reporters) who uses N-Collect: the resulting activity reports could, amongst other uses, be used as a basis for awarding airtime or for cancelling registrations.

- The ability to accept updated / new wereda shape files and to integrate the new boundaries with geographical coordinates (submitted by N-Collect) and thus maintain ability to identify source weredas.

- The main variables included in a disease notification (species, disease, type of report – nil or disease) are differentiated by colour, according to filters applied, on ADNIS maps. This simplifies the task of interpreting mapped data.

- An important feature of N-Web is to enable an epidemiologist with administrator privileges to delineate the extent of a disease outbreak by drawing an irregular polygon using vertices to change its size and shape as required.

5. N-Alert

5.1. N-Alerts sent to smart phones

The N-Alert component comprises small packets of the data (wereda, disease suspected, number of cases and deaths) that are immediately transmitted to groups of users as specified by the system administrator. For example, automatically all notifications could be reported to Federal and NAHDIC epidemiologists – this could be overwhelming so for routine purposes filters would be applied – for example only for a few priority diseases – and these filters are readily changed so that a broad overview can be obtained.

As soon as the epidemiologists identify a possible disease outbreak then the evolution of these can easily be monitored through time by requesting maps and tables from N-Web as described above.

A suggested protocol for distribution of AN-Alert is presented in the Table 2 below.

Table 2: Proposed Criteria for Distribution of Alert Messages

Level		Conditions for receiving an alert
Public sector		
Federal	DVS	None – set filters as required
	Federal epidemiologists	None – set filters as required
	NAHDIC epidemiologists	None – set filters as required
	NVI	None – set filters as required
Regional	RVL	None – set filters as required
	RAB	None – set filters as required
Zone	Zonal animal health officer	All identified 'emergency' diseases, none For other diseases and zero reports in **zone and adjacent zones** then set filters as required
Wereda	Wereda animal health officer	For 'emergency' diseases, none For other diseases and zero reports in **zone and adjacent zones** then set filters as required
Kebele	AHA participating in ADNIS	**In wereda and adjacent weredas** – set filters as appropriate
Private sector		
Any	ADNIS clinician	For emergency diseases, none For other diseases and zero reports in **zone and adjacent zones** – set filters as required

For convenience, recipients of N-Alerts will be assigned to groups by the system administrator.

Administrators can readily add or remove recipients of alerts as required – they are cited by telephone numbers, user type (MoA, NAHDIC, RVL/RAB), name, regions to be included, and diseases to be included. These permissions can easily be edited, and recipients added to, or removed from the list.

The purpose of alerts is to enable senior decision makers to rapidly determine the latest status of selected diseases – for example PPR. All ADNIS reports citing PPR can be viewed on their mobile ‘phone and if it appears that a serious situation may be developing then further information can easily be obtained from ADNIS using N-Web as described above.

5.2. Alerts sent as SMS or email

Selected users (for example the Director, DVS) will receive an automatically generated message in the form ‘a potentially dangerous disease DDD in wereda WWWWW. NNNN cases.’ Filters are applied by the administrator, for example limiting these alerts to one or two of the currently important diseases. Users with required permission could then log on to http://notifications.system to collect more information.

