

# General overview of available ICT technology (focusing on data warehousing)

10 July 2009  
Gareth Daniell

## Contents

- Data
- Data vs. Information
- Data for Business Intelligence
- ICT Tools
- What is a Data Warehouse?
- Data Warehouse Requirements
- Advantages & Risks
- Skills Required

## Data

- Users and Applications produce and require data
- Data needs to be stored and retrieved for further processing

## Data vs. Information

- Data
  - Raw material and unorganised facts
- Information
  - When data is processed, organised or presented in a manner to make it useful

## Data for Business Intelligence

- Why would we store data for later use?
  - Competitive advantage
    - Increase Profits and/or reduce costs
  - Regulatory/Compliance
    - 5 yrs of transactions for tax audits
  - Industry Standards
    - Communicate with suppliers and clients

## ICT Tools available to manage data

- Data often captured on paper
- Paper transferred to Excel



- This has flaws:
  - Multiple files for multiple data layouts
  - Single access to manipulate data
  - Prone to human error etc.

## ICT Tools available to manage data

- Microsoft Access
  - Solves problem of multiple files
  - Still single access without a custom front-end
- 3<sup>rd</sup> Party applications
  - Not necessarily exactly suited to your requirements
- Custom Application & SQL
  - Requires time, money and training

## ICT Tools available to manage data

- Why?
  - Improved data quality
  - Simultaneous access
  - Security

## What is a data warehouse

- Data is pulled from various production servers and stuck into an “**big, fat database**”.
- A large storage platform and a systematic way to store and access all the information and being able to analyze the data.
- Main purpose = store data and then facilitate reporting and analysis

## Data Warehouse Requirements

- Infrastructure
  - Computer Servers
  - Networks
  - Software
    - Open source vs. free vs. proprietary

## Data Warehouse Requirements

- Data
  - Production Data
    - Operational systems
  - Internal Data
    - ‘private spreadsheets’, CRM notes
  - Archived Data
    - ‘old data’
  - External Data
    - Market Share Data

## Data Warehouse Requirements

- Method
  - Data creation, collection and warehousing strategies and policies
  - Data access, analysis and dissemination

“put the paper on a donkey”  
aka. **Define a Process**

## Data Warehouse Requirements

- People
  - IT staff
    - Designers / Implementers & Maintenance
    - Require prior IT knowledge
    - Require warehouse specific training
  - End Users
    - Require training on use of system

## Advantages of a Data Warehouse

- Common data model
  - provides a common data model for all data of interest regardless of the data's source.
  - easier to report and analyze information than it would be if multiple data models were used to retrieve information such as sales invoices, order receipts, general ledger charges, etc.
- Identify inconsistencies
  - prior to loading data into the data warehouse, inconsistencies can be identified and resolved.
  - simplifies reporting and analysis.
- Long-term storage
  - information in the data warehouse is under the control of data warehouse users so that, even if the source system data is purged over time, the information in the warehouse can be stored safely for extended periods of time.

## Advantages of a Data Warehouse

- Timely retrieval of data
  - provides retrieval of data without slowing down operational systems.
- Collaborate with other systems
  - can work in conjunction with, and enhance the value of, operational business applications, notably customer relationship management (CRM) systems.
- Facilitate decision support
  - facilitate decision support system applications such as trend reports (e.g., the items with the most sales in a particular area within the last two years), exception reports, and reports that show actual performance versus goals.

## Risks of a Data Warehouse

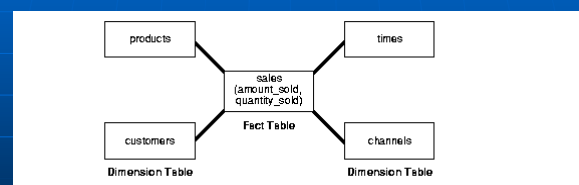
- Unstructured data
  - Data warehouses are not the optimal environment for unstructured data.
- Latency
  - Because data must be extracted, transformed and loaded into the warehouse, there is an element of latency in data warehouse data.
- Costly
  - Over their life, data warehouses can have high costs. The data warehouse is usually not static.

## Design of a Data Warehouse

- Organizations generally start off with relatively simple use of data warehousing. Over time, more sophisticated use of data warehousing evolves
- **Off line Operational Database**
  - Data warehouses in this initial stage are developed by simply copying the data off an operational system to another server where the processing load of reporting against the copied data does not impact the operational system's performance.
- **Off line Data Warehouse**
  - Data warehouses at this stage are updated from data in the operational systems on a regular basis and the data warehouse data is stored in a data structure designed to facilitate reporting.
- **Real Time Data Warehouse**
  - Data warehouses at this stage are updated every time an operational system performs a transaction (e.g. an order or a delivery or a booking.)
- **Integrated Data Warehouse**
  - Data warehouses at this stage are updated every time an operational system performs a transaction. The data warehouses then generate transactions that are passed back into the operational systems.

