# The role of health and demographic surveillance systems in global health research

On behalf of researchers from 46 Research Centres running 53 HDSS sites in 20 LMICs in Africa, Asia and Oceania



## University of Southampton, UK 16 June 2016

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## INDEPTH Network

Better Health Information for Better Health Policy







### Data sources For Births & Deaths Data



#### Population-based

#### Institution-based



## How can we do this?

### Stepping stones to a civil registration with vital statistics system

#### Sentinel registration

(e.g. urban/rural demographic surveillance sites) Not representative of the population







### Health and Demographic Surveillance System

### Out-migrate after 6 months



### Initial Census

(Unique ID given) (Rural/Urban/ Peri-Urban)



their outcomes



## **HDSS Core Equation**



Follow up of pregnancies and

#### 1

0

## **Examples of Observed Exposed Intervals** Follow-up of an individual (Person Years)







## **Population Data Structure – HDSS Participants**

#### Unique ID given

### Household



Measurements



# How does a Sentinel HDSS operate?

- Typical size: > 60,000 population, larger if urban
- Initial census using GPS for households
- 50 community Key Informants, 25 HDSS professional enumerators, 15 supervisors, 5 data entry clerks, and administrative staff.
- 2-4 number of update rounds or household visits per year
- Events by cause, age, sex all linked to resident population
- Annual recurrent core costs: ~\$200,000 USD.





# **Outputs from an HDSS**

All cause mortality rates Life table probabilities Fertility rates Migration rates





- Cause-specific mortality proportions & rates



## **Other HDSS Outputs**

- ✓ population characteristics
- Invite the set of t
- health status / burden of diseases
- ✓ access, use and impact of health services
- In the set of the s
- environmental contexts, risks, exposures
- household food security
- impact of poverty reduction strategies
- impact of health interventions





## **INDEPTH Member HDSS Sentinel Surveillance Countries**

### Over 3,500,000 people under continuous surveillance in INDEPTH Network



### Through INDEPTH to diverse countries and continents

#### www.indepth-network.org





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## Location of sites in Ghana Navrongo, Kintampo & Dodowa (HDSS sites)



Better Health Information for Better Health Policy

# **Research Strategy**



- Studies conducted use the key demographic outcomes measured by HDSSs:
  - fertility, all-cause and cause-specific mortality (ICD10),
    - morbidity and mobility.

- As a Network, priority is given to:
- Answering questions that require research in more than one HDSS
- Comparative Analyses (within countries, across nations, continents).







# **Structuring the Science**

**Observational work:** denominators, vital events and contextual variables

inherent in HDSSs

evaluations

Health and social policy and programmes: Apply findings to health and

development with support to scaling-up

health service data, etc.

**Development of sub-cohorts** (e.g. adult, adolescent or household cohorts) Intervention-research: including community-based trials, and systems and policy

- Methodological innovation: verbal autopsy, the linking of population-based and







# Example - INDEPTH Cause of Death Data (2014) The largest dataset ever - available



## INDEPTH Data Repository: www.indepth-ishare.org

#### Age-sex-time standardised cause-specific mortality fractions (CSMF) for major cause of death 16 groups for children aged 1-4 years at 18 INDEPTH sites during 2006-2012.



## **INDEPTH HDSS** sites in Africa and Asia, by sub-category of non-communicable diseases causing

Africa Centre, South Africa Kisumu, Kenya Navrongo, Ghana AMK, Bangladesh Chakaria, Bangladesh Matlab, Bangladesh Kilifi, Kenya Karonga, Malawi Farafenni, The Gambia Agincourt, South Africa Ballabgarh, India Dodowa, Ghana FilaBavi, Vietnam Ouagadougou, Burkina Faso Taabo, Côte d'Ivoire Bandarban, Bangladesh Niakhar, Senegal Nouna, Burkina Faso Nairobi, Kenya Vadu, India Kilite-Awlaelo, Ethiopia



Age-sex-time standardised mortality rates per 1,000 person-years among adults (15 years and over) in 21





# Science: Working Group Strategy

- 1. Adult health & Aging
- 2. Migration & urbanization
- 3. Vaccination & child survival
- 4. Antibiotics Resistance
- 5. Cause of death determination 10. Social Determinants of Health



- 6. Environment & health / Climate
- 7. Sexual & Reproductive Health
- 8. Health Systems
- 9. Maternal & Newborn Health

# **Capacity Strengthening and training** Help individual centres to publicise their research and results for greater policy influence.

