Minimum Standards and Guideline for e-Reporting from Health Facilities

Government of Nepal
Ministry of Health

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1 Background

The Ministry of Health (MoH) is committed to improve the use of evidence in decision making at all levels leveraging the use of modern information technology. The use of ITC further helps to improve the access and utilization of quality of health services and achieve the universal health coverage as envisioned by the Health Policy, 2014; and the Nepal Health Sector Strategy, 2015-20. In order to clearly outline its vision and set standards for the usage of ICT in the health sector, the Ministry is currently in the process of formulating an e-health strategy. This strategy is expected to increase efficiency and effectiveness of information management and improve service delivery.

The Ministry of Health is now initiating electronic health reporting from the health facilities as a first step towards practicing electronic health record at each health facility. This minimum standards and guideline for e-reporting from health facilities is guided by and in line with the e-governance related national policies and strategies, which include e-Governance Master Plan; Information Technology Policy 2067; Electronic Transaction Act 2063; Telecommunication Policy 2060; Science and Technology Policy 2061; Right to Information Act 2064; National Health Policy 2071; Nepal Health Sector Strategy 2015-20. This guideline for e-reporting from health facilities aspires to facilitate to achieve the vision and mission set by National Health Policy (2014) and Nepal Health Sector Strategy (2015-2020) for leveraging the use of ICT to create an efficient health service delivery mechanism.

The Constitution of Nepal, 2072, *protects the right of an individual to access the personal information related to medical treatment thus gives a strategic direction to move towards improving the medical record system as a whole (Clause 40, Section 3).*

The Health Policy, 2071, *expresses its commitment in improving access to health services through use of e-health; ensuring individual's right to personal health information; strengthening of health administration through use of information communication technology (ICT); and upgrading health information systems into fully computerized systems. It explicitly mentions about the need-based revision and up-gradation of Health Management Information System (HMIS) into complete computerized system.*

The Nepal Health Sector Strategy, 2015-2020, *explicitly states to 'Initiate electronic recording and reporting system at health facilities' and stresses that access to available information will be increased through the use of ICT technologies; and all the routine information systems will be functional and interoperable with the data being housed at a central data warehouse (Outcome 9).*

The National e-Health Strategy, 2016, *aspires to facilitate to achieve the vision and mission set by National Health Policy (2014) and Nepal Health Sector Strategy (2015-2020) leveraging the use of ICT in health service delivery, business and information management.*

2 Introduction

In general, under the current Health Management Information System (HMIS), facilities record health service data using paper based tools, aggregate this recorded data on HMIS paper forms, and hand deliver it to the District Health Office (DHO)/District Public Health Office (DPHO), where it is digitized and put into the web-based HMIS. Of around four thousand public health facilities across the country, about 400 facilities, particularly Hospitals, Primary Health Care Centers (PHCCs) and some Health Posts (HPs) that have the basic requirements like computer, internet and skilled human resource have been practicing electronically reporting to HMIS. The paper-based reporting practice, while practical has major drawbacks in terms of data quality ultimately reducing the use of the collected data.

The Health Management Information System (HMIS) has been supporting the DHOs/DPHOs to allow the health facilities with the adequate infrastructure (computer and internet) and skilled human resource to initiate e-reporting from the facility using the standard software provided by HMIS. In the post-earthquake context, following the Build Back Better concept, the HMIS with support from the MoH, is moving towards initiating e-reporting from health facilities in the 14 districts hard hit by the earthquake. With the key objective of standardizing the electronic reporting process and the support mechanism, the Ministry has developed this 'Minimum Standards and Guideline for initiating e-reporting from health facilities'.

To improve the quality and use of data at all levels, efforts have to be focused on proper management of the recorded data, error checking at the level of data entry, having correct arithmetic calculations, and error-free transfer of collected data. All of these are possible through the use of ICT at various stages of data management and levels of health service delivery system. This guideline focuses on creating an environment for an efficient system for the transfer of collected data from the source to the central server/data bank, by using electronic means. This would mean while data is still recorded on paper, once aggregated, it would be reported to the concerned information system using a computer, via the internet, from health facilities. As data would be entered directly into a computer from the health facilities generating the data, errors would be significantly reduced. Additionally, having the data in electronic form at the health facilities would promote the practice of using data at the point of generation leading to increased use of data for decision making.

Reporting electronically (e-reporting) would require a computer and internet connection is installed at each facility, which would open the doors for other computer and internet based initiatives (eg. tele-medicine, e-trainings) to be used at the facility level. The same computer and internet connection can be used for multiple information systems that wish to electronically report from the facilities. This guideline is to standardize the technical aspects of e-reporting and set minimum standards for the physical infrastructure, IT equipment, software and human resource required at various levels of the health system. These guidelines are currently to be used for e-reporting of HMIS data but are also relevant and applicable for other information systems in health sector (e.g., LMIS, HIIS and TABUCS) who wish to electronically report from health facilities in the near future.