Figure 17: ADNIS Components and Actions

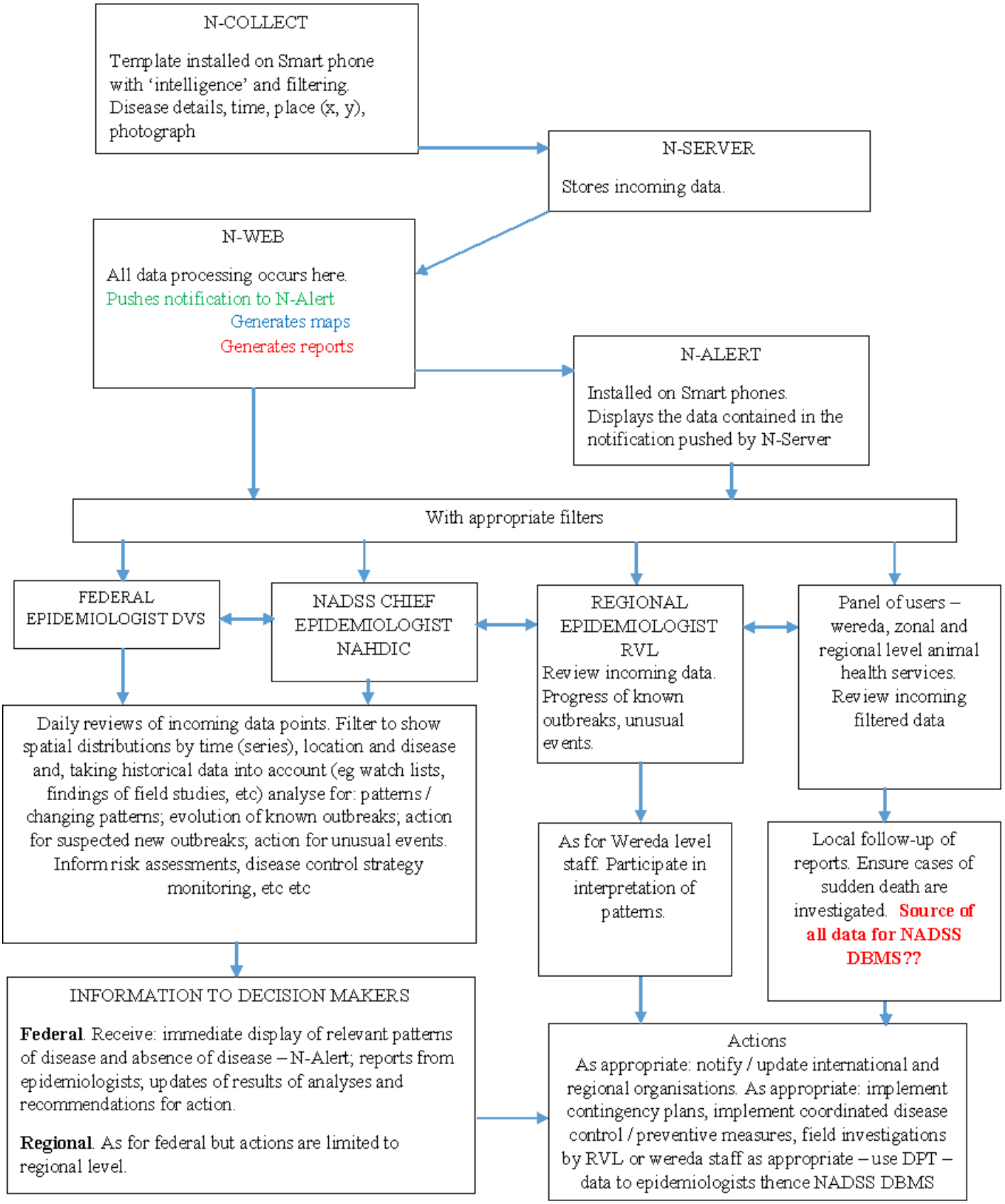
