Health Information Systems in South Africa

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A robust, integrated information system is the foundation for building a successful national healthcare delivery system.

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A health information system (HIS) provides the foundation for the generation of good-quality data, and is a major building block of the health system. It integrates collection, processing, reporting and use of information required for improving effectiveness and efficiency of health services through enhancement of management at all levels within the health system. A robust, integrated information system is thus the foundation for building a successful national healthcare delivery system.

This chapter reviews progress towards strengthening the South African HIS in light of the current health sector policy initiatives which impact on the structure and functioning of the HIS. An overview of persistent challenges and a summary of recent developments to address these are presented, as well as SA's vision for the HIS. The chapter concludes with an overview of proposed steps for future HIS strengthening.

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Introduction

A health information system (HIS) provides the foundation for the generation of good-quality data, and is a major building block of the health system.[1] It integrates collection, processing, reporting and use of information required for improving effectiveness and efficiency of health services through enhancement of management at all levels within the health system.[1] In recent times the requirement for better and more timely health and health-related information has been driven by the need to be more responsive to emerging and urgent health threats;[2] increasing emphasis on health sector reform and decentralisation; global and national shifts towards performance-based disbursements by many funders; and results-based approaches to monitoring progress towards attaining health goals by Government departments and development partners.[3] It is thus acknowledged that without the existence and optimal functioning of a coherent and harmonised HIS, the production and availability of health information required for health systems strengthening and health evaluation and reporting will be fragmented and sub-optimal, and will not meet the needs of end-users.[4]

South Africa (SA) has made many gains in the establishment and implementation of an HIS post-1994. Of note was development of a free and open-source software solution, the District Health Information System[a] (DHIS), developed as a repository for aggregated routine health data from a variety of sources.[5] Nationally the pool of information management staff has increased, and so has availability of HIS resources such as data collection tools, hardware and software.[6] Data quality has improved substantially and a standardised reporting system for data submission to the National Department of Health (NDoH) on a monthly and quarterly basis is in place. There have, however, been numerous challenges along the way, many of which will be presented here.[5-8]

This chapter reviews progress towards strengthening the South African HIS in the light of the Negotiated Service Delivery Agreement (NSDA) and re-engineering of primary health care (PHC) and other recent health sector policy changes. It provides an overview of the NSDA and other key policies which impact on the structure and functioning of the HIS, and a brief assessment of the HIS implications of two key NSDA sub-outputs. An overview of persistent challenges and a summary of recent developments to address these are presented, as well as SA's vision for the HIS. The chapter concludes with an overview of proposed steps for future HIS strengthening.

Recent policy developments and increasing demand for a strong HIS

The NSDA

In 2010 the South African Government identified 12 priority areas (outcomes) and corresponding key indicators and targets for 2010-2014.[8] Outcome 2 ('A long and healthy life for all South Africans') falls within the domain of the NDoH,[8,9] and the NSDA, detailing key outputs and associated activities for this outcome, was signed by the Minister of Health Dr Aaron Motsoaledi, a number of other Government ministers and provincial Members of the Executive Councils. The delivery agreement is designed to complement the national 10 Point Plan for overall strengthening of the health system, and contains four strategic outputs that the health sector must achieve.[10] These outputs and corresponding sub-outputs are presented in Table 1. Output 4 (strengthening health systems effectiveness) forms the foundation for achieving outputs 1 - 3 and aims to strengthen the entire public health system. Undoubtedly the introduction of PHC re-engineering (sub-output 4.1) will have major impacts on the healthcare system and subsequently on the HIS. This will be described in more detail below.

Table 1: Four strategic health outputs and sub-outputs of the NSDA

1	ncreasing life expectancy
2	Decreasing maternal and child mortality
3	Combating H V and A DS and decreasing the burden of disease from tuberculosis (TB)
4	Strengthening health system effectiveness
	4 1 Re engineering of PHC system
	4 2 mproving patient care and satisfaction
	4 3 Accreditation of health facilities for compliance
	4 4 mproved health infrastructure availability
	4 5 mproved human resources (HR) for health
	4 6 Strengthening financial management (monitoring and evaluation)
	4 7 mproving healthcare financing through implementation of National Health nsurance (NH)
	4 8 Strengthening H S

PHC re-engineering

The ultimate goal of PHC re-engineering is to create a healthcare system that moves from being predominantly curative to including a greater emphasis on cost-effective health care focusing on prevention, health promotion and rehabilitation that is closer to communities and households.[11] The package of services to be delivered will extend beyond that currently provided at health facilities, and community outreach and home-based care services form the backbone of this approach.[12] Quality assessments and accreditation processes will serve to strengthen PHC facility activities. More details can be found in Chapter 5.[13]

