One Health Units and Brucellosis in Kenya

Dr. Stella Kiambi, BVM, Msc
Zoonotic Disease Unit
Kenya

Introduction

One Health Concept

Drive for OH in Kenya

Brucellosis in Kenya

Brucellosis project
Introduction
Kenya- Geographic Attributes

- Total landmass 582,650 km².
- 80% of the landmass is ASAL that supports domestic animals and game.
- 30% of Kenyan population live in ASALs and derive virtually all their livelihood from animal resource.
Human Livestock Demographics

- Human population
  - 39 Million (Kenya Bureau of Standards, 2009)
  - Average annual population growth rate 2.6%
  - Population density 71 people per sq km
- Livestock populations
  - Cattle 18 million
  - Sheep 18 million
  - Goats 28 million
  - Camels 3 million
  - Poultry 30 million
  - Swine 0.3 million
  - Wildlife Biodiverse
One Health Concept

Convergence of the Human-Animal-Environment Interface
Definition of One Health

- “the collaborative efforts of multiple disciplines working locally, nationally and globally to attain optimal health for people, animals and our environment” (AVMA, 2007)

- Other names for One Health: One Medicine, One World One Health (OWOH), Conservation Medicine, Eco-health & VPH etc
Why One Health approach

- Majority (60%) of infectious problems of humans are shared with animals.

- Emergence and re-emergence of diseases and pathogens such as HIV virus, SARS, HPAI virus, H1N1 Virus, RVF, Ebola, Lassa, Marburg.

- Growing concern owing to the continued neglected diseases like brucellosis, cysticercosis, trypanosomosis, coxiellosis, anthrax, rabies.
Drive for One Health in Kenya

- The global pandemic threat by H5N1;
  - 1st coordinated One Health activity- CP developed
- Saw the establishment of the National Avian Influenza Task force in 2005.
- Multisectoral/ Multidisciplinary body comprising over 24 agencies and bodies.
- Rift Valley Fever outbreak in 2006/07;
  - Multi-sectoral collaboration derived from the National Task Force
- Ad hoc response to zoonoses outbreaks due to lack of integrated government structure
Legal Framework for One Health in Kenya

- **Meat Control Act** administered by veterinary services for control of meat & meat products for human consumption.

- **Public Health Act** administered by Ministry of Public Health analogous to Meat Control Act.

- **Rabies Act** requires Veterinary Officers to notify the Medical Officer of Health of any cases of rabies in domestic animals.

- Confirmatory rabies diagnosis in humans has historically been done in the Central Veterinary Laboratories.
Institutionalization of One Health in Kenya: Zoonotic Disease Unit (ZDU)

- **MOU**: Signed by MoPHS and MoLD in Aug 2011

- **Housing**: Office constructed on government land and officially opened by the Minister for MoLD and Minister for MoPHS – Oct 2012

- **Staff**: Epidemiologists deployed by government

  **Support staff**: Admin Assistant and Data personnel
Zoonotic Disease Unit (ZDU)

- **Mission**: To establish and maintain active collaboration at the animal, human and ecosystem interface towards better prevention and control of zoonotic diseases

- **Vision**: A country with reduced burden of zoonotic diseases and better able to respond to the epidemics of emerging infectious diseases
Launch of the ZDU

Hon. Minister, MOLD and Hon. Minister MoPHS officially open ZDU office
Strategic Plan for Implementing OH in Kenya (2012-17)

Objectives:

- Strengthen surveillance, prevention and control of zoonoses
- Establish structures and partnerships to promote OH
- Conduct and Promote Applied Research

To download visit [WWW.ZDUKenya.org](http://WWW.ZDUKenya.org)
Brucellosis in Kenya

Although endemic in Africa, brucellosis data in Kenya is scarce

Huge Public health problem owing to:

- Weak laboratory diagnosis (human diagnosis)
- Non standardized control in animals
- Vaccination not widely done; if any??
- Test and slaughter/ culling not practical
Brucellosis in Kenya...

- Brucellosis included in IDSR for monthly reporting in March 2011
  - Sentinel surveillance; yet to be established

- Enlisted as a notifiable disease in livestock (April 2011)

- Control strategy, yet to be developed
### Febrile Diagnostic kit® vs. Polymerase chain reaction (PCR)

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>22</td>
<td>100</td>
<td>122</td>
</tr>
<tr>
<td>Negative</td>
<td>37</td>
<td>225</td>
<td>262</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59</td>
<td>325</td>
<td>384</td>
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- **Sensitivity**: 37%
- **Specificity**: 69%
- **Concordance**: 0.03
- **Predictive value positive**: 18%
- **Predictive value negative**: 86%

Yields from evaluation of rapid kit used at Ijara District Hospital, 2011 (Thesis work: Stella Kiambi)
Collaborating institutions

