

# INF5750 Oct 8 2007

HISP  
Health Information Systems Programme

Ola Hodne Titlestad  
olati@ifi.uio.no

# Overview of this lecture

- ✓ Conceptual design of DHIS
- ✓ DHIS in action, some examples of use
- ✓ Tools supporting the distributed DHIS 2 development
- ✓ Project groups and assignments
- And please interrupt me, **participation** is encouraged!

# Main components of a HIS

- ✓ An organisational hierarchy
  - ✓ Health facilities and administrative units linked together in a hierarchy
  - ✓ Typically the health facilities are located at the bottom of the hierarchy)
  - ✓ Health facilities (providing services) are the reporting units
- ✓ Datasets/forms/reports
  - ✓ Sets of data elements are collected together in specific forms that are used to report up the hierarchy
- ✓ The data flow
  - ✓ The data is aggregated at a given frequency at the health facilities and reported up one level
  - ✓ The other levels collate/summarise the data and report a summary report to the level above

# Orgunits

- ✓ The “units” that register data in the system
- ✓ Reflects a real life health facility, department/ward within a facility, or an administrative unit (district, province, national etc.)
- ✓ Has a name, opening date and an orgunit parent
- ✓ Other properties are dynamically assigned to orgunits via the orgunit groups

# Orgunit hierarchy

- ✓ A tree structure made up of child-parent relationships of orgunits
- ✓ Can have any number of levels (4-6 is typical)
- ✓ Mostly only the leaf nodes register data
- ✓ E.g. in Zanzibar the levels are
  - ✓ 1 – national
  - ✓ 2 – zone
  - ✓ 3 – district
  - ✓ 4 – health facilities

# Forms

- a data collection tool

- often also used as a report to present data

- summary of last period's activities (aggregated data)

- typically one form per health programme

- this is the RCH form used in Zanzibar filled by a PHC unit for 1 month of data

MINISTRY OF HEALTH AND SOCIAL WELFARE  
ZANZIBAR  
REPRODUCTIVE AND CHILD HEALTH SERVICES

Name of Health Facility: CH. MASINGINI District: NORTH A.  
Month: MAY No. of Working Days: 26

Family Planning Services

Method	No. of New Clients		No. of Continuing Users		No. of new clients Terms Dispensed
	15-24 yrs	≥24 yrs	15-24 yrs	≥24 yrs	
Oral Pills	0	0	0	3	18
Injection	0	0	1	13	
IUCD	0	0	0	0	14
Norplant	0	0	0	0	
Tubal Ligation	0	0	0	0	0
Condoms	0	0	0	0	
Other Methods	0	0	0	0	0

Pregnant Mothers Attendance

No. of First Visits	Prime Gravida	Multi Gravida
Before 20 weeks	1	5
After 20 weeks	0	7
<b>Total First Visits</b>	<b>1</b>	<b>12</b>
	Prime Gravida	Multi Gravida
Re-attendance	5	23

Intermittent Presumptive Treatment (IPT)

IPT at 20 - 28 weeks	14
IPT at 30 - 36 weeks	14

No. of Mothers at Risk

Problem	Total	Referred
EPH Gestosis / Pre-Eclampsia	0	0
Anemia	0	0
Malaria	0	0
Syphilis	0	0
Pregnancy below 18 years	0	0
Pregnancy above 35 years	2	0
Pregnancy ≥ 4 gravida	5	0
Pregnancy before 3 years	7	0

Daily Delivery Services

No. of Deliveries	Prime	Multi	Total
Attended by Skilled Personnel	0	0	0
Attended by TBA	1	2	3

No. of Live Births: 3  
No. of Still Birth Fresh: 0  
No. of Still Births Macerated: 0  
No. Weighed ≤ 2500gms: 0

Infant / Maternal Deaths

No. of Maternal Deaths	No. of Children died	1 - 28 days	1 - 11 Months	1 - 5 Years
		0	0	0

Postnatal Services

No. of Mothers attending Postnatal care	7 <sup>th</sup> Day	14 <sup>th</sup> Day	28 <sup>th</sup> Day	42 <sup>nd</sup> day
	6	2	1	0