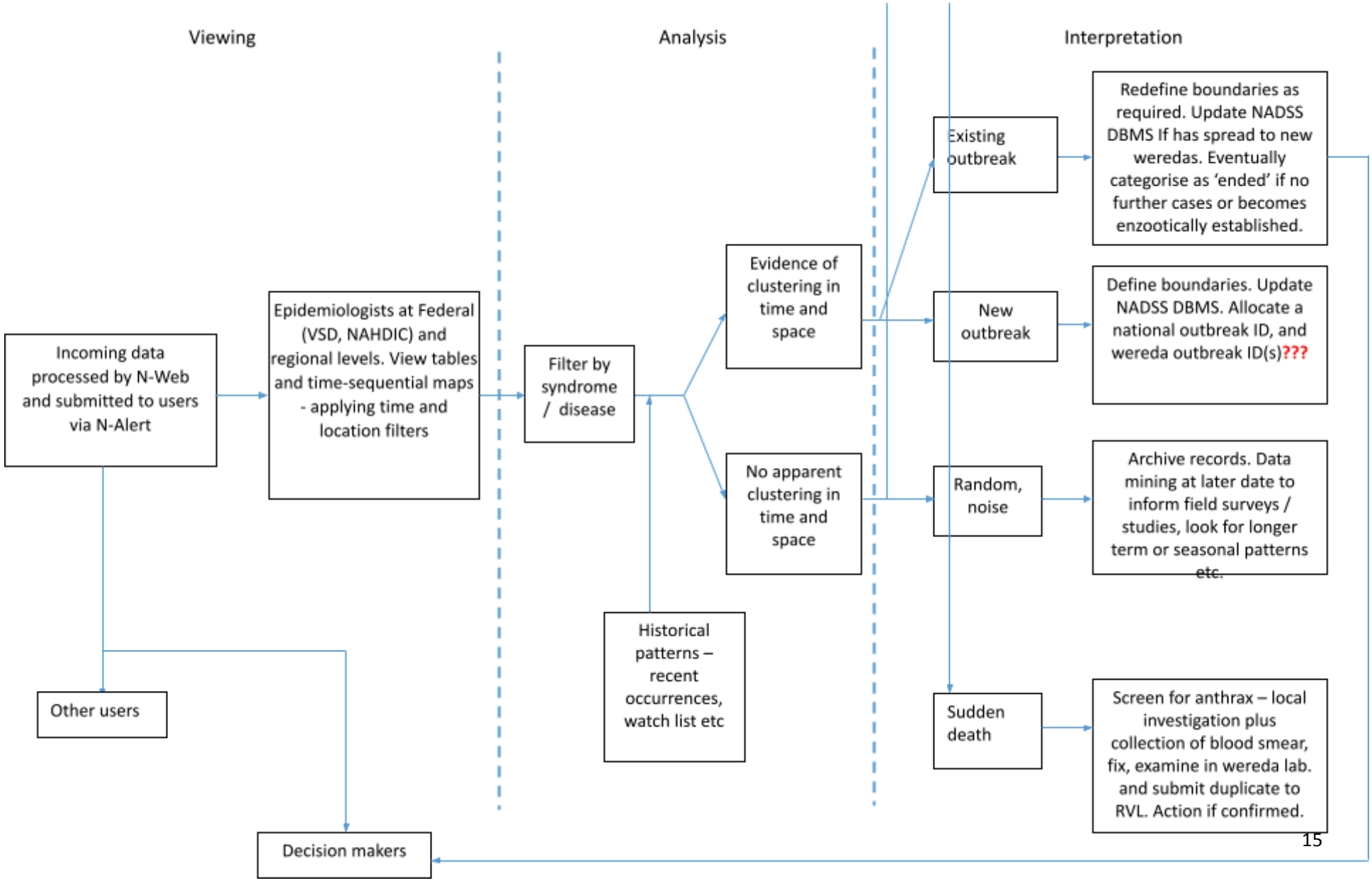