And at a broader network level, we assist centres in developing regional groups and teams.



At a multi-centre level, our workshops train data managers and analysts and help develop the next generation of HDSS professionals.



## We support Masters/PhD Training... • Masters Training

- School of Public Health, University of the Witwatersrand, Johannesburg, South Africa (44 graduates)
  - JP Grant SPH at BRAC University, Bangladesh (2 graduates)

Health Economics and Health Care  $\bigcirc$ Management at Chulanlongkorn University in Bangkok, Thailand (2 graduates)

# PhD training support (direct or nested in Working Groups)







![](_page_19_Picture_12.jpeg)

#### WE WANT TO BE ABLE TO SUPPORT MORE...

- Vaccination & Child Survival (EU & DANIDA)
- **Effectiveness and safety studies of antimalarials (Gates Foundation)**
- Genomics (NIH, US)
- Maternal & Newborn Health (CIFF)  $\bullet$
- Household out of pocket expenditures (Gates Foundation)
- **Antibiotics Resistance (Wellcome Trust/VW Foundation)**

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![](_page_20_Picture_8.jpeg)

![](_page_20_Picture_9.jpeg)

![](_page_21_Picture_1.jpeg)

INDEPTH/MCTA – Several INDEPTH centres participated in the RTS, SVACCINE TRIALS

**Existing capacities at some Centres – eg. Navrongo - Clinical Trials Unit** 

Long-term neurocognitive assessment of children following an episode of severe malaria

![](_page_21_Picture_5.jpeg)

![](_page_21_Picture_6.jpeg)

# **Innovation: CHESS**

- Integration across population and health facility data systems:
- Inking demographic, mortality, morbidity, clinical, laboratory, household and other contextual data unique electronic individual identification system

![](_page_22_Picture_3.jpeg)

![](_page_22_Picture_5.jpeg)

# Innovation: sub-cohorts

Sub-cohorts within full HDSS populations will be

![](_page_23_Picture_5.jpeg)

- followed
- monitor morbidity incidence
- Collect clinical data and laboratory specimens

![](_page_23_Picture_10.jpeg)

![](_page_23_Picture_11.jpeg)

# Innovation: CHESS, a combined system <sup>25</sup>

![](_page_24_Picture_5.jpeg)

- •The system will provide:
- In the second second
- determine population-based disease and
- etiology-specific incidences and mortality

![](_page_24_Picture_10.jpeg)

# **INDEPTH** in the near future

### **Comprehensive Health and Epidemiological Surveillance System (CHESS)**

![](_page_25_Figure_2.jpeg)

![](_page_25_Picture_3.jpeg)

![](_page_25_Figure_4.jpeg)

![](_page_26_Picture_0.jpeg)

# Health and Demographic Surveillance System

## (Sankoh & Byass, 2012, Int. Journal of Epidemiology)

## **Comprehensive Health and Epidemiological Surveillance System**

(Sankoh et al, 2015, The Lancet Global Health)

![](_page_26_Picture_6.jpeg)

![](_page_26_Picture_8.jpeg)

# **Use HDSSs in Global Health Research**

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![](_page_27_Picture_2.jpeg)

strengthens

# **Expanding Footprint of HDSSs**

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Associate Members

# Thank you!

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#### www.indepth-network.org

![](_page_29_Picture_3.jpeg)