Growth Assessment / Nutritional Status for Children under 5 years

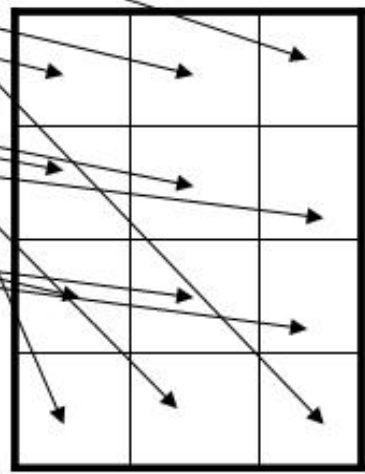
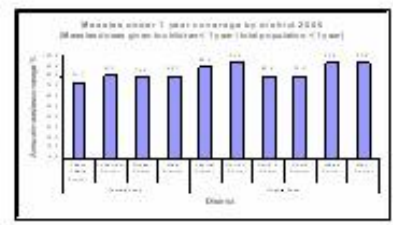
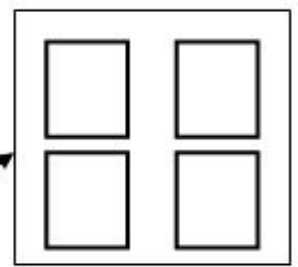
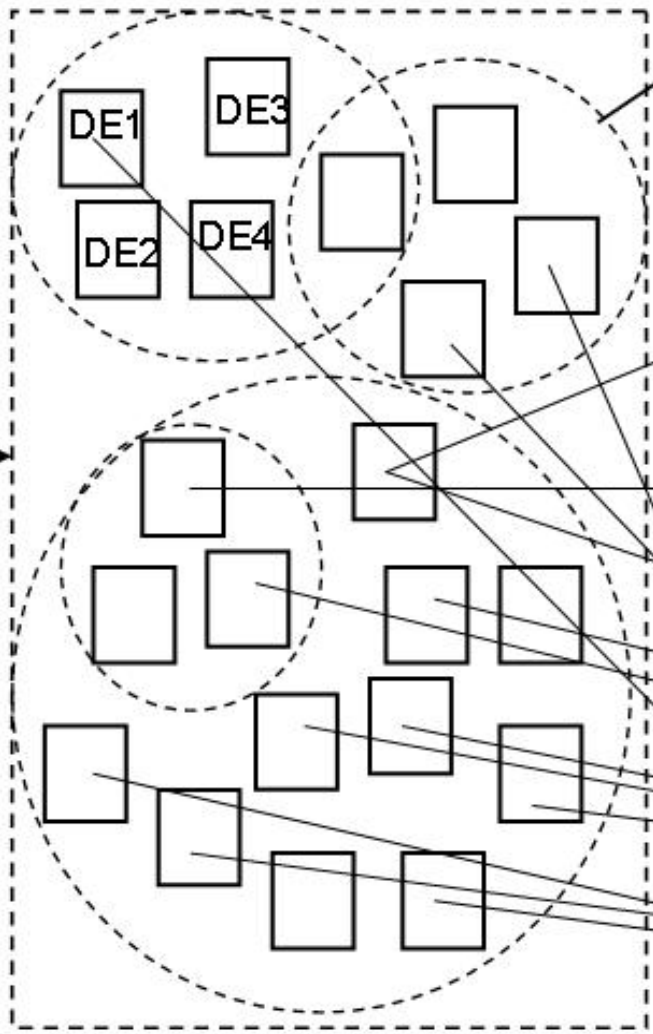
Age (Month)	Total Attendance (Male) 146				Total Attendance (Female) 136	
	Green		Grey		Red	
	Male	Female	Male	Female	Male	Female
0 - 11	52	48	16	12	0	0
12 - 23	32	32	7	6	0	0
24 - 35	24	20	2	6	0	0
36 - 60	9	10	2	2	0	0
<b>Total</b>	<b>117</b>	<b>110</b>	<b>29</b>	<b>26</b>	<b>0</b>	<b>0</b>

Name of Service Provider: K. Mwachamwa Designation: PHN/B  
Signature: [Signature] Date: 31/5/07

Data collection tool

DE1	DE2	DE3	DE4
DE1	etc.		