Figure 4: DETAILS OF ANALYSIS AND INTERPRETATION OF INCOMING NOTIFICATION DATA

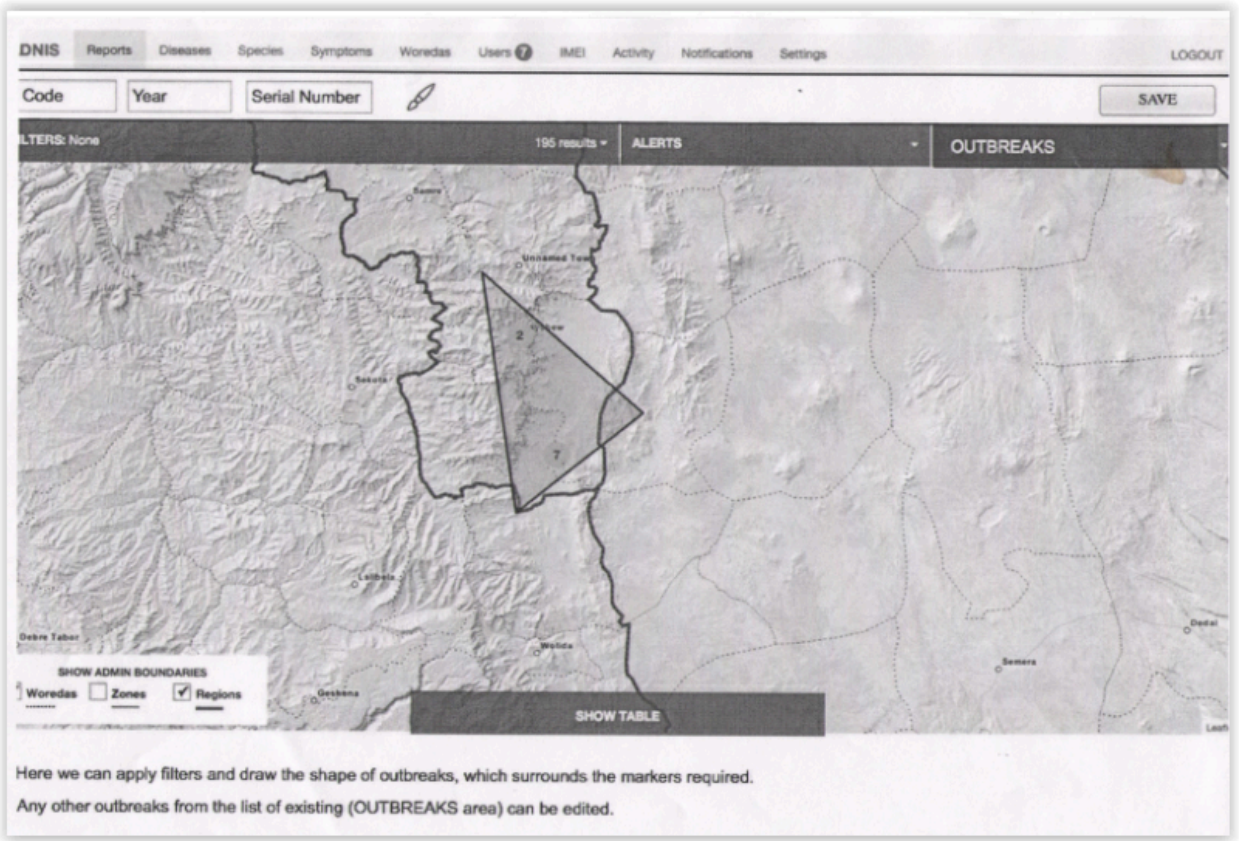


5.3. Outbreak definition and identification

In the context of the ADNIS an outbreak is the occurrence of one or more related[4] cases of a target disease in an epidemiological unit (see definitions) with cases distributed in time and space such that spread is very likely to individuals in the population at risk. The identification of an outbreak from notification data will be the responsibility of epidemiologists who will use appropriate criteria and judgment.

Immediately a suspected outbreak is detected an epidemiologist (RVL or NAHDIC) will delimit it on a map. The system will then allocate an outbreak reference number as described below.

Figure 18: Delimiting an Outbreak



A unique national outbreak reference number will be automatically assigned by the system as soon as an outbreak is identified by the regional epidemiologist. Usually this will be by detecting a clustering in time and space of cases of a target disease. For important exotic diseases such as BSE and ECF which are not contagious the first occurrence may be in the form of a non-propagating single case. This would be treated as an outbreak, and one which must be investigated by a laboratory team as soon as possible.

A national outbreak reference number is in the form DDD/YYYY/NNN, where:

- DDD is the three digit alpha code for the concerned disease (eg FMD for foot and mouth disease, CBP for contagious bovine pleuropneumonia, PPR for peste des petits ruminants, etc),

[4] Related in time and space

- YYYY is the year, eg 2015
- NNN is the serial number for that outbreak of that disease in the given year. For each successive outbreak the serial number will be increased by 1. It should be mentioned that every year, it will start from 1 and end up in 365. I am saying so because I assumed that the zero report is also part of the suspected case report (either a suspected case or zero report is sent from each reporting point. What would be the code for zero report?

Thus SGP/2014/12 would indicate the 12th outbreak of sheep and goat pox that was detected in 2014.