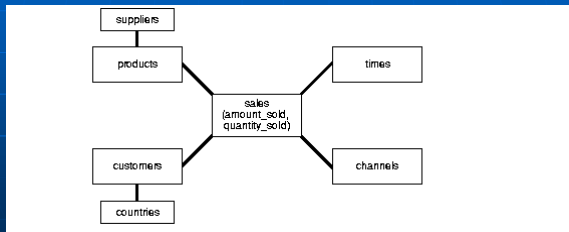
## Design of a Data Warehouse

- Star Schema



## Design of a Data Warehouse

### ■ Snowflake Schema



## Skills to implement, populate and maintain a Data Warehouse

- Decided on technologies
  - Open source vs. free vs. proprietary
- Train / acquire IT staff accordingly
- Arrange end-user training on use of interface
  - Capturing data
  - Extracting data

## Questions

# A Health Data Warehouse Implementation part 1

10 July 2009  
Gareth Daniell

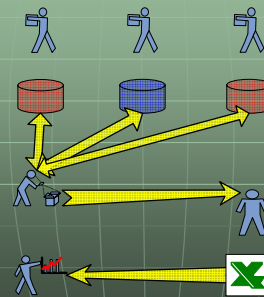
## Contents

- Current use of ICT Tools
- Data Warehouse Requirements
- Advantages / Benefits gained
- Skills Required

## ICT Tools used to manage data

- Paper, MS Excel and MS Access

## ICT Tools used to manage data



## Data Warehouse Requirements

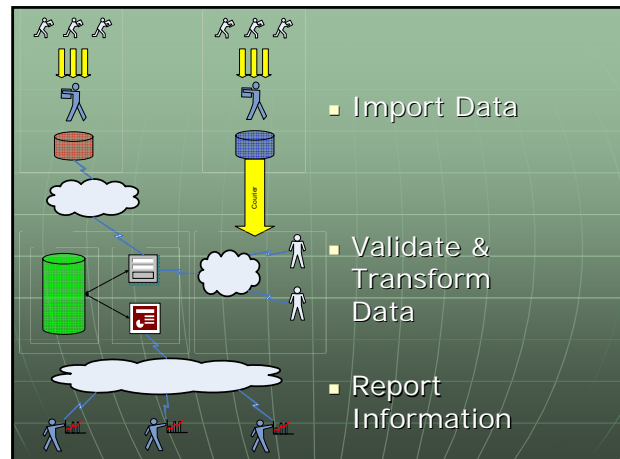
- Infrastructure
  - Own Servers
  - Networks
    - At Head Office and offline process planned
  - Software
    - Windows Server & IIS
    - SQL Express

## Data Warehouse Requirements

- Data
  - Patient System
    - In Patient
    - Out Patient
    - Mental
  - Dental
  - Maternal Register
    - Maternity
    - Antenatal
  - TB Quarterly
  - HIV Summary

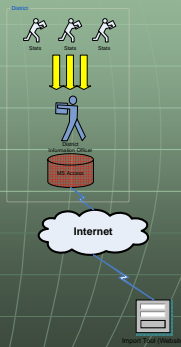
## Data Warehouse Requirements

- Method



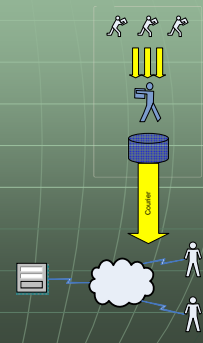
## Data Warehouse Requirements

- Import Process 1
  - Step 1: Capture daily data on tally sheet
  - Step 2: Summarise tally sheet on monthly basis
  - Step 3: Summary to District Information Officer
  - Step 4: District Officer capture data into local application
  - Step 5: Upload database from local application to data warehouse via Internet



## Data Warehouse Requirements

- Import Process 2
  - Step 1 - 4: Same
  - Step 5: Courier local database to Central Office
  - Step 6: Central Office impersonates District Officer and uploads database (via intranet)



## Data Warehouse Requirements

- People
  - Expert Consultant
  - Sent ICT staff for additional .Net training

## Advantages of a Data Warehouse

- Implementing a data warehouse will consolidate all data in a central location
- Identify inconsistencies sooner and improve quality of data
- Duplication of data at a central level – safe guard against loss
- Simplified, timely and uniform reporting