3 Objectives

The key objective of this initiative is to ensure timely availability and use of quality data in planning, monitoring and decision making at different levels; particularly at the point of data generation.

The specific objectives of this guideline include:

- Improve the quality of the data being collected
- Define minimum standards for initiating e-reporting from health facilities, and by doing so maintaining uniformity among the various facilities.
- Provide guideline to the stakeholders at different levels in initiating e-reporting from health facilities
- Support health facilities in reporting electronically
- Promote use of data for monitoring, planning and decision making at different levels; particularly at the point of data generation
- Reduce data entry work load at District Level, allowing for more time on analysis

It is envisioned that these objectives can be met by following the standards prescribed in this document, followed by a strong monitoring mechanism.

4 Electronic Reporting

Under the current HMIS, flow of information from health service delivery level to the Ministry and the National Planning Commission is based on a mixed system of paper and electronic means. In general, under paper-based reporting part of the system, every day health facilities record health service delivery data on various paper forms, and every month aggregate the collected data on additional paper forms which are then sent to the DHO/DPHO for entry into the computerized information system. Additionally, health facilities also receive additional data, in paper form, for aggregation from Female Community Health Volunteers (FCHVs). The flow of information from health facilities to the various health information systems is shown in Figure 1. The system of using paper based data recording and reporting, while seem practical, is prone to errors, ultimately affecting the quality of data being entered into the computerized system for further analysis. Additionally, this paper based recording and aggregation system makes is difficult for using the generated data at the health facility level. Given the geographical terrain of Nepal, the transportation of paper forms from facilities to the DHO/DPHO every month is very time consuming and risky – paper forms can be easily damaged and/or lost while being transported.

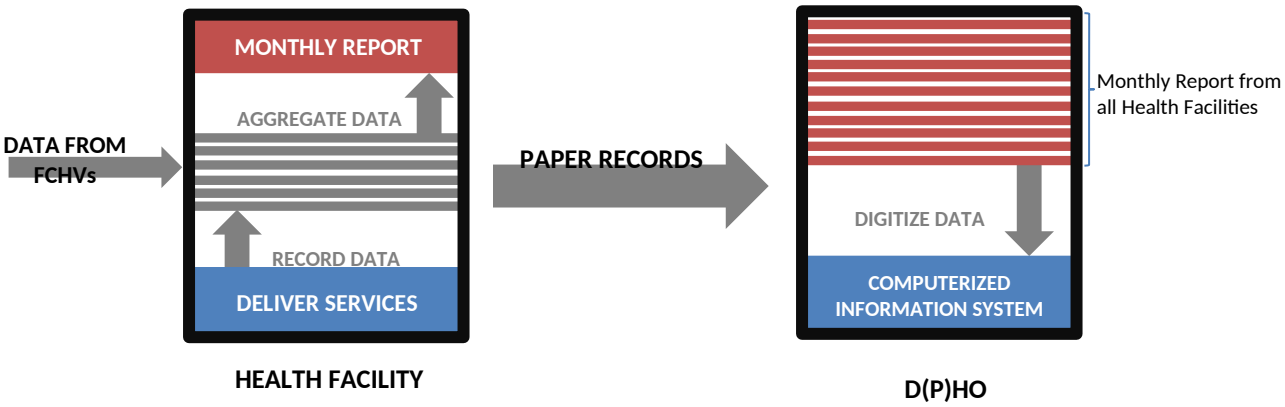

Figure 1 Current information flow from facilities

Additionally, the burden for the statistical officer/assistant at the district health offices is immense as they have to digitize monthly reports from each facility in the district; all their time has to be spent digitizing the data rather than on analyzing it and providing feedback to the programme focal persons and the health facilities on quality and use of the data.

The concept of E-reporting is to electronically send data from the health facilities directly to the