Wereda outbreak reference numbers

It is suggested that for each wereda affected in a given disease outbreak a wereda outbreak reference number will be generated by the sister component in NADSS using the following format:

A wereda-level outbreak reference number is in the form DDD/YYYY/RRZZWW/NNN where:

- DDD is the three digit alpha code for the concerned disease (eg FMD for foot and mouth disease, CBP for contagious bovine pleuropneumonia, PPR for peste des petits ruminants, etc),
- YYYY is the year, eg 2015
- RRZZWW is the CSA wereda code (RR = region code, ZZ = zonal code, WW = wereda code)
- NNN is the serial number for that outbreak of that disease in the given wereda in the given year. For each successive outbreak the serial number will be increased by 1. It should be mentioned that every year, it will start from 1 and have a maximum value of 365.

Thus SGP/2014/010101/1 would indicate the 1st outbreak of sheep and goat pox that was detected in Tahitay Adiyabo wereda (Tigray NRS, Central zone) in 2014.

Kebele outbreak reference number

Kebele-level outbreak reference numbers could be accommodated and would be in the form DDD/YYYY/RRZZWWKK/NNN, where KK is the code for the wereda. Others as for wereda code.

Note that outbreak reference numbers can be edited by the system administrator – for example should the diagnosis be amended in light of laboratory investigation.

6. Protocols for distribution and use of ADNIS smart phones[5]

Government owned phones

During the pilot phase these will be provided to public sector workers who must comply with regulations governing the use of government-owned property. Free use of the smartphone and maybe a monthly allowance of prepaid airtime will be provided (by the DVS) depending upon performance (as measured by N-Web) and receipt of N-Alerts will serve as incentives.

User-owned phones

[5] The use of incentives to encourage disease reporters (AHAs etc) requires discussion to answer questions such as: What type of incentive? Who will pay? If payments are included, then much to pay? How to manage the incentive system?

Later, public sector workers and private operator may be able to participate in ADNIS using their personal android smart phone. The ADNIS template would be installed on their smart phone and training provided. Monthly prepaid airtime and may be provided depending upon performance.

7. System administration.

The senior system administrator has a number of important tasks including: in cooperation with the server owner, assuring server security; granting permissions for access to the various levels of ADNIS; document how the system is administered including rules for access etc.; managing lists of users, and; ensuring that the system is maintained and meets the needs of users.

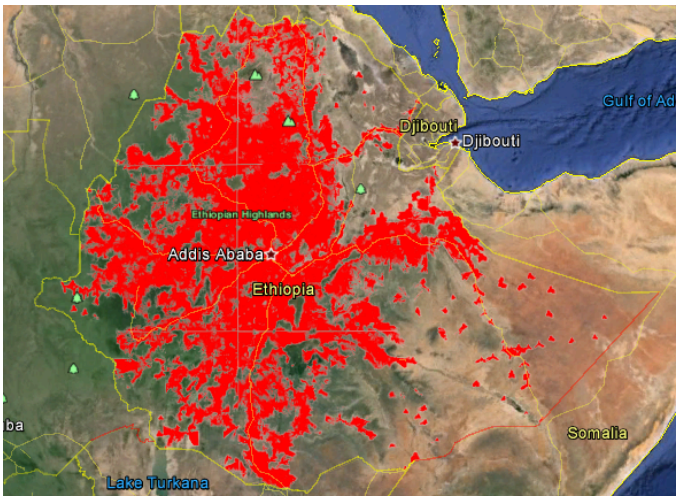
The senior system administrator will be the senior veterinary epidemiologist in charge of NADSS at NAHDIC, with epidemiologists at the regional veterinary laboratories being assistant administrators with more limited but defined powers.

8. ADNIS in Pastoral Areas – a special case.

Given the great importance of the pastoral areas as the prime source of livestock for live animal exports and for the export abattoirs it is essential that they have the highest possible standards of animal disease surveillance. This is required to increase the confidence of importing countries in Ethiopia's international veterinary certification system and to enable effective risk-based disease control measures in the lowlands.

Livestock production in the lowlands is characterised by dispersed herds, low livestock densities (some 1/7 of that of the highlands), veterinary para-professionals being predominantly CAHWs (rather than AHAs as in the highlands), and relatively poor coverage by ETC network (see Figure 18) Therefore ADNIS will require a different organisation structure, for example (i) storing notification data on smart phones and submitting when in an area with network coverage, and (ii) increasing the number of ADNIS smartphones per wereda.