## Skills to needed to implement a Data Warehouse

- Additional .Net Training and/or 3<sup>rd</sup> Party assistance
- Additional Resources

# A Health Data Warehouse Implementation part 2

Country specific post-warehouse  
(Lesotho)

10 July 2009  
Gareth Daniell

## Contents

- ICT Tools
- Risks going forward
- Going forward

## ICT Tools used to manage data

- SQL Express
  - PS open source vs. "free"
- .Net and its framework
- Web Based Solution
- SQL Reporting services

## Risks facing a Data Warehouse

- Source Data changes
  - Rewrite of district-level applications
- IT Staff
  - Central and District Level
  - Users and IT support

## Skills to needed to maintain a Data Warehouse

- Constant validation - all policies and processes are adhered to
- Further IT Training – Data warehouse will change in short-term
- End-User training
  - Central and District Levels

## What's Next?

- Working at the central level
- Identify a pilot district for rollout
- Rollout to all districts
- New district level applications

## Questions

# GIS AND HEALTH

## GIS AND HEALTH Contents

- ▶ What is GIS
- ▶ GIS and Health: Location
- ▶ GIS and Health: Spatial Analysis
- ▶ GIS and Health: Uses
- ▶ GIS and Health: Relationships
- ▶ GIS and Health: Examples

## What is GIS?

- ▶ Geographical (*Spatial*) Information System (GIS)
- ▶ ESRI definition:
- ▶ Information System
  - GIS is a System for:
    - ▶ Input
    - ▶ Storage
    - ▶ Processing
    - ▶ Retrieval
  - OF *SPATIAL* DATA
- ▶ Standard Definition of Information System except for the word *SPATIAL*

## What is GIS?

- ▶ GIS is a collection of:
  - Computer Hardware
  - Software
  - Data
  - Personnel
  - Methods
- ▶ Enables the user to better understand and evaluate data by using cartographic tools to display information stored in a database
- ▶ Spatial analysis of data which shares a common *location* reveals hidden patterns and *relationships* that are not readily apparent in spreadsheets or statistical packages

## What is GIS?

- ▶ There is another way to describe GIS by listing the type of questions the technology can (or should be able to) answer. Location, Condition, Trends, patterns, Modelling, Aspatial questions, Spatial questions.
- ▶ **Location: What is at?**  
The first of these questions seeks to find out what exists at a particular location. A location can be described in many ways, using, for example place name, post code, or geographic reference such as longitude/latitude or x/y.
- ▶ **Condition: Where is it?**  
The second question is not the same as the first and requires spatial data to answer. Instead of identifying what exists at a given location, one may wish to find location(s) where certain conditions are satisfied (e.g., clinics within 20 km's of a certain major hospital accessible with a tar road)
- ▶ **Trends: What has changed since?**  
The third question might involve both the first two and seeks to find the differences (e.g. in land use or elevation) over time.

## What is GIS?

- ▶ **Patterns: What spatial patterns exists?**  
This question is more sophisticated. One might ask this question to determine whether landslides are mostly occurring near streams. It might be just as important to know how many anomalies there are that do not fit the pattern and where they are located.
- ▶ **Modeling: What if?**  
"What if..." questions are posed to determine what happens, for example, if a new road is added to a network or if a toxic substance seeps into the local ground water supply. Answering this type of question requires both geographic and other information (as well as specific models). GIS permits spatial operation.

## What is GIS?

### ▶ Aspatial questions

"What's the average number of people working with GIS in each location?" is an aspatial question - the answer to which does not require the stored value of latitude and longitude; nor does it describe where the places are in relation with each other.

### ▶ Spatial Questions

" How many people work with GIS in the major centres of Delhi" OR " Which centres lie within 10 Kms. of each other? ", OR " What is the shortest route passing through all these centres". These are spatial questions that can only be answered using latitude and longitude data and other information such as the radius of earth. Geographic Information Systems can answer such questions.

## GIS AND HEALTH: *LOCATION*

- ▶ The concept that *location* can influence health is a very old one in medicine. As far back as the time of Hippocrates (c. 3rd century BC), physicians observed that certain diseases tend to occur in some places and not others



## GIS AND HEALTH: SPATIAL ANALYSIS

- ▶ Origin of Spatial analysis, Dr. John Snow
- ▶ In 1854, a major cholera outbreak in London had already taken nearly six hundred lives when Dr John Snow, using a hand-drawn map, showed that the source of the disease was a contaminated water pump.

## GIS AND HEALTH: SPATIAL ANALYSIS

- ▶ By plotting each known cholera case on a street map of Soho district (where the outbreak took place), Snow could see that the cases occurred almost entirely among those who lived near the Broad Street water pump.