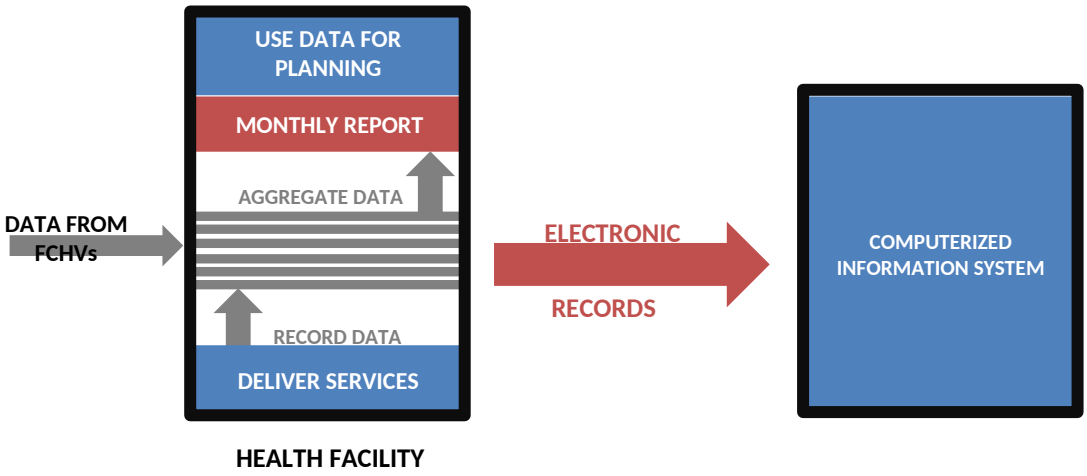

Figure 2 Information flow with e-Reporting

computerized information system (e.g., HMIS). This would mean that there are no paper forms being transported long distances, and that the burden of data entry at the district offices is completely removed if all health facilities practice e-reporting. The immediate advantages of this initiative can be felt at the district level where the staff can focus their time on ensuring quality of and performing analysis on the data sent. At the facility level, the system of e-reporting presents a new opportunity in terms of using the monthly reports for monitoring, planning, and decision making at the facility level.

As seen from Figure 2, there is still a large amount of paper use at the health facility level which needs to be minimized in order to have a ' reduced paper use', efficient data management system. This would involve the introduction of e-recording systems (eg. Electronic Medical Record systems), which would be the logical next step after the initiation of e-reporting at health facilities. While improving data quality, e-recording would add additional benefits such as eliminating the high costs for printing, transporting, and storing the paper forms currently being incurred by the Ministry of Health; and present the health facilities with an efficient way of generating periodic reports automatically.

4.1 Standard Registry

Electronic reporting can be initiated for various systems, eg. HMIS, LMIS, Immunization Records etc, and can be achieved through different software and hardware combinations. In order to streamline the various e-Reporting initiatives, by avoiding duplication and maintaining adherence to the standards proposed in this document, the e-health unit of the Ministry of Health will maintain a standard registry of all initiatives and their features. All e-reporting initiatives in the health sector from both government and non-government sectors will have to be registered at the e-health unit, and be part of the registry.

4.2 Monitoring and Evaluation

A technical team comprising representatives from MoH, DoHS and stakeholders will be formed at the central level, which will regularly monitor the implementation of various e-reporting initiatives.

In case of pilot initiatives, MoH will assess the pilot phase of e-reporting after one year of the implementation; and based on the results, a decision will be made on its feasibility for expansion throughout the country.

5 Minimum Standards for e- Reporting from Health Facilities

For a functional, efficient e-reporting system to be in place at health facilities, a minimum set of physical infrastructure, IT equipment, software, and human resource is required at both the central and facility levels.

For existing information systems that are pursuing e-reporting, the infrastructure specifications described below as minimum requirements are to be upgraded to (if required) by the end of 2016.

5.1 Central Level

5.1.1 Physical Infrastructure

Proper infrastructure, at all levels, is a must for the smooth functioning of any e-reporting system. It is envisioned that the IT equipment dealing with collecting/storing data used for various e-health initiatives will be housed in one, central data center meeting all the requirements described below and shall be owned by the Ministry of Health.

5.1.1.1 Server Room

Every e-reporting server needs to be housed in a standard server room and/or data center as per the specifications described below. The server rooms/data centers can be shared with other servers (eg. in a data center) or be stand-alone server rooms for particular information systems, as long as the specification criteria are met. The physical location of the server room can be anywhere, as long as the specifications provided in this section are met.

5.1.1.1.1 Space Requirements

The room should be isolated from other occupied areas of the building, preferably without any windows. Doors should be at least 4 feet wide to accommodate for the movement of equipment in and out of the room. The room should have adequate space to house the planned equipment in proper racks, while maintaining the manufacturer recommended clearance specifications. The racks should have seismic bracings to account for any seismic activity that might damage the equipment.

5.1.1.1.2 Electrical Requirements

The room should have a proper electrical wiring system, concealed in ducts secured to walls or other structural elements within the room. The electrical system should provide an isolated ground for the server room, preferably with a dedicated neutral and a grounding grid. Dedicated distribution/control panels, preferably digital, should be provided for the electrical system of the room.