HIS implications of PHC re-engineering

PHC re-engineering will undoubtedly demand an increase in human, financial and infrastructural resources, with an increase in the number of staff collecting data across SA. Teams will be required to collect community-level data for routine reporting to the health facility they are linked to and will be expected to know the demography and epidemiological status of their catchment population, and must collect and analyse data related to their activities. Each team member must be appropriately trained to collect the data, use data collection tools, and collate, report and use the resultant information. Sufficient user-friendly and durable stationery has to be made available, and systems for storage of these data set up. Data collection tools and data management, analysis and reporting processes need to be aligned with those used at the facilities, and modified according to need and local practices.

a The DHIS software program should not be confused with the concept of a DHIS for managing health information within the district health system. It has been implemented nationally and in eight of the nine provinces.

Aggregated data collected by teams will be included in the facility's routine monthly report. The existing HIS at facility level will need strengthening, with more data capturers, hardware (functional computers and printers) and software, including access to the intranet and, over time, to the Internet. This will ensure electronic reporting of data to higher levels and facilitate communication.

HR requirements

In order to support front-line facilities with feedback and reporting of information, there should be sufficient capacity of health information staff at sub-district, district and provincial levels. Technical skills are required to analyse, interpret and present data in a format that is useful for planning and management. Ideally managers should also possess these skills, but it is preferable that public health specialists, demographers, epidemiologists, geographic information system practitioners and statisticians be available to do this work in more detail and with greater sophistication. Appropriate information and communication technology (ICT) infrastructure should be in place and information technology (IT) staff are required for troubleshooting and maintenance of the IT system.

Staff responsible for certifying patients will have to be trained in how to complete death certificates accurately, and those responsible for completing discharge forms should receive training in application of ICD-10 coding. Database developers and managers will be required to develop large databases that can link health and health-related data with those of other relevant sectors, ultimately to form a secure, centralised and integrated data repository for use and access at all levels. The integrated data repository database must provide easily retrievable linked population, administration, finance, HR for health, logistics, pharmacy and infrastructure data.

Successful implementation and monitoring of the NSDA goals requires a well-functioning and integrated HIS which is adequately resourced and funded.

SA's vision for strengthening the HIS

Since 1994 much has been done to support establishment of a strong HIS. This includes legislation governing health information (e.g. the National Health Act (NHA) which assigns the stewardship role to the NDoH and provides a framework for use of information in the health sector);[14] laws governing official statistics[15] (e.g. Census data) and civil registration[16] (e.g. vital statistics); and policies providing guidance on improving data quality and monitoring and evaluation (M&E) of performance. The recently released District Health Management Information policy presents a vision to develop a well-functioning district health management information system (DHMIS) that will provide good-quality, reliable and timeous evidence, useful for tracking and improving health service delivery and ultimately to develop a national HIS. The Auditor-General of SA is constitutionally mandated as responsible for accountability and governance in the public sector through auditing financial and performance (health) data.[17] These and other key HIS-related legislative documents and policies are presented in more detail in Table 2.

The NSDA document also presents a vision for the HIS in SA, proposing that a framework be created for development of a comprehensive and integrated M&E system and associated HIS.[9] It calls for development of common standards, norms and systems and establishment of a set of defined roles for M&E at national, provincial and district levels, with emphasis on improving data quality. It also proposes that an electronic health record system be developed for the country. The document states that strengthening the HIS will "… involve a range of analytical and research activities using existing datasets and refining information collection systems and tools used to collect and manage health workforce data, and the use of these to drive the evaluation of workforce-related interventions in the system, and assist with planning".[9]