Data Elements and groups



# DHIS comp. of the form

- ✓ More fine-grained: break up the form into *data elements* with unique definitions
- ✓ A form is a collection of data elements (a data set)

DataValue

OrgUnitID	DataElementID	PeriodID	Value
1	1	2	10
1	2	2	9
1	3	2	9
2	1	3	17
3	1	3	22
Etc.			

DataElement

DataElementID	DataElementName
1	BCG < 1 year
2	DPT < 1 year
3	Measles < 1 year

OrgUnit

OrgUnitID	OrgUnitName
1	Blindern health station
2	Majorstua health clinic
3	Sogn health post

- Snowflake/Star database pattern
- Very flexible
- Data retrieval slower when huge amounts of data



# The flexibility of data elements

- ✓ Allows you to separate input (data collection) and output (analysis)
- ✓ Provides data analysis far beyond the standard collection tools (reports)
  - ✓ Use of Indicators to compare and monitor coverage etc.
    - ✓  $\text{BCG coverage} < 1 \text{ year} = \text{BCG} < 1 \text{ year} / \text{Population} < 1 \text{ year}$
  - ✓ Use of groups (compare categories of data and orgunits)
  - ✓ Dynamic view of the data in pivot tables, dashboards, ad-hoc reports etc.
- ✓ Allows you to dynamically deal with requirements changes and new areas of interest (key strength of HISP)

# The data value

- ✓ The actual numbers and text input stored in the system
- ✓ Has references to (which makes the value unique):
  - ✓ orgunit
  - ✓ data element
  - ✓ period
- ✓ The value itself can be number, text, yes/no etc. – number is by far the most common

# Data Set

- ✓ A collection of data elements
- ✓ Used to organise data entry (input)
  - ✓ 1 data collection tool (form) -> 1 data set
- ✓ Valid for a given frequency (monthly or quarterly or yearly or..)
- ✓ Assigned to orgunits (defines who can use it)

# Groups

- ✓ A collection of data elements, indicators or orgunits
- ✓ Used to organise analysis and reports (output)
- ✓ Represents various dimensions of the data
  - ✓ all data elements related to nutrition
  - ✓ all private orgunits
  - ✓ all hospitals
  - ✓ all indicators on immunisation coverage

# Group sets

- ✓ To structure how groups are organised
  - ✓ To group orgunits on specific dimensions
- ✓ Properties:
  - ✓ Compulsory / not compulsory
  - ✓ Exclusive / Inclusive
- ✓ E.g. the “Orgunit type” group set,
  - ✓ contains the orgunit groups: cottage hospital, district hospital, referral hospital, PHC unit, administrative unit
  - ✓ Is compulsory and exclusive: meaning all orgunit must be member of one and only one of the groups listed above

# Indicators

- ✓ Formulas based on data elements
  - ✓ coverage, incidence rates, utilisation rates etc.
- ✓ Improves data analysis:
  - ✓ enables comparison across facilities and geographical areas
  - ✓ very useful for monitoring progress against targets
- ✓ Target population often the denominator
- ✓ DHIS indicator:
  - ✓ Indicator Value = Factor x Numerator / Denominator
  - ✓ The factor depends on the indicator type:  
Rate (1), Percentage (100), Per 1000 (1000), per 100 000 (100 000)
- ✓ Annualised indicators:
  - ✓ Monthly data -> Multiply the factor by 12.
  - ✓ To estimate the annual value based on 1 month of data in the numerator and an annual value in the denominator (population)

# Indicator cont.

## BCG coverage under 1 year (annualised)

$$12 \times 100 \% \times \frac{\text{No of BCG doses given} < 1 \text{ y}}{\text{Population} < 1 \text{ y}}$$

### ✓ North A district:

✓ Population < 1 year:	1200
✓ No of BCG doses <1y Sep. 2007:	80
✓ <b>BCG coverage &lt; 1 year May 2007:</b>	<b>80 %</b>

### ✓ North B district:

✓ Population < 1 year:	1600
✓ No of BCG doses < 1 y Sep 2007:	100
✓ <b>BCG coverage &lt; 1 year May 2007:</b>	<b>75 %</b>