The server(s) and associated equipment housed in a server room should be online at all times. Therefore, a dedicated set of equipment for uninterrupted power and power conditioning is MANDATORY in the server room. The equipment would include UPS, Inverter/Battery system(s), Isolation transformers, etc. The equipment should provide a minimum of 1 hour of power backup to

all the equipment. For longer power outages, power should be restored to the server room using other backup means such as diesel generators.

The server room should have a dedicated electric distribution board to control the electricity flow within the room.

5.1.1.1.3 Communication

Multiple, dedicated communication channels need to be present in the server room to maintain uninterrupted connectivity to the server from e-reporting workstations throughout the country.

5.1.1.1.4 Internet

Multiple high-speed, dedicated internet connections (>10 mbps), from different Internet Service Providers (ISPs) – to act as backup in case of outage of one ISP , should be present in the server room for e-reporting purposes ensuring 365 days, 24 hours a day connection.

5.1.1.1.5 Intranet and other networks

A well-managed, Gigabit ethernet network or better should be installed in the server room with proper cable management, and using rack-mountable equipment.

A high-speed (Gigabit network or faster) dedicated, secure, computer network, with redundancy measures, between the primary server and the off-site backup server is required.

A minimum of one land line telephone should be installed in the server room (either intercom, or direct line).

5.1.1.1.6 Temperature Control

The server room should have an adequate HVAC (Heating, Ventilating, and Air Conditioning) system to maintain the temperatures and air quality according to the specifications prescribed by the manufacturers of the housed equipment. Care should be taken to prevent water leaks from the air conditioning system, and proper clearance between the A/C and other equipment should be maintained to prevent damage in case of water leaks.

5.1.1.1.7 Fire Safety

The room should have an adequate fire suppression system, preferably a ‘pre-action’ sprinkler system. If a sprinkler system is not possible, adequate number of fire extinguishers should be installed in the room. Regular maintenance of the fire extinguishers is MANDATORY.

5.1.1.1.8 Security

The server room should be secure both physically and from cyber intrusions.

All entrances, exits to the room have to remain locked at all times, and only authorized personnel should be allowed entry into the room, preferably using digital key cards. Windows are not preferred in server rooms, but if not possible to completely remove, should be kept at a minimum and be properly secured.

For cyber security, all the servers and other network accessible devices should be secured behind a firewall.

5.1.2 IT Equipment

The server room should be secure, both physically and from cyber intrusion. The equipment selected for the server room should accommodate the safe storage of the data being sent from the facilities with appropriate mechanisms for security and backup.

5.1.2.1 Primary Server

The primary server for an e-reporting initiative should be capable of accepting, storing, and managing all the data being sent from the different reporting points (primary care facilities, hospitals, DHO, Regional Health Directorates, different departments, etc), in a safe and secured way. The server, along with its associated software, should be capable of accepting multiple incoming connections at any time (365 days, 24 hours a day), ie. multiple reporting centers should be able to report at the same time. It is envisioned that the server specifications and other requirements will be revisited/revised every 3 years. Detailed specifications outlining the minimum server selection criteria are presented in Section 8: Annexures.

5.1.2.1.1 Processing Capabilities

The processing capabilities of the server should be based on the technical requirements of the software to be used for e-reporting. The selection of the processor and system memory should assume a minimum operation of 3 years for the server.

5.1.2.1.2 Storage

The storage capacity of the server will have to be based on a detailed analysis, which calculates the amount of data produced by the e-reporting system in 3 years of the operation, and also includes fault tolerance measures. Additionally server should allow for the expansion of the storage capabilities, if required.

5.1.2.1.3 Power System

The server should have a redundant, hot swappable dual power supply.

5.1.2.1.4 Security

Physical access to the server should be kept to a minimum, and should be password protected. The password should only be known to the authorized personnel.

5.1.2.2 Backup System

5.1.2.2.1 Server Backup

A backup server that duplicates all the processes and transactions of the primary server at a frequent interval (< 1s), such that if, for any reason, the primary server fails, the backup server can immediately take its place without any down-time, is required. The location of the back-up server should be at a different physical location (off-site) than the primary server, with a high-speed computer network connecting the two servers together.

5.1.2.2.2 Data Backup

With the aforementioned server backup, data of the primary server will be mirrored on the backup server at a different location, however if such a case arises that a backup server cannot be installed off-site, it is mandatory to have a off-site data backup system with the use of external media such as Hard Disk Drives or Magnetic Tape. This backup should be done as frequently as possible, but at a minimum weekly.

5.1.2.3 Communication

5.1.2.3.1 Internet

Multiple high-speed, dedicated internet connections (>10 mbps), preferably from different Internet Service Providers (ISPs) should be accessible to the server room for e-reporting purposes ensuring 365 days, 24 hours a day connection.