## GIS AND HEALTH: SPATIAL ANALYSIS

- ▶ This pump belonged to the Southwark and Vauxhall Water Company, which drew water polluted with London sewage from the lower Thames River.
- ▶ The Lambeth Water Company, which had relocated its water source to the upper Thames, escaped the contamination

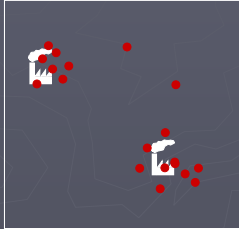
## GIS AND HEALTH: SPATIAL ANALYSIS

- ▶ Snow recommended that the handle of this pump be removed, and this simple action stopped the outbreak and proved his theory that cholera is transmitted through contaminated drinking water.
- ▶ People could also see on this map that cholera deaths were not confined to the area around a cemetery of plague victims and were thus convinced that the infection was not due to vapours coming from it as they first thought.



## GIS AND HEALTH: Combining data sets

- Information about "where" allows us to combine heterogeneous data sets



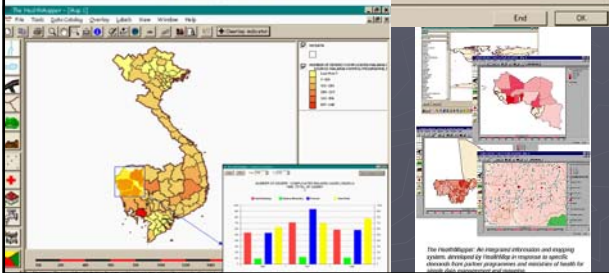
## EXAMPLES

- WHO (World Health Organization) Health Mapper
- The WHO is also using GIS technology in its Leprosy Elimination Programme (LEP) - [http://web.archive.org/web/20050207172746/http://www.who.int/lep/Monitoring\\_and\\_Evaluation/gis.htm](http://web.archive.org/web/20050207172746/http://www.who.int/lep/Monitoring_and_Evaluation/gis.htm).
- MARA (Mapping Malaria Risk in Africa)

WHO (World Health Organization) GIS Programmes



Number of severe malaria cases by region (1998)  
Cambodia, Viet Nam



## GIS in Malaria: The MARA/ARMA Initiative

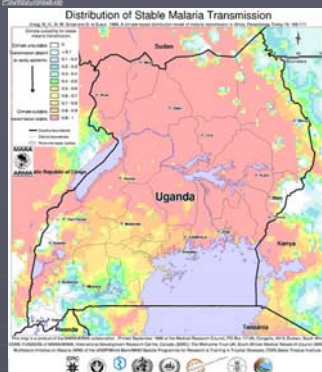
- The MARA/ARMA collaboration (Mapping Malaria Risk in Africa / *Allas du Risque de la Malaria en Afrique*) is funded by the International Development Research Centre of Canada (IDRC), the South African Medical Research Council (SAMRC), the UK Wellcome Trust, the Swiss Tropical Institute and the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR).
- MARA/ARMA aims at providing a GIS atlas of malaria risk for Africa, by integrating spatial environmental and malaria datasets to produce maps of the type and severity of malaria transmission in different regions of the continent.
- The project attempts to define malaria risk categories (environmental strata) in terms of non-malaria data, e.g., environmental and climatic data, and to develop a mask layer of factors that exclude malaria (a no-risk category), e.g., absence of population, high altitude, deserts, etc.
- Areas of no data are highlighted during the course of the project with the possibility of using geographical modelling to extrapolate to such no-data areas, based on the defined environmental stratification rules.

MARA  
Mapping Malaria Risk in Africa  
<http://www.mara.org.za>



ARMA  
Agence de Recherche et de Modélisation  
Malaria en Afrique

- By spatially defining the African continent into regions of similar type and severity of malaria transmission, appropriate control measures can be tailored to each region according to its needs, thus maximising the potential and outcomes of available control resources (human, financial and technical).
- The MARA/ARMA maps should be of great value to research on malaria transmission dynamics.
- MARA/ARMA can also serve as a model for the study and control of other diseases, and all non-malaria-specific information gathered during the course of the project can be reused in a similar manner.




