

# **Anthrax Outbreak Investigation and Response**

**Nakuru East sub-county**

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# Introduction

- Anthrax; a Neglected Zoonotic Disease
- Enzoonotic to most parts of Africa including Kenya
- Anthrax in animals- Acute syndrome resulting in death in 1-3 days
- Anthrax in humans- occurs in 3 forms i.e.

GIT(enteric/oropharyngeal), cutaneous, inhalation forms.

- Disease of antiquity- 5<sup>th</sup> biblical plague, 1<sup>st</sup> disease to meet Koch's postulates

# Public health importance



- *B. anthracis* is a category A agent (CDC)
- Mortality indices; GIT (25-60%), inhalation (85%), cutaneous <1%
- Among top 13 most important zoonoses to African farmers (ILRI)
- Incidence unknown due to nature of occurrence, WHO estimates;
  - In Europe 10 livestock cases = 1 human cutaneous case
  - In Africa 1 livestock case = 10 human cutaneous and enteric cases

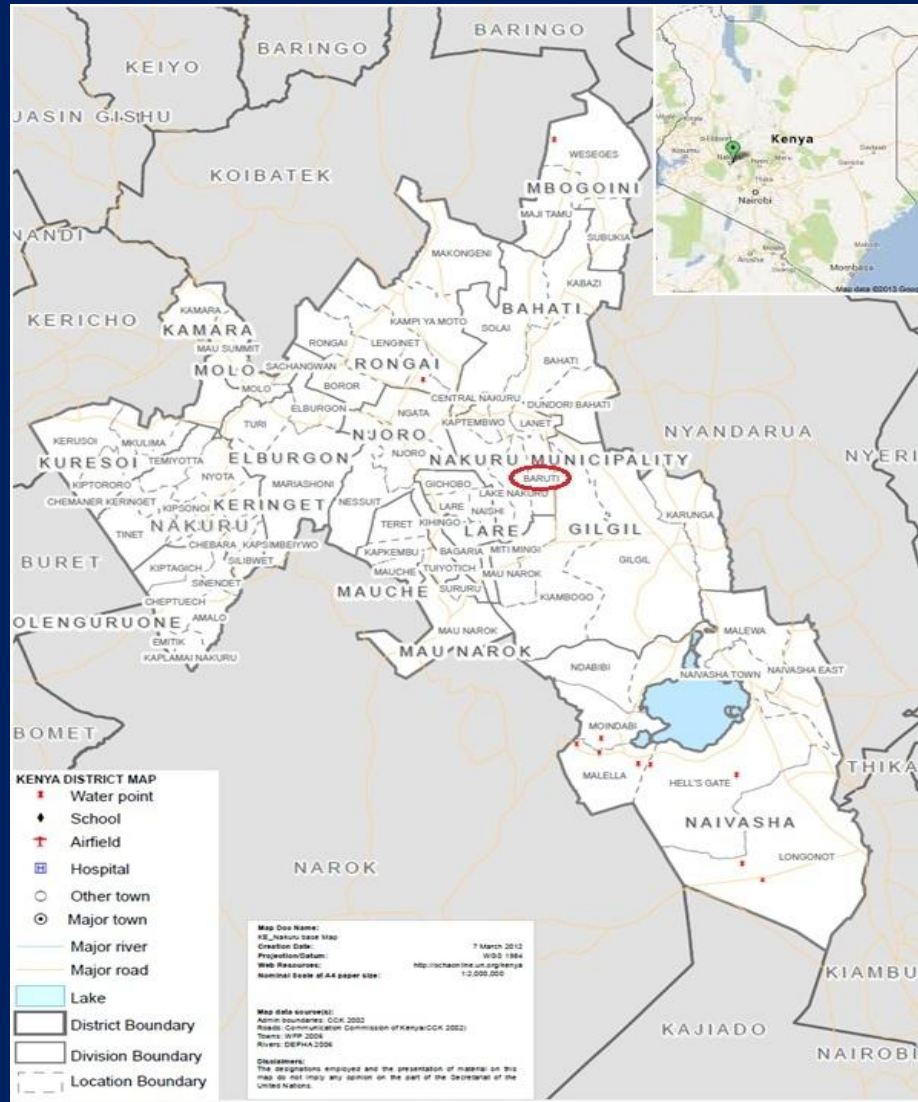
# Justification for investigation

- 24th Feb 2014, request made by the DDSC Nakuru to the ZDU investigate and assist in response to the outbreak