5.1.2.3.2 Intranet and other networks

A high-speed (Gigabit network or faster) dedicated, secure, computer network, with redundancy measures, between the primary server and the off-site backup server is required.

5.1.2.4 Restriction for testing

The primary or backup server is not to be used for any testing purposes including for newer versions of software being used currently. A separate testing server, of appropriate configuration, should be set up for any testing purposes, and only final, production versions of the software are to be used on the primary and backup servers.

5.1.2.5 Security Device(s)

To ensure the server is secure from external, unauthorized access, an active security device, such as a firewall, should be installed together with the server. This device/appliance should be configured to only give access to the server and related devices, equipment to authorized personnel only, and block any other attempts at accessing the data. The authority of modifying security settings should be given to authorized personnel only.

5.1.2.6 Maintenance

A planned, preventive maintenance plan should be developed for both the hardware and software components of the system. If the maintenance plan requires down-time of the server, this should be communicated to all the users of the system notifying them of the outage, and assumed service resumption time.

A dedicated person, or team should be appointed to be the focal point of all maintenance related work.

Detailed specifications for the server, associated accessories, and communication requirements are included in Section 8: Annexures

5.1.3 Software

5.1.3.1 Licensing

The software to be used for e-reporting should be licensed for use of Ministry of Health. A license for use is required for all types of software, ranging from software built from scratch for the MoH to proprietary software, as well as open-source software.

5.1.3.2 Standards

The e-reporting software should preferably be based on free and open-source standards, as suggested by the Information Technology Policy of 2067. If such software is not available and/or suitable for the e-reporting initiative, proprietary software with appropriate licenses can also be

used. Licensing regulations, along with long term support and maintenance provisions should be reviewed before selecting proprietary software.

The e-reporting software should be capable of functioning in both on-line and off-line modes.

5.1.3.3 Interface

The interface to the software should be user-friendly, and self-explanatory to the largest extent possible. The interface to the e-reporting system, at the facility computer level, should be web based. E-reporting systems should ideally contain user interfaces for the 'use of data' at various levels of reporting (e.g., a health facility should be provided with an interface to view and analyze the data that it has reported).

5.1.3.4 Modification

If modifications are required for any standard software packages used for e-reporting, they should be done by obtaining proper software license(s) and written permission from the e-health unit of MoH.

5.1.3.5 Customization of proprietary software

In case of proprietary software, it is highly recommended that any modification to proprietary software is done by the firm/individual having the proprietary rights to the software. If such an arrangement is not possible, proprietary software should only be modified/customized by firms/individuals licensed/certified by the proprietor of the software.

5.1.3.6 Maintenance & Support

The software being used for e-reporting should be regularly maintained. Such maintenance and other technical support and/or backstopping should be done via long term maintenance and support contracts.

5.1.3.7 Interoperability

The software being used for the e-reporting initiative should be interoperable with other related software being used in the health sector, to the largest extent possible.

5.1.3.8 Data Security

Any data stored by the e-reporting initiative should be secured against any physical or cyber threats. In no case, should data that identifies individuals be stored on external servers.

5.1.4 Human Resource

At the central level, there should be dedicated technical team to troubleshoot issues at center, district, and health facility level.

5.2 Health Facility Level

For e-reporting, the facility should have adequate infrastructure, and other logistics to accommodate the equipment required for reporting electronically. This section describes the minimum set that is deemed necessary at the facility level for e-reporting by the Ministry of Health.

5.2.1 Physical Infrastructure

There needs to be adequate physical infrastructure to house the IT equipment and related accessories required for the e-reporting initiative at the health facilities. In addition to a building

with adequate space and furniture for the equipment, the following sections outline other infrastructural requirements.

5.2.1.1 Electrical System

The facility should be connected to a stable electrical connection (local or national grid, or a sufficiently sized alternative energy source). The electrical system in the facility should be professionally done, in accordance to the prevalent codes and best practices.

5.2.1.2 Communication

A stable internet connection, using the best available technology, should be installed at the facility. The network equipment required for the internet connection should be installed and stored in a safe and managed manner. Any additional wiring that is required should be concealed in ducts and properly secured. If a power backup system exists in the facility, it is advisable to connect the network equipment to this backup system to ensure continuous connectivity.

5.2.1.3 Security

The facility should be equipped to store the equipment for e-reporting in a safe manner, in a preferably non movable environment – securing portable computers to office furniture. In case of permission from facility in charge for government work, the mechanism should be in place to take it to a different location.

5.2.2 Health Facility Client Computers

The workstation computers to be used at different levels of health facilities and administration office for e-reporting should be capable of connecting to the internet, particularly to the server(s) housing the e-reporting software using free and open source software.

