Original Article

Towards a Digitized and Integrated Health Information System in Sudan: Assessment of Readiness at State Level

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ABSTRACT

Background: A strong health information system able to generate timely and accurate information is essential to ensure effective and efficient performance. Sudan's health information system is still paper-based and characterized by fragmentation and verticality. Efforts to overcome this have led to development of an integrated system to digitize the health information. For this to succeed the 18 states in Sudan need to be evaluated and assessed to identify the gaps in capacity and readiness for such important change. The aim of this paper is to assess the capacity and readiness of the health information system in Sudan at state level for the digitization of the health information system.

Materials and Methods: This is a cross sectional institutional based study conducted in 2014 targeting the health information units in the 18 states ministries of health in Sudan. Quantitative data was collected using a pre-tested checklist and analyzed using SPSS version 20. Qualitative data was collected through semi-structured interviews with state managers and analyzed using the evaluation matrix.

Results: All states ministries of health had health information units but this was believed inadequate in 27.8% and 72.2% had units at locality level. Data analysis units were not present in one third of the states. Basic statistical training was done in 15 states. Internet services was available in 14 states but was scarce at locality level (16.7%). Annual reports though produced by 17 states, one third admit not reporting to higher levels in a regular manner.

Conclusion: There is a need to strengthen the health information system at state level. Challenges of ICT infrastructure, capacity building and coordination need to be addressed. This needs collaborative work and political commitment.

Keywords: Health Information System, states, digitization.

A health information system (HIS), which is defined as : " a mechanism for collection, processing, analysis and transmission of information required for organizing and operating health services, research and training" [1], It is through information and evidence that important decision making that is essential to improve health system performance, accountability and health outcomes can be made[2].

The Sudan HIS is one of the first information systems established in the region. It has a bottom-up approach where data thatis collected from the facilities, is compiled at the locality/district level. This is sent to State Ministry of Health (SMOH) and further consolidated to be sent to Federal Ministry of Health (FMOH) where all filled forms from all the states are put together each year to give rise to the Annual Statistical Report. This important process is almost entirely done manually. Efforts are now being made to

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digitize the health information system to increase efficiency and timely reporting. For this to be successful, the health information system needs to be assessed for its readiness for such important change. The last national HIS Assessment was carried out in 2007 under the Health Metric Network (HMN) project and this found the existing system to be deficient to support management functions and informing the planning and policy making in a meaningful way [2].

Sudan like many developing countries is facing the double burden of both communicable and non-communicable diseases and with the high turnover of qualified staff; the country needs a stronger and more efficient health system. This cannot be done without a strong and well-functioning health information system (HIS) that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status. All of these components contribute to better health policy and planning, efficient health resources allocation, and improved health service delivery. This paper is concerned with assessment of the health information system readiness for digitization at the state level.

MATERIALS AND METHODS:

Study design: This is a cross – sectional institutional based study.

Study settings: 18 Information units in the 18 states ministries of health in the Republic of Sudan

Study population: The study population are Mangers of units in the 18 states, Directorate of planning in the 18 states, Statisticians and other qualifications and training received, the infrastructures at units

Sampling size and Sampling Technique: Total coverage (18 information units from 18 states)

Data collection method: List of variables: Availability of planning, human resource, level of qualification and training, status of infrastructure: Availability of basic ICT equipment, and availability of financial resource

Data collections tools: Close and open structure questionnaires for statisticians, Standard checklist modified to include the equipment and infrastructure, In depth interview with Health Information managers and Directorate of Planning in the 18 states. The tools of the study (questionnaires and checklists) were pretested and the questionnaire and checklist were reviewed and revised, necessary correction and omissions were performed.

Training of data collectors: Data through interviews were collected by the researcher. Data through questionnaire and check list were collected by 6-7 statisticians. Data collectors were trained for two days on how to fill the tools properly and how to make sure that every question and its option is clear and understood. They were also trained to introduce themselves friendly and to explain the study objective.

Ethical considerations: Ethical clearance was obtained from the Institutional Review Board at Elneelain University and the National Research Ethics Committee (RECS) at the Federal Ministry of Health. Permissions were obtained from the concerned departments and an informed consent was obtained from each study participant prior to the interview.

Data analysis: Quantitative data was analyzed by computer using SPSS version 20. Qualitative data was analyzed using the evaluation toolbox. (Semi- structure – interview- data collection and analysis template).

RESULTS:

All 18 states ministries of health had health information units/departments

(100%). Furnished offices available for health information units in the states ministries of health were found to be adequate in 72.2% of the states. Information units at level of the locality were present in 72.2 % of the states. All states had an information unit with workforce about five or more cadre working. 66.7 % had workers between 5 and10 and 33.3 % had cadre more than 10. All information units had statisticians (100%), followed by information technicians 66.7%, demographers 33.3% while the least was the presence of public health personnel 11.1 %.

