(H)DSS CONCEPTS AND METHODS

[(HEALTH) AND DEMOGRAPHIC SURVEILLANCE SYSTEM]

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What is HDSS

Set of field and computing operations to handle the longitudinal follow-up of well-defined entities or primary subjects (individuals, households, and residential units) and all related demographic and health outcomes within a clearly circumscribed geographic area.

- Site selection:
- Census: Define and register the target population
  - Collected at prescribed intervals
- Core system: Monitor population dynamics through routine collection and processing of information on births, deaths, and migrations
- Complementary systems: Collects various other data sets that provide important social and economic correlates of population and health dynamics:
  - Union formation
  - Asset, income
  - Education
  - Morbidity
Importance of HDSS

- Provide health information that more accurately reflects the prevailing disease burden;

- Assist in monitoring and tracking new health threats, such as emerging and reemerging infectious disease and drug resistance, and alert the health community to prepare response;

- Serve as a platform for action-oriented research to test and evaluate health interventions, such as new vaccines or drugs, health education messages and cost-effectiveness of initiatives.
HDSS Sites

- During the past 30 years, DSSs have been established in a number of field research sites in various parts of the developing world.

- Currently there are 37 DSS sites in 19 countries that are members of INDEPTH network.
  - 25 sites in Africa
  - 10 sites in Asia
  - 1 in Oceania and
  - 1 in Central America.
### HDSS Sites (contd.)

<table>
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<tr>
<th>Asia, C/America &amp; Oceania</th>
<th>Africa</th>
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<td>Chilillab DSS, Vietnam</td>
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What is INDEPTH network

- **INDEPTH Network**: International Network for the Demographic Evaluation of Populations and Their Health in developing countries.

http://www.indepth-network.net/

- The vision of INDEPTH is to harness the collective potential of the world's community-based longitudinal demographic surveillance initiatives in resource constrained countries. Collective work will provide a better, empirical understanding of health and social issues, and enable scientists to apply this understanding to alleviate the most severe health and social challenges.
CU, Boulder has institutional links with two DSS sites

- MATLAB HDSS, BANGLADESH
- AGINCOURT HDSS, SOUTH AFRICA
MATLAB HDSS, BANGLADESH

- It is recognized as the largest and longest sustained DSS.

- Matlab HDSS started operations in 1966 as a major component of the field research program of ICDDR,B.

- It has made significant contributions to health development in both Bangladesh and the rest of the world.
MATLAB: Objectives

- To provide a small-area registration system which is suitable for assessment of the effectiveness, safety and acceptability of maternal and child health and family planning interventions.

- To undertake research related to diarrhea diseases, and on the measurement and determinants of fertility and mortality.

- To develop a demographic field site that can be used for training of program planners, researchers and implementers.
Matlab: Site and Population (2005)

Located in Chandpur district. About 55 km southeast of the country’s capital, Dhaka.

- ~184 sq. km.
- 142 villages
- ~46,716 households
- ~224,762 people
- Avg. Hhold size: 4.8
- 88% Muslim
  - 12% Hindu*
- TFR: 2.8
- $e^0$: Male~66.8 years
  - Female~70.8 years
- 70% of Hholds are either landless or functionally landless (land<.050 acres)
- 30% has no formal schooling
- 12% farming (head of the household)
- Field visit every months
Matlab Site selection

- In 1960 Cholera Research Laboratory was established in Dhaka to develop a vaccine which would prevent, and eventually eradicate, cholera. An essential element of this program was the implementation of large scale controlled vaccine field trials. This required selection of a field site where certain conditions could be met, including the presence of endemic cholera and year round access to villages. Matlab Thana was chosen.
Matlab: Under five mortality (per 1000 live births)
Matlab: Main environmental issues

- Embankment divide the study area into two equal parts.
- Arsenic problem.
Data

- All vital events (birth, death, marriage, migration).
- Site of various health and population studies.
Agincourt HDSS, South Africa

- A rural subdistrict of Bohlabelo District, Limpopo Province, near Mozambican border
Started in 1992 as part of a program of decentralized health systems research and development.

By late 1990s, the Agincourt program was transformed to a site of advanced community-based research program to better understand the health and population dynamics in rural South Africa.
Agincourt site selection

- Its location, some distance from any tar road or township settlement;

- The presence of health center, with its satellite clinics and its potential to function as a referral network

- The need to develop rational pattern, delinked constraints imposed by homeland boundaries; and

- The presence of large numbers of Mozambicans, displaced by the recent civil war.
Agincourt site and population (2003)

- 400 sq km
- 21 villages
- \(~11,600\) Hholds
- \(~72,000\) people
- Avg. Hhold size: 6
- 31% Mozambican
  - 69% South African
- \(e^0\): Male~52 years
  - Female~60 years
- CDR (‘92-‘93): 5.0/1000
  - (‘03-‘04): 10.9/1000
  - 2003: 2.3
- 36% female headed household
- Visit annually
- 36% female headed household
- Visit annually
Individual level data

- Baseline census, 1992: updated annually
- Vital events (births, death, in and out migration): updated annually
- Cough (1999 – one screening question)
- Stroke (2001 – two screening questions)
- Temporary migrations (2002)
- Marital status – current and historical (2005)

Household level data

- Child Care Grants (2002, 2005)
AHDSS data storage

- All data are stored in Relational database which holds data in multiple interrelated tables;

- Every Table represents either an object (for example, a person, location) or an event (for example, birth, death, marriage);

- Data in different tables is connected not physically but logically. The logical connection between two tables is a field which both have in common;

- Every Table has a primary key which uniquely identifies each record in a given table.

- Use SQL or Microsoft Access to create a dataset for a research project or use programs like State or SAS to create dataset;

- Very complex configuration…need to very familiar with conceptual and concrete definitions within database to export datasets from relational database.
# Core Tables

## Object Tables
- Individuals
- Locations
- Households

## Event Tables
- Deaths
- Births
- Pregnancies
- Immigrations
- Out Migrations

## Episodes Tables
### Residences
- * Person at geographic location
- * Can start with a Enrollment (1992), birth or in migration
- * Can end with death or out migration

### Memberships
- * Person’s membership to a household
- * Can start with a Enrollment (1992), birth or in migration
- * Can end with death or out migration or change of household head

### Union Episodes
- * Person in union with one and only one other person
Figure 2: Trend and Age Profile of Mortality. Trends in Expectation of Life at Birth B. Age-Specific Mortality Rates, 1992-2005

Over the study period mortality has worsened significantly, Figure 2 panel A. For women expectation of life at birth has fallen from something around 70 to about 60 years between the mid 1990s and 2005. For men the drop was from about 65 to 52 years. Both sexes lost about 12 years of life. Almost certainly the mortality of women (and probably men too) in the early period of the study was underestimated resulting from errors in data management and recording of death, in particular data for 1992 and 1993 should not be trusted.

The age profile of mortality between 1992 and 2005 is displayed in Figure 2 panel B. Child mortality is comparatively low with little sex differential. The risk of dying from childhood through roughly age 25 is roughly equal for women and men, and then the mortality for men rises sharply while the mortality of women plateaus. At all ages older than 25 male mortality exceeds female by a
Figure 1: Trend and Age Profile of Fertility

A. Trends in TFR, CBR and CDR

Over the study period fertility has fallen by about one child per woman from a TFR of roughly 4 to less than 3, Figure 1 panel A. The crude birth rate has similarly fallen from about 32 to 25 per thousand. These overall reductions are reflected at all ages, Figure 1, panel B.