Table 2: Summary of key Acts and policies relating to health information

Acts	Key components relating to health information
NHA (Act 61 of 2003)[14]	➢ The NDoH shall facilitate and coordinate the establishment implementation and maintenance of the information systems by provincial departments district health councils municipalities and the private health sector at national provincial and local levels in order to create a comprehensive national H S ➢ The Minister may (section 74(2)) for the purpose of creating maintaining or adapting databases within the national H S prescribe categories/kinds of data for collection and submission and the manner and format in which and by whom the data must be compiled collated and submitted to the NDoH ➢ Future development of the National Health Management nformation System will include incorporation and integration of health information from the private sector The promulgation of Chapter 9 of the NHA of 2003 will provide the legal framework for this process
Births and Deaths Registration Act (Act 51 of 1992)[16]	➢ This Department of Home Affairs (DHA) legislation governs notification of registration of births deaths and stillbirths ➢ Births are to be notified at the DHA within 30 days ➢ Death due to natural causes stillbirths and deaths occurring outside of the country are also to be registered at the DHA
Statistics Act (No 6 of 1999)[15]	➢ The Statistician General is responsible for all matters governing statistics in SA such as formulating quality criteria and establishing standards classifications and procedures for statistics ➢ The Statistician General is also responsible for promoting coordination of the producers of official national statistics to ensure harmonisation of information and avoid duplication
Promotion of Access to nformation Act (No 2 of 2000)[18]	➢ Gives effect to the constitutional right of access to data/information held by the State and that is required for exercise of protection of any rights ➢ Additionally it provides a framework for requesting such data and information ➢ Aims to foster a culture of transparency and accountability ➢ The DH S predominantly contains aggregated public health data that should within the parameters provided in this policy be available to all South Africans
Public Finance Management Act (No 1 of 1999)[19]	➢ The accounting officer of an institution must establish procedures for quarterly reporting to the executive authority to facilitate effective performance monitoring evaluation and corrective action
Public Finance Management Amendment Act of 1999 (No 29 of 1999)[20]	➢ The accounting officer for a department must submit within five months of the end of a financial year to the relevant treasury/executive authority (a) an annual report on the activities of the department; (b) the audited financial statements for the financial year; and (c) the Auditor General s report on those statements
Public Audit Act of 2004 (No 25 of 2004)[17]	➢ An audit report must reflect such opinions and statements as may be required by any legislation applicable to the auditee but must reflect at least an opinion or conclusion on the reported information relating to performance of the auditee against objectives set out in the audit
Policies	**Key components relating to health information**
Government wide M&E (GWME) guidelines (2007)[3]	➢ Developed by the Presidency and presents an overarching policy framework for M&E in the South African Government ➢ Consists of four parts understanding M&E; the GWME system; M&E at institutional level; implementation of the system ➢ Clarifies M&E concepts principles and processes and describes the purposes and processes of M&E activities in Government ➢ Provides guidance on how M&E should be aligned and linked to managerial systems such as planning budgeting project management and reporting ➢ Prescribes the type of data to be submitted but is more flexible about data collection processes
DHM S policy (2011)[6]	➢ Provides a regulatory framework in terms of the NHA of 2003 ➢ Developed by the NDoH and focuses on seven priority areas health information coordination and leadership; indicators; data management; data security; data analysis and information products; data dissemination and use; H S resources ➢ States that health managers at all levels of the healthcare system assume ownership of the H S ➢ Aims to standardise implementation of the DHM S and to clarify roles and responsibilities of each level of the health system ➢ Objectives are to strengthen M&E as well as the use of information in policy and programme planning ➢ Clarifies the roles and responsibilities of each administrative level and category of staff ➢ Ensures data security and integrity ➢ Policy is to be used in conjunction with a set of standard operating procedures (SOPs) produced in a separate document
National Evaluation Policy Framework (2011)[21]	➢ Provides the basis for a minimum system of evaluation across Government ts main purpose is to promote quality evaluation which can be used for learning to improve the effectiveness and impact of Government by public entities reflecting on what is working and what is not and revising their interventions accordingly ➢ Seeks to ensure that evidence from evaluation is used in planning budgeting organisational improvement and policy review as well as ongoing programme and project management to improve performance Provides a common language for evaluation in the public sector ➢ While it provides for a Government wide system the main focus is on evaluations specified in the national evaluation plan

As can be seen from Table 2, the legislative and policy environment exists to support information management in SA. However, the gap between policy and implementation is wide. It is therefore imperative to identify the key challenges which persistently hinder translation of key health sector policies into practice.

Persistent challenges

Key challenges which persistently act as barriers to the establishment of a strong HIS and adoption of a culture of information are summarised below.

Legislative and policy challenges

An overarching national Health Information Strategy that seeks to harmonise and standardise HIS activities has not been developed. This was also identified as a key challenge in an HIS assessment conducted using the Health Metrics Network Framework in 2009.[4]

Clear and comprehensive policies and guidelines to support implementation of much of the above legislation have also not been developed. Sections of some Acts have not been enacted; for example, the NHA of 2003 stipulates that private sector data be integrated with public sector data, but this has not yet been done.[14]

A Government-wide IT governance framework and IT strategic plan does not exist,[22] and an ICT strategy for health has yet to be developed.[6]

Governance and leadership challenges

There is poor alignment between measurement of health system inputs and processes, key indicators and health sector objectives and goals in the information system.