# Data aggregation and datamart

- ✓ The aggregation service provides aggregated data values for any **level** in the hierarchy and for any **period**
- ✓ E.g. a data value for the district level is the total of the data values collected for the health facilities at the level below, for a given data element and period combination
- ✓ Data can also be aggregated on period, e.g. to produce a quarterly report based on monthly values for any given data element and orgunit combination
- ✓ Managers at the various levels have different data needs and focus on different levels
  - ✓ A national manager will mostly analyse data at national (1) and zonal (1) level while a district manager will demand facility-based data
- ✓ Aggregated data are stored in “datamart” tables for quick access



# Data synchronisation (import/export)

- ✓ DHIS is often implemented as a loosely-coupled network of stand-alone installations
- ✓ Data values are sent upwards in the hierarchy using XML files (via e-mail, flash drives etc.)
- ✓ Names (of orgunits, data elements etc.) are used to synchronise metadata
- ✓ The **DXF**, DHIS Data eXchange Format is used for import and export of data values and metadata

# Data validation

- ✓ Data quality is a major issue in HIS
  - ✓ huge amounts of data
  - ✓ little time on data collection, focus on patient care
  - ✓ low “information capacity” at facility level in most developing countries
  
- ✓ Data validation in DHIS:
  - ✓ Data entry validation:
    - ✓ min/max ranges for each orgunit + data element
  - ✓ Validation rules:
    - ✓ No of still births < Total births
    - ✓ Can be run on many “forms” at a time
  - ✓ “Manual” validation through data presentation, e.g. pivot tables, graphs etc.

# Some examples of use

- ✓ The DHIS 2 online demo is available at
  - ✓ [www.hisp.info:8090](http://www.hisp.info:8090)
- ✓ The DHIS 2 wiki
  - ✓ <http://www.hisp.info:8080/display/DHIS2/Home>
- ✓ The DHIS 2 Trac
  - ✓ [www.hisp.info/dhis2](http://www.hisp.info/dhis2)
- ✓ Developer's mailing list archive
  - ✓ <http://www.hisp.info/pipermail/dhis-dev/>
- ✓ SCM mailing list archive
  - ✓ <http://www.hisp.info/pipermail/dhis-scm/>

# Distributed DHIS 2 development

- ✓ First release (2.0-M1) in February 2006
  - ✓ The current release is M8
- ✓ Core development so far mainly in Oslo
  - ✓ Master students, 1 employed programmer
- ✓ Participation in other nodes is increasing
  - ✓ India, a dashboard module, local modules for reporting
  - ✓ Ethiopia, special module for ICD-based data (MM module), local reports
  - ✓ Vietnam, local reports, active on the internationalisation module
- ✓ This semester we are “all” gathered in Oslo!
  - ✓ Abyot from Ethiopia
  - ✓ Bharath from India
  - ✓ Kim Ahn from Vietnam
  - ✓ Lars and Torgeir already in Oslo

# DHIS 2 communication platform

- ✓ The confluence wiki for collaborative documentation
- ✓ The Trac issue tracker for bug tracking and project management
- ✓ Subversion for source control management
- ✓ Mailing list for developers and a subversion commit-list (scm)

A typical infrastructure for larger open source projects

# Project Work

- ✓ Participate in real life project (HISP)
  - ✓ Interact with other developers, most are based in Oslo this semester.
  - ✓ Interact with users in various countries, depending on your task.
- ✓ Collaborate across the groups
  - ✓ many group tasks are related
  - ✓ some are dependent on others
- ✓ Use the DHIS 2 communication tools
  - ✓ to collaborate with other developers
  - ✓ to communicate within the HISP network

# Project Work

- ✓ Evaluation:
  - ✓ 3 project/group assignments
    - ✓ deadlines are Oct 26, Nov 16, Dec 14
  - ✓ An individual essay, Dec 14
  - ✓ We will monitor individual participation within the groups
    - ✓ - you have to contribute to pass the course
- ✓ Each group will be assigned a lab assistant for supervision and support
- ✓ You will have to use the collaborative tools to pass the assignments
  - ✓ Documentation on the wiki
  - ✓ Project plan and division of labour using the Trac issue tracker
  - ✓ Use the subversion repository for source code control

Q&A

Questions?

Thank you.