5.2.2.1 Hardware

The workstation computer should preferably be a portable device with a physical keyboard. The device should be capable of connecting to wired and wireless networks at a reasonable speed. The processing power and system memory selected for the device should be such that the computer can perform normal tasks such as running an internet browser, word processor and spreadsheet without any major issues.

5.2.2.2 Operating system

The preferred operating system for use on the workstations for e-reporting is one which is free and open source, as outlined by the Information Technology Policy of Nepal, 2067. The operating system should be capable of running a modern web browser.

5.2.2.3 Power Backup

The workstation computer should be capable of providing a minimum of 2 hours of power backup in case of a power outage at the facility.

5.2.2.4 Maintenance

The workstation computer at each facility should be maintained through a maintenance program that preferably covers multiple facilities.

It is preferred that this maintenance program for facilities in a particular district is done through the District Health Office of the concerned district.

5.2.2.5 Human resource

At the health facility, there should be at-least one dedicated staff available for e-reporting.

Detailed specifications for the facility level computer, associated accessories, and communication requirements are included in Section 8: Annexures

6 Roles and Responsibilities of Stakeholders

To initiate e-reporting from a particular facility, a combined effort is required from various stakeholders. This section illustrates the roles and responsibilities of the various stakeholders including the reporting facilities and the agencies that are committed to support the facility and the D(P)HO to initiate e-reporting.

6.1 Health Facility

- Fulfill the basic requirements to initiate e-reporting;
- Send Letter of Interest (LoI) to DHO/DPHO
- Designate minimum one dedicated and interested staff responsible for e-reporting;
- Ensure safety of computer and other related equipment;
- Ensure maintenance of computer and other related equipment;
- Participate in training on e-reporting;
- Ensure timely data entry and e-reporting;
- Ensure quality of data;
- Monitor and review progress;
- Analyze and use data for monitoring and planning at the local level;
- Display key indicators on the Dashboard as appropriate;
- Coordinate and collaborate with DHO/DPHO and partners at the local level.

6.2 District Health Office/District Public Health Office

- Assess the readiness of health facilities for e-reporting;
- Support health facilities in fulfilling the basic requirements to initiate e-reporting;
- Support health facilities in planning, installation of equipment, and implementation of e-reporting activities;
- Organize trainings related to e-reporting for health facility staff;
- Monitor and review the e-reporting activities of the participating health facilities regularly;
- Coordinate and collaborate with higher level Divisions and Centers.
- Analyze, interpret the data being reported from the facilities and facilitate evidence based decision making at the facility level.
- Ensure high levels of data quality by conducting regular assessments.

6.3 Central Level

6.3.1 PHAMED, MoH

- Develop policy framework and operation guideline for e-reporting related activities
- Allocate necessary resources (financial, technical, physical) to the various system levels for implementing e-reporting.
- Develop capacity at different levels

- Manage regular monitoring, supervision, mentoring and feedback
- Advise different departments, divisions, sections
- Coordinate with partners to ensure the availability of resources required for e-reporting implementation.
- Gradually expand the number of e-reporting health facilities; and
- Gradually move towards e- recording.

6.3.2 Individual Systems

- Ensure that the information systems and their related hardware/software meet the minimum standards set forth by this document.
- Support health facilities to initiate e-reporting, including the initial setup of hardware and software.
- Capacity building of the users of the information systems at various levels
- Manage regular monitoring, supervision, mentoring and feedback
- Ensure that the information systems and the data they contain are fully secure.
- Demonstrate and advocate evidence based decision making by using the information collected/analyzed by the information system.
- Maintain the software and hardware components vital to the operation of the information system periodically.
- Upgrade software and hardware components vital to the operation of the information system as required.
- Allocate necessary resources (financial, technical, physical)

6.4 Supporting Partners

- Provide necessary technical and financial support to health facility and DHO/DPHO
- Coordinate with DHO/DPHO and central level
- Implement joint monitoring with DHO/DPHO, Central level

7 Implementation plan for 14 Earthquake Affected Districts

Build Back Better in earthquake affected districts

Health and population sector has been severely affected as evident from damages and losses to health infrastructure and disruption of health care service delivery system by the 2015 earthquake. A total of 446 public health facilities (consisting 5 hospitals, 12 Primary Health Care Centers and 417 Health Posts, 12 others) and 16 private facilities are completely destroyed while a total of 765 health facility or administrative (701 public and 64 private) structures are partially damaged. Nearly 84% (375 out of 446) of the completely damaged health facilities are from the 14 most affected districts. As a result, the ability of the health facilities to respond to the healthcare needs has been affected and service delivery is disorganized. Consequently, vulnerable populations, including disaster victims, have been further disadvantaged in accessing health services in remote areas. A total of 18 health workers and volunteers have lost their lives and 75 got injured adding further challenges in the delivery of health services.