## GIS AND HEALTH:



- LIVE DEMONSTRATION

## ACKNOWLEDGEMENTS AND RESOURCECS

- ▶ M. N. K. Boulos (School for Health,  
University of Bath )
- ▶ ESRI Virtual Campus

THANK YOU

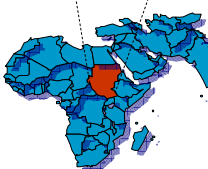

**Republic of Sudan**  
**Federal Ministry of Health**

**Closing Workshop Of Health Modules**  
**Pretoria**  
**8-12 July 2009**

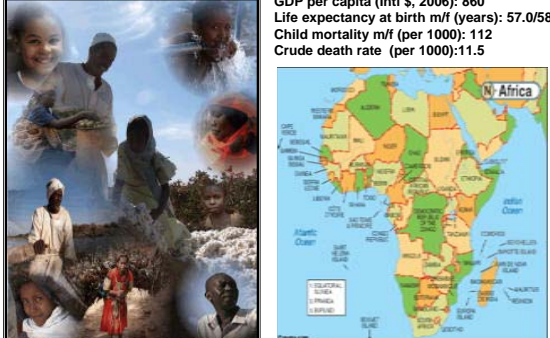
**Health Information System (HIS)**  
**Situation Analysis**

Prepared by: Mr. Elsheikh Eltjani Elsheikh  
 Dr. Amel ELAmin M.ELNour



### Introduction

Land area: 2.506(million sq.km)  
 Total population: 39,154,490  
 GDP per capita (Intl \$, 2006): 860  
 Life expectancy at birth m/f (years): 57.0/58.0  
 Child mortality m/f (per 1000): 112  
 Crude death rate (per 1000):11.5



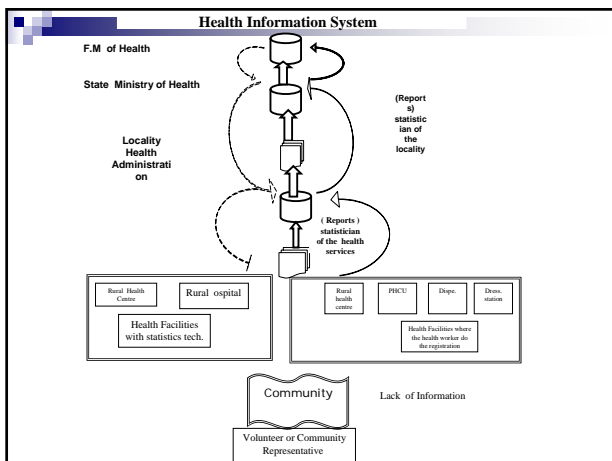
### Situation Analysis

The Sudan Health Information System (HIS) is one of the first established information systems in the region. It has a bottom-up approach where information is collected at the locality level and relayed to the State Ministries of Health (SMOHs) for a final consolidated document that is presented to the Federal Ministry of Health (FMOH).

### National Health Information Center(NHIC)

The national authority is responsible for the design of HIS, standardized health information forms, registers and procedures, training personnel, and general supervision of health information and vital statistics activities in the country.

The data collected flow through the following channels as represented in the following diagram:-



### Brief summary of activities performed by the NHIC

**(i) Data Supply:-**

- The NHIC works as a data –base that facilitates the availability of most of the health information and indicators necessary for formulation and application of the national strategies for health .
- The center puts much effort to cooperate with the national institutions and different departments to exchange information and indicators, e.g. Central Bureau of statistics (CBS).
- The center offers statistical services to the different international agencies which require certain health information e.g. UN agencies and NGOs.

### (ii) Training:-

- The center plays a major role in the training of all health information staff in PHCU, hospitals, and statisticians in states.
- The training covers the techniques of Health data collection, form filling and table presentation, as well as the use of computers for data entry, manipulation and analysis, beside raising their comprehension in health and medical environment (Medical Terminology, Medical records ICD10).

(iii) The center is responsible to provide states with data Reporting Tools e.g.. unified forms including birth & death forms and registers).

(iv) The center gathers all health information from different states, compiles health indicators, and publishes annual report for users.

■ (V) The center participates in executing Health surveys e.g.:-

- DHS 1987
- PAPCHILD 1992
- MCIS 1999
- SMS 2000
- SHHS 2006
- NHA HS 2009

**Using Health Metric Network( HMN)  
Assess tool Sudan HIS was  
reviewed and the following are  
overall results**

<b>Overall HIS</b>	
Dissemination & use	40%
Information products	62%
Data management	17%
Data sources	41%
Indicators	69%
Resources	42%
<b>Data Sources</b>	
Administrative records	27%
Health service records	46%
Health & diseases records	30%
Population-based surveys	74%
Vital statistics	15%
Census	53%
<b>Information Products</b>	
Estimation method / transparency	76%
Disaggregation	57%
Representativeness / appropriateness	65%
Consistency / completeness	50%
Periodicity	62%
Timeliness	69%
Data collection method	58%
<b>Quality of Health Information</b>	
Overall health indicators quality	62%
Risk factors	63%
Health system	56%
Health status - morbidity	70%
Health status - mortality	64%