There is also a lack of standardisation and governance by health managers, leading to large numbers of indicators at all levels in the health system. These are often poorly selected and not sensitive enough to track changes in service delivery or coverage.

Limited buy-in and involvement of health system managers in data management activities, particularly data analysis, use and feedback, is a persistent challenge which needs attention. In addition, for the most part data are not used for decision making and planning by health managers.

Resources, software and hardware challenges

Studies have shown that HR are inadequate, with high attrition rates, inadequate training and limited availability of physical resources (e.g. data collection tools, registers, computers, printers).[23] To compound this, roles and responsibilities of HIS staff are often not standardised, so they are often burdened with non-HIS activities.[23] There is limited HR development planning and no established HIS career path; furthermore, accredited HIS training programmes do not exist.[23] Inadequate technical support (e.g. epidemiologists, statisticians, public health specialists, demographers, geo-spatial information systems expertise) at all levels in the health system is a significant challenge. Amongst other software problems there is also limited or no versional control.[23]

Data sources and storage

The DHIS software stores aggregated data, which precludes detailed patient-level analysis. Web-based versions of DHIS are not available in provinces, resulting in data being exported from the various levels to ultimately produce a national report.

There are also no fixed cut-off dates for data input into the DHIS, and data are not "frozen" after particular dates, resulting in reporting of different information regarding the same facility and indicator.

At hospital level the various information systems are often not integrated, and service data are not linked to hospital administration and finance data.

The transversal Personnel Administration System (PERSAL), an integrated system for administering HR transactions and salary payments at national and provincial level, is designed to routinely record staff information and has limited analytical or planning capabilities.

There is also a failure to use the Basic Accounting System (BAS) systematically to determine allocation of expenditure in financial programmes, sub-programmes or expenditure categories, rendering comparison across provinces very difficult. Data exchange between systems is ineffective or non-existent (e.g. PERSAL and BAS with DHIS).

A single data repository that integrates routine health data, population-based (e.g. vital statistics, Census, survey data) and relevant non-health data from other sectors does not exist, and there is also no master facility list or standardisation of facility types or definitions.

Data management and feedback challenges

There is a general climate of poor data collection practices. For example, there is a lack of standardisation of data collection tools and large numbers of registers, many developed for vertical data collection activities. These are often not controlled at national and provincial levels. Finally, poor data feedback mechanisms between national and provincial levels and between provincial, district and sub-district levels need to be addressed.

Recent developments aimed at strengthening the HIS in SA

The NDoH has acknowledged the existence of key HIS challenges and policy translation gaps, and is attempting to remedy these through the National Health Information Systems Committee of South Africa (NHISSA), a sub-committee of the Technical Advisory Committee chaired by the Director-General (DG) of the Department of Health. NHISSA has been assigned a number of responsibilities, including:

- development of policies and regulations to govern information management in the health sector;
- coordination of revision of the National Indicator Dataset;
- oversight of procurement of HIS resources, and protection and accuracy of information;
- standards setting for coding systems;
- integration of longitudinal systems (e.g. TB and HIV M&E) with the DHIS;

- establishment of a unique patient identifier with a long-term view of establishing electronic medical record systems;
- piloting of mobile technology to improve aspects of the HIS; and
- oversight of development of an HIS that is harmonised and standardised.[6]

Successful implementation of these interventions will ensure improvement in the assessment of progress towards attaining the goals of the NSDA. Some of these interventions are discussed in more detail below.

Development of the DHMIS policy

The DHMIS policy (2011) was developed to provide an overarching regulatory framework in terms of the NHA of 2003,[6] and focuses on the routine DHMIS. The goal of the policy is to standardise implementation of the DHMIS and create uniformity across SA, and its objectives are to:

- strengthen M&E as well as use of information in policy and programme planning and decision making through standardising data management processes;
- clarify roles and responsibilities at each administrative level and staff category in order to promote increased data quality and ownership; and
- ensure data security and integrity.

The policy has seven priority focus areas: health information coordination and leadership; indicators; data management; data security; data analysis and information products; data dissemination and use; and HIS resources. It is intended to be used in conjunction with a set of SOPs which will be finalised in 2012.