Figure 19: Current and planned coverage of ETC EDGE and 3G networks as at June 2013



Options

Using AHAs, CAHWs, or pastoralists. The relative merits of these are described in Table 3.

Table 3: Characteristics of possible notification agents in pastoral areas

Notification agent	Advantages	Disadvantages
AHA – preferably a public employee, alternatively an employee in a stable private network, or a public employee	Well trained	Static in a non-static production system
CAHWs – must be member of a stable (private) veterinary network	Mobile and better able to detect and report disease occurrences	Relatively low educational level.
Relatively well-educated members of pastoralist families	Mobile and better able to detect and report disease occurrences	Informal. Educational level??
Judicious mixture of the above	As above	Relatively few.

9. ADNIS – the future

9.1. Integrating ADNIS and the new data mana[6]gement system

A new web-based database management system, Dovar 2, has been developed for the National Animal Disease Surveillance System. It would be possible to link ADNIS notifications with Dovar 2 and thus establish an innovative and up-to-the-minute e-based national surveillance system. To achieve this will require input from expert software developers.

9.2. Integrating Digital Pen Technology

9.2.1 Function

Digital pen technology (DPT) will be used to collect, process and transmit data collected by disease investigation teams. These data will be used:

By RVLs and the NAHDIC as part of the diagnostic process which integrates source data with the results of laboratory tests and assays to identify the responsible cause /agent and inform control / preventive measures.

By federal and regional epidemiologists to undertake epidemiological analyses, identify determinants, estimate various epidemiological rates, quantifying losses, characterising 'typical' outbreaks etc.

9.2.2 Managing DPT data

The DPT will capture many variable values and a customised DBMS is required to store these data, and retrieve filtered data for analyses.

Dovari 2 would not be a suitable for this purpose as:

6

- DTP will include data reported elsewhere and this will therefore lead to duplication
- It would require significant modification both in table design and reporting modules.

It is recommended that a dedicated and simple web-based DBMS be developed to accept, store and process these data: this should be an integral part of, or be fully compatible with LIMS[7].

It is important that once laboratory investigations have been completed the findings will be imported into Dovari 2. For this purpose, laboratory staff (probably the epidemiologist) will log on to Dovari 2, locate and then update the outbreak record. The central server-based database (at the MoA) will then be automatically updated with these new data.

[7] The Laboratory Information Management System

10. Diseases included in the ADNIS system

Disease	Notifiable? (OIE)[8]	Status in Ethiopia (OIE country report 2013)	Comments
FMD	Yes	Clinical cases. Not reported since 2011	Highly infectious. Enzootically established, cycles through populations (see time-to-time variations in sero-prevalence rates).
Rinderpest	Yes	Last reported 1995	Highly infectious. Cattle populations uniformly susceptible.
Contagious bovine pleuropneumonia	Yes	Clinical disease	Present in Ethiopia. Long incubation period. Often chronic.
Haemorrhagic septicaemia	Yes	Clinical disease	Associated with rains. Attack rate generally low but, rarely and under suitable conditions, can be very high (up to 100%). Spread by direct contact.
Lumpy skin disease.	Yes	Clinical disease	Mechanical transmission of the causal virus by mosquitoes, flies etc. Attack rates generally low but can reach 45%
Anthrax	Yes	Clinical disease	Zoonosis. Infection by ingestion, inhalation, or entry through break in skin. Most by ingestion of spores. Incubator areas with nitrogen-rich alkali spoils. Very persistent in spore form.
Rift Valley fever	Yes	Last reported 2006	Arthropod-borne. High proportion of ruminant populations are susceptible. Potential for rapid spread in very wet conditions when vector proliferates.
Contagious caprine pleuropneumonia	Yes	Clinical disease	Potential for significant spread in naïve populations. Very contagious. Chronic cases may exist and be a persistent source of new infections.
Nairobi sheep disease.	Yes	Never reported	Transmitted by several species of ticks, including Rhipicephalus spp and Amblyomma spp. Depending on tick burdens morbidity rates can be high.