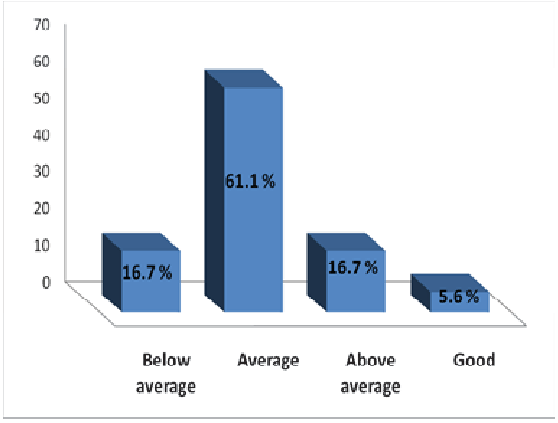

Fig. (1): Status of health information system working environment in the 18 states in 2014

Table (1): Health information system work force training courses in the 18 states in 2014

Training	Freq.	%
Basic training	15	83.3
Basic computer	13	72.2
Excel program	13	72.2
SPSS	11	61.1
Training ICD-10	3	16.7

Regarding communication infrastructure and internet availability, 15(83.3 %) states had printers in their units while telephones were only present in 5 states' information units and only, 3(16.7%) states possessed fax facilities. Internet service was available in 14(77.8 %) states. Only three states localities and 4 (22.2) state hospitals had internet facilities. Electric supply stability was found adequate in just above half (55.6 %) of the states.

Table (2): Availability of information communication infrastructure in the 18 states in 2014

Availability of information	Printer N (%)	Telephone N (%)	Fax N (%)
Yes	15 (83.3)	5 (27.8)	3 (16.7)
No	3 (16.7)	13 (72.2)	15 (83.3)
Total	18 (100)	18 (100)	18 (100)

Availability of registers was adequate in 61.1 % as well as availability of reports. Adequate availability of birth notification was found in 12 states whereas death notifications availability was good in one state and adequate in only eight states. Mortality statistics report was available at 83.3%. Sources mainly were from public health facilities followed by private health facilities, community level and civil registry. Reported statistics from Central Bureau of Statistics (CBS) and private sector was available from 14(77.8%) and 3(16.7%) respectively. Cooperation with other departments within the state ministry of health was found good in 94.4% and in 66.7% there was coordination with state civil registration.

Periodical supervision in the 18 states was only present in 7(38.9%) states. All locality information units received supervisory visits followed by hospitals in six of the states, five Healthcare centers in five of the states, only PHC units in three states and one dispensary and one dressing station.

Computers were used for data analysis in 88.9%. A Statistical program installed was available in 18 (94.4%) computers, but 5.6% don't have it. Data analysis units

were not present in 33.3%. Guidelines for data quality assurance were present in 61.1% and feedback mechanisms were available in 50%.

Regarding generation of reports, annual and quarterly reports were produced by 17 states while monthly reports were available in 13 states. Data is storage is paper based in 16(88.9%) states while electronic data storage were found in 14(77.8%) states. One third admitted they do not report regularly to higher levels in time.

HIS managers in 15 states agreed to participate in the interviews giving a response rate of 83.3%. A clear vision for the HIS at the state level was present in 12(80%) states. Presence of a health information annual plan that is endorsed is available in 14(93.3%) states. An endorsed coordination mechanism was only present in 9(60%) states. Regular supervision to locality health information units was not present in 6(40%) states. Response benefiting from indicators data in decision making was in 13(86.7%). All interviewed state managers were in favor of the integration for overcoming the fragmentation in HIS and saw the digitization of the integrated system and implementation of DHIS2 will be crucial to improve the performance and efficacy of the HIS in Sudan. Challenges stated included the need to establishing and strengthening HIS at community level. Some states suffer from shortage of statistical technicians. There is a need for political support at both state and locality levels.

DISCUSSION:

At both federal and state levels, computers are available. As for ICT infrastructure, all state units have printers except three states, three state units have fax and five state units use telephones.

Internet service is available in 14(77.8%) states but 8(44.4%) states yet, they suffer of power instability. The lack of basic infrastructure as electricity may remain a serious constraint in low-income countries for some time. It is often difficult for governments to put scarce resources into paper, pencils, registers, and computer equipment[3]. The availability of computers and other ICT equipment at locality and health facility levels are scare, a challenge that in other developing countries.

While most health units in industrialized countries have access to computer equipment, in many developing countries computers are still not available at the district level. Yet rapidly developing Computer technology will make health information systems increasingly effective and powerful management tools for the health services. Computer equipment is becoming more affordable[4].

Telephones and faxes are rarely used in state information units, while it has been shown that the use of telephones have been successfully used in many places to overcome barriers caused by internet unavailability[5].

The study finding show that 14 of the states get CBS statistics, 12 states coordinate with civil registration and coordination between health information units and the other departments in 17(94.4%) states. This performance improves the efficacy of the system. This is proved by the fact that most of the states have mortality statistics reports, and all states get mortality statistics from private health facilities, community and civil registry. Also, all states get birth statistics from public health facilities and eight states get them from private facilities, community level and civil registry.

Information on births and deaths as well as causes of death is used as health indicators. If those countries are to make greater use of them in monitoring the impact of health programs and policies,

urgent measures are required to improve the functioning of the systems and quality of the statistics they provide[7].

In this study we find that 13(72.2%) state information units produce monthly reports; 17(94.4%) produced quarterly then annual reports but only three (16.7%) states get statistics report from private health sectors. This necessitates development of Health Information Strategies for strengthening leadership, coordination and organizational management structure.

CONCLUSION:

The Health information system in Sudan, though one of the oldest systems, is still considered weak and fragmented. Integration and digitization of the system is an important step towards strengthening the HIS. Challenges in ICT infrastructure, coordination mechanisms and capacity building of health information units especially in the states and to the level of the locality need to be addressed to achieve goals of timely and accurate reporting. All this need collaborative efforts at all levels and strong political commitment at both federal and state level for its success.

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