Table 3 summarises some of the key aspects of the DHIS policy relating to the challenges identified. Implementation of the DHIS policy and adherence to SOPs represents a significant step towards obtaining an unqualified audit from the Auditor-General of SA and improving quality of the entire M&E process.

Table 3: Aspects of DHIS policy which address key HIS challenges

Ownership and governance

- Overall ownership of the DHM S resides with the DG at national level heads of department (HoDs) at provincial level and the district manager at district level
- NH SSA will ensure that all H S adhere to national guidelines and specifications

HIS resources

- **Financing:** Provincial and district heads are responsible for ensuring that finances and systems are in place for sourcing adequate resources at all levels The policy does not provide guidance on how the costing must be done nor the percentage of the budget which should be allocated to the H S
- **Staffing:** Various staff categories with uniform job descriptions are to be appointed at different levels of the health system Positions of data capturers health information officers and health information managers are to be included in the list of critical posts in each province No guidance is provided on training or requirements for career progression
- **Equipment and ICT:** All managers are to ensure that adequate equipment are made available at all levels National and provincial CT units will be responsible for acquisition of hardware and software and for data storage standardisation maintenance and upgrading of computer equipment There will be a gradual shift towards server and web based solutions

Indicators

- The NDoH is responsible for developing and monitoring the national indicator dataset (N DS) and its associated data elements
- A dataset incorporating relevant data produced by other sectors (e g private non governmental organisations) will be developed
- The N DS will be revised every two years and written requests for additions must be submitted to the DG along with sufficient motivation for its inclusion The DG will communicate the new N DS to the provinces at least six months prior to commencement of the next financial year
- Requests from within the province for changes to the provincial indicator set (P DS) must be submitted to the provincial HoD at least three months before commencement of the new financial year
- The DG is also responsible for ensuring that annual targets are developed for all indicators and these are to be adapted by each province and district

Data sources

- **Administrative systems:** The NDoH will be responsible for 'matching the BAS and DH S reporting units and for establishment of a set of financial data elements that can be imported from BAS each month or quarter Steps will be taken to synchronise the various information systems within the Department of Health and between the NDoH and other departments such as Statistics SA and the National Health Laboratory Services

Data use, management and feedback

- **Data collection tools:** The National nformation Cluster is to lead the process of streamlining and standardisation of a set of data collection tools to be replicated within the provinces
- **Data flow:** SOPs will guide the data flow process and timelines for data submission and all data are to be signed off by the respective managers before submission to the next level The deadline for routine data submission will be progressively reduced from 60 days to 45 days
- **Data quality assurance:** Eight dimensions of data quality will be monitored relevance integrity timeliness accessibility reliability completeness accuracy and coherence and comparability
- **Data analysis:** Provincial HoDs are required to analyse data reported in their provinces for each reporting period Two types of reports will be produced a standardised quality report for the reporting period; and a standardised performance report This will be done at all levels A web based reporting system will also be developed
- **Data dissemination and use:** Managers at all levels in the health system must ensure that their data are reviewed and data have to be used in development of legislated strategic plans (e g district health plans and annual performance plans) The NDoH will also complete geo referencing of public health establishments which will further assist with data analysis and feedback The DH S policy places emphasis on leadership and states that ownership of the H S lies with the various departmental heads and that M&E must form part of the performance agreements of these managers
- **Feedback:** Quarterly and informal monthly feedback to lower levels on data quality and programme performance is to be provided by all levels The NDoH will produce a comprehensive health statistics publication which will reflect the performance of the entire health system and be disaggregated by province A tender for completion of this work was published in October 2011

Implementation of the three-tiered antiretroviral treatment M&E system

SA has the largest antiretroviral therapy (ART) programme in the world. In March 2011 in an attempt to standardise facility-level ART data management the National Health Council approved the adoption of a three-tiered strategy for monitoring provision of ART in all provinces.[24] This strategy was renamed the Systematic Monitoring of ART, Evaluation and Reporting (SMARTER) by NHISSA. This World Health Organization-derived strategy comprises the following:

- paper-based ART registers (tier 1);
- an electronic non-networked system (tier 2); and
- electronic networked systems using a patient information system (tier 3).

A sub-committee of NHISSA has been established to oversee and govern the implementation process, and a national implementation team of national M&E staff, governmental partner staff, and the University of Cape Town's Centre for Infectious Disease Epidemiology and Research (CIDER), provide ongoing implementation support. Pilot training was conducted in Bushbuckridge in July 2011. Tiers 1 and 2 Master Training of provincial staff and development partners has started and is being rolled out country-wide.