[8] Listed as notifiable by OIE but relevant Ethiopian legislation drafted but not yet promulgated

Disease	Notifiable? (OIE)[8]	Status in Ethiopia (OIE country report 2013)	Comments
Bluetongue	Yes	Never reported	Spread by Culicoides spp. Morbidity rates can be 50 – 70% in naïve populations (status in Ethiopia unknown).
Peste des petits ruminants	Yes	Clinical disease	Present in Ethiopia. Virus spreads rapidly in susceptible populations.
Sheep and goat pox	Yes	Clinical disease	Morbidity rates can be 70 – 90% in enzootic areas. Potential for rapid spread.
Camel pox	Yes	Clinical disease	Attack rates higher in young animals (25 - 100% compared with 5 – 30% in adults). Potential for widespread dissemination. Insects may play a role in disease transmission.
Newcastle disease	Yes	Clinical cases. Last reported 2011	Highly infectious. Given the flock dynamics of poultry populations a large proportion of (unvaccinated) at any time will be susceptible.
Highly pathogenic avian influenza	Yes	Never reported	Very infectious. Poultry populations uniformly susceptible. Potential for rapid spread.
Marek's disease	No	Several reports of Marek's disease in commercial flocks	Highly infectious. Recovered birds remain viraemic for life. In affected flocks the disease can continue for several weeks so potential for widespread dissemination over large areas.
Infectious bursal disease (Gumboro)	No	Clinical disease	Highly contagious. Morbidity rates up to 100%. Potential for widespread dissemination in susceptible populations
African swine fever	Yes	OIE shows suspected but not confirmed in 2011 and 2012??/	Spread by direct contact between susceptible animals and clinical cases. Soft ticks and wart hogs act as reservoirs for the virus.
African horse sickness.	Yes	Clinical cases	Spread by Culicoides spp. Morbidity >20% in susceptible populations. Particularly affects horse (in comparison with asses and mules)
Rabies	Yes	Sporadic	Important zoonosis
East Coast fever	Yes	Absent	Introduction of this disease (agent and vector) would be disastrous.
Bovine spongiform encephalopathy	Yes	Absent	Probability of occurrence v. low. Vigilance needed.

11. Definitions of Terms

In general the definitions given by the OIE are used. However, as appropriate these have been modified (these definitions refer to the ADNIS)

Definitions

Term	Definition
Case	Individual animal clinically affected by one of the ADNIS target diseases ADNIS users must only report the number of new cases in each notification
Confirmed case	A confirmed case is one for which a definitive laboratory-based confirmation identification of the causal agent has been made
New case	a. A case that has not been previously reported b. a case that has occurred in the population at risk since the last notification
Death	Individual animal that has died as a result of infection with an ADNIS target disease
Epidemiological unit	Means a group of animals with a defined epidemiological relationship that share approximately the same likelihood of exposure to a pathogen. This may be because they share a common environment (e.g. animals in a pen), or because of common management practices – for example animals belonging to residents of a village, or animals sharing a communal animal handling facility / grazing area / watering point. The epidemiological relationship may differ from disease-to-disease, or even strain to strain of the pathogen.
Population at risk	For practical purposes this is the total number of animals of a given species which are at risk from infection by the disease agent. In practical terms it is the same as the epidemiological unit. ADNIS reporters must use local knowledge (eg livestock movement patterns) and judgment when defining a population at risk.
Notify	To report the suspected occurrence of an ADNIS target disease to decision makers up the chain of command – for example to NAHDIC / RVL, RAB, and DVS.
Outbreak of disease	The occurrence of one or more (usually many) cases of a given disease in an epidemiological unit
Suspected	A disease outbreak or case for which a provisional diagnosis has been made based on the combination of (i) clinical signs presented (syndrome) manifested in the majority of affected individuals, (ii) epidemiology and, importantly (iii) the animal health worker's knowledge of historical disease patterns in the affected population.
Syndrome	Combination of clinical signs presented by a sick animal or animals