**According to the HMN findings the  
National Health Information Center  
took actions to cover the gaps  
identified by the assessment and  
there for policy and strategic plan  
were formulated**



## The HIS Strategic plan contain

- ❖ Background
- ❖ Rationale
- ❖ Policy context
- ❖ Overall health information system assessment
- ❖ Process of the strategic plan development
- ❖ Situation analysis of national health information system.
- ❖ Challenges and opportunities
- ❖ Guiding principles
- ❖ Vision
- ❖ Mission
- ❖ Values
- ❖ Priority areas for the national health information system.
- ❖ Details of the strategic objectives, strategies and intermediate steps.
- ❖ Monitoring and evaluation framework.

### Vision:

Establishment of a comprehensive national health information system which is based on modern technologies and characterized with accuracy, timeliness, comprehensiveness, adequacy and standardization. The system is capable of generating high quality of health, social and environmental information addressing the purposes and needs of all the health information users including the health personnel and others.

### Mission

- Emphasis is laid on the federalism of the system with unified work in data collection, compilation and analysis aiming to generate quality information for production of indicators for empirical demonstration of social justice and equity within the health sector.
- Development and strengthening of the national health information network.

### The goal:

The overall goal of the NHIS is increase the availability, accessibility, quality and use of health information that is critical for decision-making at the federal, state and the locality levels.

### The priority areas for the NHIS:

- HIS resources.
- Data management processes.
- The capacity, practices, dissemination, integration and use of health and disease records including the vertical surveillance systems.
- Information – based policy, decision-making and planning at different levels.
- Vital registration system.
- Capacity building for conduct of research and surveys to supplement the routine data collection systems.
- Essential health indicators.

### Strengthening National HIS: Examples of other specific activities...

- Revise [list of essential indicators](#) (based on new information needs); creation of data dictionary
- Develop HIS policies and legislation on the following specific components: vital registration, notifiable diseases, private sector data
- Create integrated database – data warehouse
- Enhance synthesis and [use of data](#) for decision-making by combining data from all sources.
- Undertake various procedures and innovative mechanisms for improving use and integration of information from data sources

## GDDS IN SUDAN

As Sudan is a member of the GDDS we used to provide necessary information required for updating GDDS data and participating in the lunched workshops using the provided recourses and make use of the technical assistant .

IN The Last Workshop held in Botswana , we reached a consensus around country **Sets** priorities

## Priorities Sets in Botswana

### Priority 1

Designing a metadata dictionary

### Priority 2

Revision and finalization of the policy and the strategic plan.

### Priority 3

Technical assistance in revising the network and databases.

\* Since The Second Priority was performed by WHO consultant .The First and Third priority were merged in one task designated to the GDDS consultant that is (Developing The data Warehouse)

A GDDS consultant visited SUDAN to asses the condition and make situation analysis to develop the data warehouse and handle a document with advice and plan of implementing the data Warehouse

## Developing The data Warehouse

### Main Issues

- Implement a data warehouse that will contain data from all data sources to facilitate data sharing and easy retrieval of data by users from all corners
- Implement the import tools that will be used by the various districts to upload their individual databases to the central data warehouse.

**Thank you**



**Republic of Sudan**  
**Federal Ministry of Health**


### Present and Future of Health Information System In Sudan

Proposal web page



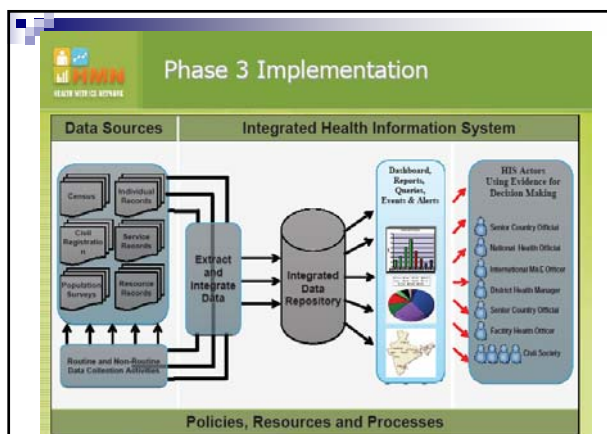
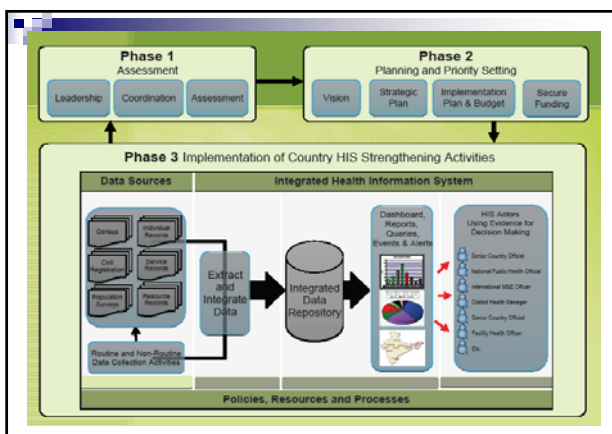