Similarly, existing capacity of the Ministry of Health in general and that of concerned District Health Offices and health facilities have been stretched to ensure the resumption of disrupted health

services and to coordinate with concerned agencies and stakeholders and for management of increased case load for treatment including trauma cases.

Electronic reporting from health facilities in the earthquake highly affected 14 districts will be initiated in phases. In first phase, in 2015/16 (2072/73) this initiative will be initiated in health facilities meeting the minimum standards described above with support from development partners. These facilities will also be selected based on the health facilities' readiness for this initiative. The readiness criteria have been explained in Section 7.1 below. This initiative will gradually be scaled up in rest of the facilities in these districts and to other districts in next fiscal year. And gradually electronic recording will be initiated first in these facilities covered in the first phase and gradually scaled up at all health facilities across the country.

The table below shows a detail implementation plan for initiating e-reporting from health facilities to be covered in first phase.

In each of the 14 districts implementing e-reporting from facility, a mechanism will be developed to provide all necessary technical assistance to the districts and health facilities for smooth operationalization of this initiative. This will include a technical human resource dedicated to resolving any technical issues faced by the district and health facilities for the running fiscal year in consultation with the MoH, HMIS and district health office.

7.1 Ranking criteria: Infrastructure Assessment

Health facilities have faced extensive damage in infrastructure and equipment due to the earthquake in April and its subsequent aftershocks. Many facilities are not in a situation to immediately meet the minimum standards of infrastructure, equipment, and human resource stated in this document. With the ongoing reconstruction efforts of the Ministry of Health, it is expected that most of the damaged facilities to be in a situation to meet the minimum standards in the near future. However, to start the e-reporting initiative immediately, a selection of facilities that meet the minimum standards have been made. Table 1 presents the different criteria and their associated score that will be used to select the facilities for the first phase of rolling out the e-reporting initiative.

Table 1 Ranking criteria for e-reporting initiative

SN	Criteria	Score
1	**Availability of electricity: Connected to national/local grid**	**30**
2	**Availability of power backup**	**15**
2.1	Solar with inverter	15
2.2	Inverter only	10
2.3	Generator	5
3	**Internet connectivity**	**15**
4	**Service delivery building damage status**	**40**
4.1	No damage/Superficial damage	40
4.2	Partial damage, repair committed	20
4.3	Completely damage, prefab committed	10
	Total	**100**

Data for the assessing criteria presented in Table 1 came from the Detailed Engineering Assessment of Health Facilities, conducted by the MoH after the earthquake.

In the first phase, the facilities scoring 50 or more based on the above mentioned criteria will be supported for initiating e-reporting. The rest of the facilities will be supported once they meet the minimum score (50).

7.2 Implementation Modality

7.2.1 Infrastructure

The physical infrastructure for the initiative need to be as prescribed in the minimum standards section above. The pre-fabricated health posts that are currently being constructed in the 14 earthquake affected districts serve as adequate infrastructure for health facility level. The central level infrastructure should also be assessed, and if not currently compliant with the minimum standards, a plan should be developed for the upgrading of the infrastructure to meet such standards.

7.2.2 IT Equipment

New IT equipment should be procured for health facilities that do not have IT equipment according to the minimum standards.

7.2.2.1 Internet

An internet service that is the most reliable in the area, convenient to install, and maintain should be selected for the facilities.

7.2.3 Software

As prescribed in the minimum standards, the software used for the initiative will have full usage licenses and compatible with other systems in the health sector while having an easy to use user-interface.

7.2.4 Human Resource

One staff member of the health facility will be assigned as the focal person of e-reporting. A team for technical backstopping of issues at facilities, districts will be in place at the central level.

7.2.4.1 Training

Proper training on data entry, and data use using the e-reporting system will be given to the focal persons at the health facilities.

7.2.5 Maintenance and Support

A long term maintenance program for the IT equipment at the health facilities as well as central level will be ensured.

7.3 Support from partners

Partners supporting the Ministry of Health in the e-reporting initiative should focus on supporting the ministry, districts, and health facilities in meeting the minimum standards described in Section 5. Additionally, to maintain uniformity among districts and health facilities, as well as to avoid duplication of efforts and resources, the various interested partners should maintain close coordination among each other.