Table 4: **List of ADNIS target disease**

Disease	Notifiable? (OIE)[9]	Status in Ethiopia (OIE country report 2013)	Comments
Foot and Mouth Disease (FMD)	Yes	Clinical cases. Not reported since 2011	Highly infectious. Enzootically established, cycles through populations (see time-to-time variations in sero-prevalence rates).
Rinderpest (RP)	Yes	Last reported 1995	Highly infectious. Cattle populations uniformly susceptible.
Contagious bovine pleuropneumonia (CBPP)	Yes	Clinical disease	Present in Ethiopia. Long incubation period. Often chronic.
Haemorrhagic septicaemia (HS)	Yes	Clinical disease	Associated with rains. Attack rate generally low but, rarely and under suitable conditions, can be very high (up to 100%). Spread by direct contact.
Lumpy skin disease (LSD)	Yes	Clinical disease	Mechanical transmission of the causal virus by mosquitoes, flies etc. Attack rates generally low but can reach 45%
Rift Valley fever (RVF)	Yes	Last reported 2006	Arthropod-borne. High proportion of ruminant populations are susceptible. Potential for rapid spread in very wet conditions when vector proliferates.
Anthrax (ANT)	Yes	Clinical disease	Zoonosis. Infection by ingestion, inhalation, or entry through break in skin. Most by ingestion of spores. Incubator areas with nitrogen-rich alkali spoils. Very persistent in spore form.
Contagious Caprine pleuropneumonia (CCPP)	Yes	Clinical disease	Potential for significant spread in naïve populations. Very contagious. Chronic cases may exist and be a persistent source of new infections.
Bluetongue	Yes	Never reported	Spread by Culicoides spp. Morbidity rates can be 50 – 70% in naïve populations (status in Ethiopia unknown).
Peste des Petits Ruminants (PPR)	Yes	Clinical disease	Present in Ethiopia. Virus spreads rapidly in susceptible populations.
Nairobi sheep disease (NSD)	Yes	Never reported	Transmitted by several species of ticks, including Rhipicephalus spp and Amblyomma spp. Depending on tick burdens morbidity rates can be high.
Sheep and goat pox (SGP)	Yes	Clinical disease	Morbidity rates can be 70 – 90% in enzootic areas. Potential for rapid spread.
Camel pox (CPOX)	Yes	Clinical disease	Attack rates higher in young animals (25 - 100% compared with 5 – 30% in adults). Potential for widespread dissemination. Insects may play a role in disease transmission.
Newcastle disease (ND)	Yes	Clinical cases. Last reported 2011	Highly infectious. Given the flock dynamics of poultry populations a large proportion of (unvaccinated) at any time will be susceptible.
Highly pathogenic avian influenza (HPAI)	Yes	Never reported	Very infectious. Poultry populations uniformly susceptible. Potential for rapid spread.
Infectious bursal disease (IBD)/Gumboro	No	Clinical disease	Highly contagious. Morbidity rates up to 100%. Potential for widespread

[9] Listed as notifiable by OIE but relevant Ethiopian legislation drafted but not yet promulgated

Disease	Notifiable? (OIE)[9]	Status in Ethiopia (OIE country report 2013)	Comments
			dissemination in susceptible populations
Mareks disease (MD)	No	Enzootically established	Highly infectious. Revoered birds remain viraemic for life. I affected flocks the disease can continue for several weeks so potential for widespread dissemination over a wide are.
African swine fever (ASF)	Yes	OIE shows suspected but not confirmed in 2011 and 2012??/	Spread by direct contact between susceptible animals and clinical cases. Soft ticks and wart hogs act as reservoirs for the virus.
African horse sickness (AHS)	Yes	Clinical cases	Spread by Culicoides spp. Morbidity >20% in susceptible populations. Particularly affects horse (in comparison with asses and mules)
Bovine spongiform encephalopathy (BSE)	Yes	Absent	Spontaneous occurrence possible (< 1 per million). Spread thereafter not possible under Ethiopian conditions.
East Coast fever (ECF)	Yes	Absent	Tick-borne (R. appendiculatus). Agent and vector not present in Ethiopia but if are introduced then very rapid spread, which would be very difficult to control, would be expected
Rabies (RAB)	Yes	Enzootically established	A zoonosis and dogs are the major source of transmission to man (mainly bites)