### Results of Data Sources

Data Source	Contents	Capacity & Practices	Dissemination	Integration and use	Total	%
Census	Highly adequate	Not adequate	Present but not adequate	Not adequate	Present but not adequate	53
Vital statistics	Not functional	Not adequate	Not functional	Not functional	Not functional	15
Population-based surveys	Adequate	Highly adequate	Highly adequate	Present but not adequate	Adequate	74
Health and disease records (incl. disease surveillance sys.)	Present but not adequate	Not adequate	Not functional	Not functional	Not adequate	30
Health service records	Not adequate	Present but not adequate	Adequate	Present but not adequate	Present but not adequate	46
Administrative records	Not adequate	Present but not adequate	Not adequate	Not functional	Not adequate	27
<b>Over all</b>						<b>41</b>

### Results of Data Management

Summary	Result	%
Data management	Not functional	17



### Expected Results Of HIS PLAN

- 1- Strengthen health information System at national , state and localities
  - \* Computer and Networking
  - \* Activating Monitoring and Supervision System
- 2- Improve Quality Reporting , coverage and Utilization of health information by 70%
  - \* Personnel and infrastructure Capacity Building
  - \* Improve Communication Facilities

### Main Features of Sudan Future HIS Plan

- Finalisation and building consensus of system and tools standardization , including vital registration
- Upgrade HIS to cover both facility And Community Based Comprehensive HIS system
- Revising and processing the computerized network

SQL Server , System Design should be completed , Implemented and Installed

- Data warehouse system in place .
- GIS application
- Develop a **dashboard** to monitor health systems
  - Define the contents
  - Advise on reporting mechanisms

According to the finding of HMN assessment the following objectives are included in the Strategic Objectives of NHIC

- Raising birth registration by 80% and death registration by 50%;
- Improvement and encouragement of birth& death notification and registration at health facility and community levels;
- Community participation in birth & death notification and registration.

### Developing The data Warehouse


A GDDS consultant visited SUDAN to asses the condition and make situation analysis to develop the data warehouse and handle a document with advice and plan of implementing the data Warehouse

#### Main Issues


- Implement a data warehouse that will contain data from all data sources to facilitate data sharing and easy retrieval of data by users from all corners
- Implement the import tools that will be used by the various districts to upload their individual databases to the central data warehouse.

### Dashboard for health systems monitoring: focus

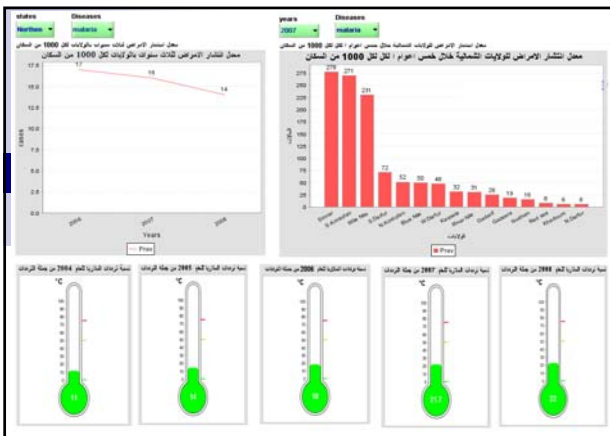
- Simplicity > comprehensiveness
- Parsimonious subset of indicators > full range of M&E indicators
- Measurability but not shying away from promoting new investments
- Comparable data over time and between countries
- National focus but include statistics within the country



### Dashboard



- Mortality trends
- Burden of disease
- Overall performance (Life expectancy by GDP per capita)
- Coverage trends (index)
- Service provision status and trends (indexes)
- Financing
- HR
- Information
- Governance
- Distribution with country (equity)



### Proposal web page

The screenshot shows a web page for the 'National Health Information Centre' (المركز القومي للمعلومات الصحية). The page has a blue header with the center's name in Arabic and English. Below the header is a navigation menu with links for 'الرئيسية', 'التسجيل', 'الدخول', 'PRODUCTS', 'SERVICES', 'PARTNERS', and 'CONTACT US'. The main content area features a photo of a man sitting at a desk and a 'Dash Board' link.