- Zoonotic Diseases Unit (Coordinating)
- Ministry of Livestock Development
- Ministry of Public Health and Sanitation
- CDC/KEMRI
- Training institutions (FELTP)
- Funding: United States Department of Defense, Defense Threat Reduction Agency (DTRA)
Multi-Sectoral, Multi-Disciplinary Brucellosis Planning Team
Phase 1

Sero-prevalence survey with following objectives:

- To determine the baseline sero-prevalence of brucellosis in humans and animals
- Identify the factors of infections with *Brucella spp* in animals and humans
- To evaluate the community knowledge attitude and practices with regard to Brucellosis
Phase 2

Incidence study with the objectives:

- To determine the incidence of human and animal brucellosis
- Determine the socio-economic impact of brucellosis in both human and livestock populations
- To determine the circulating brucella serotypes
- Validate the appropriate human diagnostic kits
Research output (sero-prevalence and incidence studies)

• Establish burden of brucellosis in humans and livestock

• Determine the incidence and factors associated of brucellosis

• Determine the socio-economic impacts of brucellosis infection

• Determine the brucella spp contributing to infections and possible transmission pathways

• Establish the appropriate diagnostic test for brucellosis
Phase 1: Pre-study Planning

- Weekly planning meetings (multi-sectoral)
- Standard Operating Procedures developed
- Survey manual developed
- Series of trainings and workshops
- Good clinical practice training carried out
- Field work (Nov-Dec 2012)
Materials and Methods

- **Study design:** Cross-sectional survey
- **Study sites:**
  - **Kiambu County**
    - Considered low risk; Peri-urban small holder system
    - Animals mainly on zero grazing
  - **Kajiado County**
    - Considered high risk county
    - Land tenure, mainly communal with little crop farming
    - Pastoralism is the main livestock keeping system
- No animal vaccination for brucellosis in these counties
Sampling

- Two stage cluster sampling by sub-location and household
- Random selection of sub-locations after stratification by livestock production system
- GPS handsets used to locate the pre-determined geo-codes
- Random selection of households
- Interviewing - Household/compound head and additionally to each consenting/assenting human before sampling

*HH= Household*
Methods....

- **Human specimen collection** on all enrolled HHs
  - Three humans ≥ 5 yrs of age per HH

- **Animal specimen collection** in enrolled HHs
  - Up to 15 animals of each eligible species (cattle, sheep, goats, camels)

- Data collection using a standardized questionnaire on PDAs
Study Coordination structure

Brucellosis coordinating team

ZDU

Brucellosis National coordinator

Kiambu County Coordinators (DVO & DMOH)

Kiambu County Supervisors (Vet & Medic)

Team leaders (Most senior in the team Vet or Medic)

Kajiado County Coordinators (DVO & DMOH)

Kajiado County Supervisors (Vet & Medic)

Team leaders (Most senior in the team Vet or Medic)
Teams composition

- There were 10 teams in total, with 5 teams per county
- Each team consisted of seven staff:
  - A Health worker (nurse/ clinical officer)
  - Two veterinarians/paravets
  - A Lab technologist
  - A guide
  - Two animal handlers
- Roles for every team member were elaborated
Explaining the study

I wonder what these people want!
Field session: Data collection
Questionnaire administration (PDA)

This phone is too big!
Human sampling
Cattle sampling
Samples collected and shipped to appropriate labs

<table>
<thead>
<tr>
<th>County</th>
<th>Human samples</th>
<th>Livestock samples</th>
<th>Total samples</th>
<th>No. of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiambu</td>
<td>1210</td>
<td>2005</td>
<td>3304</td>
<td>494</td>
</tr>
<tr>
<td>Kajiado</td>
<td>813</td>
<td>3513</td>
<td>4331</td>
<td>310</td>
</tr>
<tr>
<td>Total</td>
<td>2023</td>
<td>5518</td>
<td>7635</td>
<td>804</td>
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Laboratory

• All samples logged into a database within CVL
• Human sera - ELISA (IBL America ELISA
  • CDC Kisumu lab Kisumu
• Animal sera - by cELISA (Svanovir ELISA)
  • Central Veterinary lab in Kabete
NB: Testing to commence soon
Phase 2: Incidence study

- To commence in 2013
Acknowledgement

- Principal Investigator - Dr. Kariuki Njenga
- CDC/KEMRI
- Department of Veterinary Services
- Department of Public Health and Sanitation
- Local administration
- Local guides
- Hospitals
- Study team
- Communities and study participants of Kiambu & Kajiado Counties
- Transport Company
- Any other person that may have assisted in the study in any way
“There is no dividing line between the medicine of different species, nor should there be.”

Virchow