The '3535' Data Capturer Project

The previously-named Basic Routine Health Information System for Data Capturers (the '3535' Data Capturer Project), which is funded by the NDoH, aims to train matriculants as data capturers for deployment in public health facilities.[25] Implemented through a collaborative partnership between Continuing Education at the University of Pretoria, the Health Systems Trust and the HIS Programme (HISP), the project aims to train 3 535 data capturers. The course has five modules: basic computer literacy; HIS; data management; DHIS; and the Electronic TB Register (ETR.net). After training the trainees are placed at health facilities as part of a one-year internship programme. By the end of February 2011, 2 500 data capturers were trained and 1 700 were subsequently employed. More courses are planned for 2011/12.

Rapid assessment of HIS needs in provinces

NHISSA has commissioned John Snow Inc.'s Enhancing Strategic Information (JSI/ESI) project to conduct a rapid assessment of the routine HIS – people, processes, hardware and software – and surveillance system needs by means of an online survey.[b] In addition, qualitative data were gathered through appreciative inquiry workshops as part of nine Integrated Provincial Data Improvement workshops. The main purpose of these workshops was to draft quality improvement plans, prepare provinces for implementation of the DHMIS policy, present the rapid needs assessment's preliminary results, and present data quality assessment results to assist provinces with development of data quality improvement plans. The full report will be made available early in 2012.

b The rapid assessment was based on an earlier survey conducted by the Health Systems Trust in 2006[23] as part of the National HIS project, and builds on the 2011 JSI/ESI NDoH DHIS Rapid Resource Assessment project.[26]

Improving data quality through national data clean-up workshops

Data clean-up workshops were held in each province to ensure alignment between data submitted to provincial level and that stored at district level. A similar process takes place when data submitted to national level are disaggregated and reconciled with data stored at provincial and district levels. The aim is to ensure consistency across all levels. A number of workshops were held in 2011 with plans for more in 2012.

Monitoring of progress towards compliance with audit requirements

NHISSA has put in place regular monitoring of progress towards implementation of provincial action plans to institute corrective action in response to audits by the Auditor-General of SA in each province. Progress is reported at each NHISSA meeting.

The Health Data Advisory and Co-ordination Committee

The Health Data Advisory and Co-ordination Committee (HDACC) was established by the DG to assist in improving the quality of health outcomes data and to advise on NSDA indicators. The Committee consists of representatives from Government, higher educational institutions, public entities, non-governmental organisations and the private sector. In 2011 the HDACC reviewed the NSDA indicators, identified additional indicators, reviewed data sources and advised on suitable targets. Newly proposed high-level NSDA indicators were published in the 2011 HDACC report.[27]

Proposed next steps for HIS strengthening

In addition to the interventions already under way, there are a number in the pipeline, including:

- Development of a costed five-year HIS strategy for SA. The DHMIS Task Team will take the lead on this, and develop it through a collaborative process. The strategy itself will encompass all aspects of HIS and be developed through collaboration with various stakeholders, including entities responsible for producing essential health-related data (e.g. Statistics SA and the Department of Home Affairs).
- Revision of the NIDS.
- Finalisation of national M&E strategies for:
  - the NSDA;
  - PHC re-engineering; and
  - community-based care services.
- Finalisation and adoption of an eHealth Strategy; a draft was developed in July 2011 and is currently being finalised. It will provide guidance on infrastructure, mobile health technology (mHealth), telemedicine and electronic health records.
- Development of a national Unique Patient Identifier to enable registration of all patients on a National Patient Registry.
- National training of staff on completion of death certificates and ICD-10 coding.

- Publication of a national statistics document that will ensure feedback of data to lower levels.

Conclusion

The recent introduction of the NSDA will undoubtedly demand an increase in human, financial and infrastructural resources. Auditing of performance management data has also increased demand for good-quality data and standardisation and streamlining of tools and processes. The NDoH has displayed a willingness to strengthen the HIS, as evidenced by introduction of the DHMIS policy and the activities of NHISSA. Plans to develop a costed health sector five-year HIS strategy demonstrate responsiveness and willingness to collaborate with other health sectors in order to develop a coherent and harmonised information system.

However, many challenges facing the HIS have persisted for years, partly as a result of failure of managers to translate key HIS legislation and policies into practice. Finances, political will and identification of champions to advocate for HIS and promote buy-in at the highest levels in the health system are essential to ensure success of the five-year strategy.

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