### HMN

The screenshot shows the HMN (Health Metrics Network) website. The header includes the HMN logo and the tagline 'Better information. Better decisions. Better health.' Below the header is a navigation menu with links for 'Home', 'About', 'Tools', 'Countries', 'News', 'Partners', 'Resources', and 'Contact'. The main content area features a news item titled 'Sudan' with a photo of a man and a grant amount of \$250,000.





## **FUTURE PLANS FOR IMPLEMENTATION OF GDDS PROJECT IN TANZANIA**

**Presentation made at the GDDS Closing Workshop on Health  
Statistics Module**

**at the Southern Sun Hotel, Pretoria in South Africa  
in July 2009 by**

**Ibrahim.Masanja-National Bureau of Statistics and  
Claud Kumalija –Ministry of Health and Social Welfare.**



## **Way forward**

- Plans are under way to move from GDDS to SDDS
- Implementation of Health Sector Strategic Plan III (2009 – 2015)
  - Strengthening integrated routine HMIS
  - Introduce data aggregation and sharing based on ICT
- Need for the government and development partners to continue supporting the project in future to ensure availability of enough resources (human, finance, and materials)
- Implementation of the Tanzania Statistical Master Plan 2009-2014 as a sustainable long term strategy for Development of Statistics within the National Statistical System.



## **Support Requirement**

- Capacity building on data quality and management
- Capacity building on ICT
  - i. WAN/LAN, GIS, Data warehouse, e-Health etc
- Equipment and Financial resources
- Technical Assistance (TA) to strengthen data system



## **THE END**

**THANK YOU FOR YOUR ATTENTION**

## Plans for the Future- GDDS Health

Mahlape Ramoseme  
Ministry of Health and Social  
Welfare  
Lesotho

## Data Warehouse

- Finalise the data warehouse
- Establish data warehouse at the districts
- Train IT on maintenance of the data warehouse

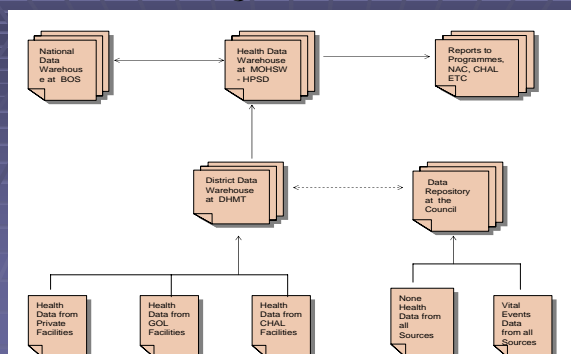
## Data Management

- Deploy Health Information Officers to all the ten districts
- Deploy data clerks to all the health centres (Government of Lesotho, Christian Health Association of Lesotho) – improve timeliness and completeness
- Improve communication at the health facilities – telephones and two-way radios

## Cont.

- Connect internet to all hospitals and district health management teams offices
- Train officers at all levels on analysis of data
- Promote review /reflection meetings at the district level to improve use of data and ownership
- Harmonization of different stakeholder through integration of data management

## Envisaged Data Flow



# Thank You

## Plan for Future- Mauritius

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HIS Strengthening Strategy and Plan 2009-2011 already endorsed  
 Multi sectoral Steering Committee met in June  
 Decided on way forward  
 Adhoc committee for finalise Implementation Plan next week

## Implementation

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- Implementation Plan :
- Activities, timeframe, responsibilities, resources, etc

### Overall objectives of HIS Strategy

- Coordinated approach to collection, analysis, dissemination and use of information
- Appropriately computerized system networking
- Decentralized analysis and use of information for monitoring and management of health services

### Overall objectives of HIS Strategy

- Health personnel trained in management and use of data
- Improved management of data through structured procedures and guidelines

## Opportunities

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- Year 2009 – important milestone for the health sector in Mauritius
- National Health Strategy – one of its 6 areas: “E-Health & Health Information System”
- PBB Framework – fully implemented

## Opportunities

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- Reproductive Health Strategy
- ISO – Manual of Operational processes (records)
- M & E Framework for HIV/AIDS

### Support required

- Capacity building in data analysis/reporting/interpretation/dissemination
- Data Management standard procedures and guidelines , metadata dictionary
- Training need assessment & training
- Data warehouse
- GIS for disease surveillance

### Acknowledgements

- The World Bank, IMF, donors
- Mr Ronald for continuous support and guidance
- Dr Arthur Heywood