8 Annexures

8.1 Annex 1: Server Specifications

Server Specifications	
Features	Description
Brand	-
Model	-
Country of Origin	-
Certification	ISO 9001
Form Factor	Rack Mountable (1U/2U)
Processor	Intel Xeon E5 V3 Series (or equivalent) or better
Multi-Core Technology	8 Core or better
No. of Processor	1 (One) or more
Max CPU supported	2 (two) or more
Speed	2.0 GHz Processor or higher
Cache Memory	20MB L3 Cache or better
Memory	4 x 8GB RDIMM, Dual Rank, x8 Data Width or above
Hard Disk	Size of the HDD to be determined by the volume of data to be stored. Multiple HDDs, to be configured in a suitable RAID configuration, are to be selected for fault tolerance.
Storage bays	In accordance to the HDD needs, with room for future expansion
RAID Controller	Must support RAID 0,1, 5, 10 and shall have 1GB Cache
Network Interface	Integrated 2 x Quad Port Gigabit Ethernet
Optical Drive	DVD RW Drive
Power Supply	Redundant Hot Plug Power Supply
Mouse & Cables	USB Optical Scroll Mouse
Operating System	Depending on e-reporting software requirements
Documents	All documents like Brochures, Booklets, Product profile
Accessories	Power, VGA and other Necessary cables as per requirement
Warranty & Support	3 (Three) years full warranty including Parts, Software & labor (without cost) and should install and configure the software according to client's requirement

8.2 Firewall Specifications

Firewall Specifications	
Features	Description
Brand	-
Model	-
Country of Origin	-
Certification	FIPS-140 Level 2
Interface	Minimum 8 x 10/100/1000 Base-T
Module options	Minimum 2 modular slots : should SFP GE, Serial
Memory	DRAM : Minimum 2GB Flash : Minimum 2GB
Firewall throughput	1.8 Gbps or higher
VPN performance	300 Mbps or higher
IPSec VPN tunnels	900 or higher

Firewall Specifications	
Features	Description
Connections per second	8500 or higher
Layer 2 switching	Should support • VLAN 802.1Q • Link Aggregation 802.3ad/LACP • Jumbo Frame • STP, RSTP, MSTP • Authentication 802.1x Port based and • Multiple supplicant
Routing	Should support • Static routes • RIPv2 • OSPF • BGP • MPLS, VPLS, L3VPN
Multicast	Should Support Multicast Internet Group Management Protocol (IGMP v1/v2/v3), Session Description Protocol (SDP), source-specific
Traffic management	Should support • Marking, policing, and shaping • Class-based queuing with prioritization • Weighted random early detection • Queuing based on VLAN, data-link connection identifier, interface, bundles, or filters
Virtualization	Should support Security zone : 60 or higher Virtual router : 60 or higher VLAN : 1800 or higher
Security	Should support • Firewall, zones, screens, policies • Stateful firewall, ACL filters • DoS and DDoS protection (anomaly-based) • Prevent replay attack; Anti-Replay • Unified Access Control • Intrusion detection • Antivirus, antispam and web filtering • Content filtering • Integration with NAC for dynamic policies
User Authentication	Should support • Third-party user authentication RADIUS, RSA SecureID, LDAP • XAUTH VPN, Web-based, 802.X authentication • PKI certificate requests • User Role Based Firewall Controls
VPN	Should support • Tunnels (generic routing encapsulation, IP-in-IP, Ipsec) • Ipsec, DES, 3DES, AES encryption • MD5 and SHA-1 authentication • Dynamic VPN
High availability	Should support • Active/active—L3 mode

Firewall Specifications	
Features	Description
	• Active/passive—L3 mode • Stateful failover • Modular Operating System
System management	Should support • Web UI • CLI • Configuration Rollback • Auto Configuration • Should store minimum 25 configurations in the box
Warranty Period & Support	At least 1 years replacement and service warranty

8.3 Specifications for Client Computers (At HF Level)

Specifications for client computers (at HF level)	
Features	Description
Brand	To be mentioned by the bidder
Model	To be mentioned by the bidder
Country of Origin	To be mentioned by the bidder
Chassis	Portable - Laptop
Processor	4th Generation Core i5 Processor 3.2GHzor better
Chipset	Intel Chipset
Memory	4GB, DIMM dual-channel 1600MHz DDR3 SDRAM
NIC	Gigabit NIC
Hard Drive	500GB SATA
Graphics	Intel® HD Graphics
Optical Drive	DVD+/-RW Drive
Keyboard	Standard Keyboard
Mouse	Trackpad or equivalent
Screen	14" LED
IO Ports	At least 2 USB 3.0; at least 2 USB 2.0 ; 1 VGA (either directly or using converter); 1 Mic-in & 1 Headphone out
Operating System	Ubuntu Linux or compatible
Security	Chassis lock slot support, Chassis Intrusion Switch, Setup/BIOS Password, I/O Interface Security, Data Protection|SecurityTools, Data Protection| Encryption
Warranty	3 Years Manufacturer Warranty (Shall be mentioned in catalogue)