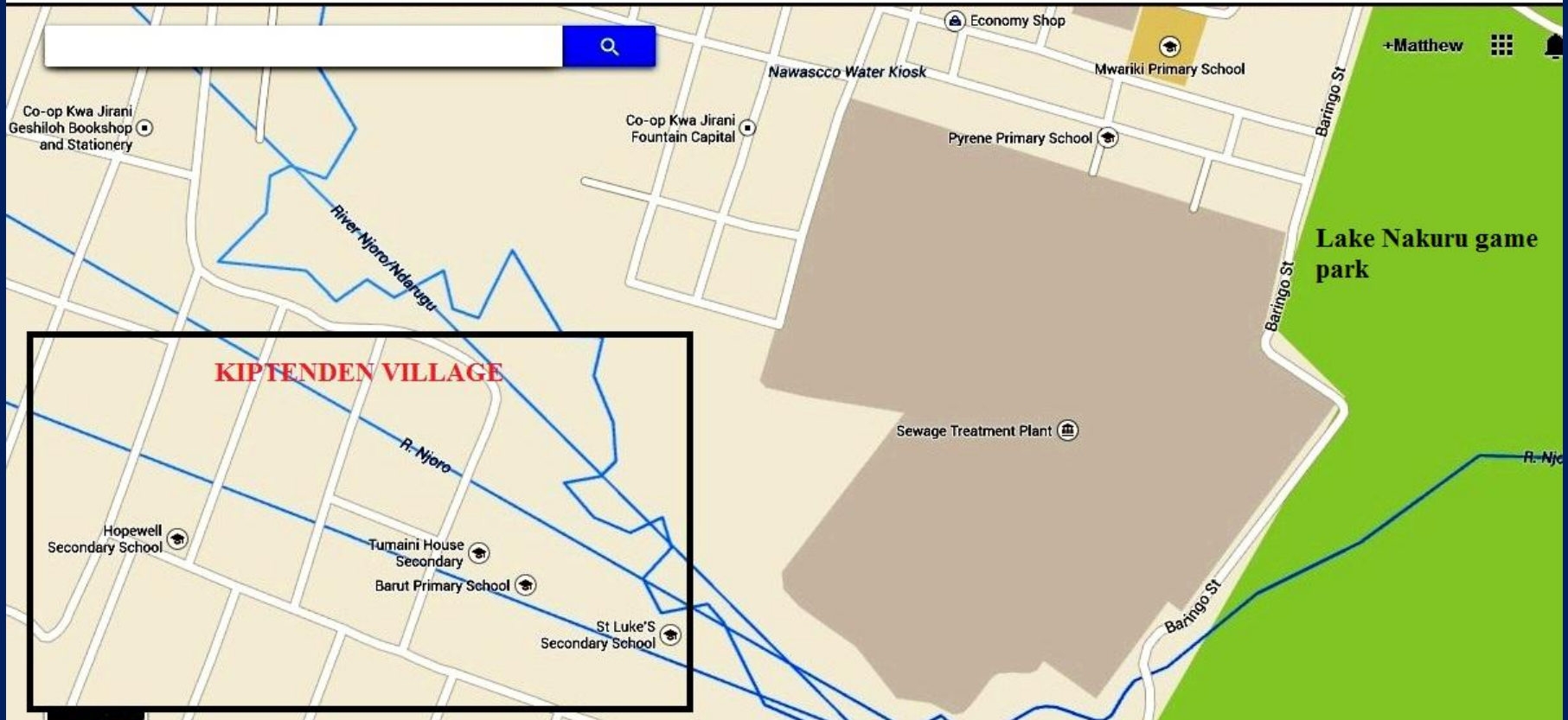
## Objectives

- To characterize the outbreak in time, place and person.
- To determine risk factors for anthrax among humans and humans.
- To obtain affected-area data for environmental factors
- To institute control and prevention measures.

# Study area 1/2



# Study area 2/2



# Study designs

- Retrospective cohort study
- Ecological study- Convenience soil sampling of herding area
  - Retrospective review of rainfall records

## Case definitions

- We adapted CDC case definitions for humans, OIE for animals

## Case finding

KII, Linear snowballing

# Results- 1. Human investigation

- 16 suspect anthrax cases

## **Socio-demographic information**

- 94% male

- Median age 33 years (4-65) 3< 10 years

- All - informal employment, 83% quarry miners

- None had more completed secondary school education



# Results

- **Clinical results**

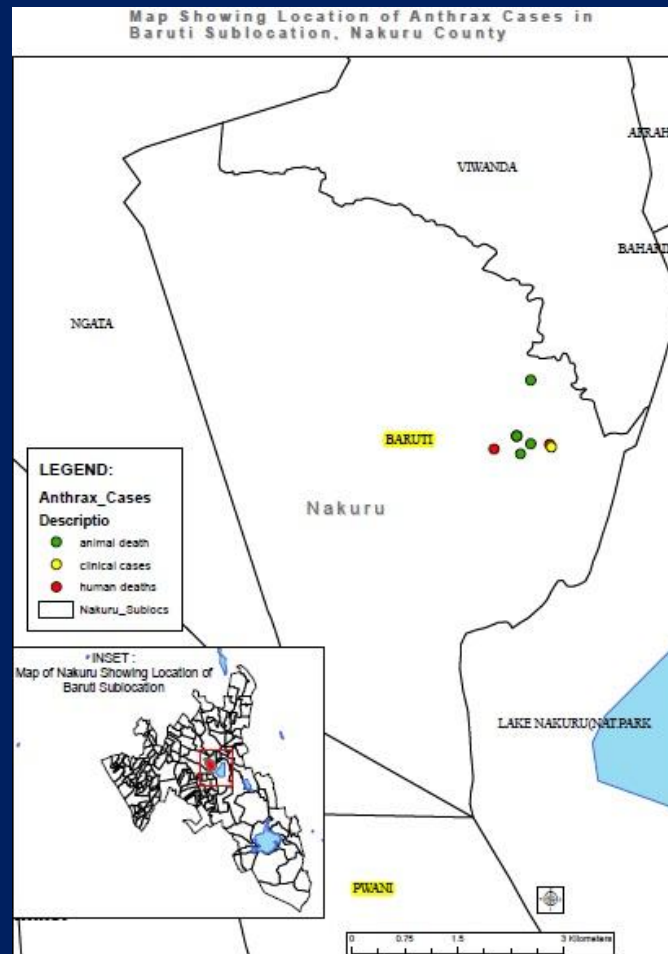
- Two suspect cases died; CFR 13%

- Six probable cases (link to confirmed animal anthrax); AR 38% ;

3 cutaneous symptoms only, 2 had GIT + cutaneous, 1 had oropharyngeal

- Average incubation period in days; 2 cutaneous, 1 GIT and 6 oropharyngeal

# Spot map of human and anthrax animal cases



# Picture 1- Cutaneous anthrax at nape





# Picture 2-cutaneous anthrax right hand





## Picture 3- Swelling of sub-mandibular glands



# Picture 4- Painful swallowing

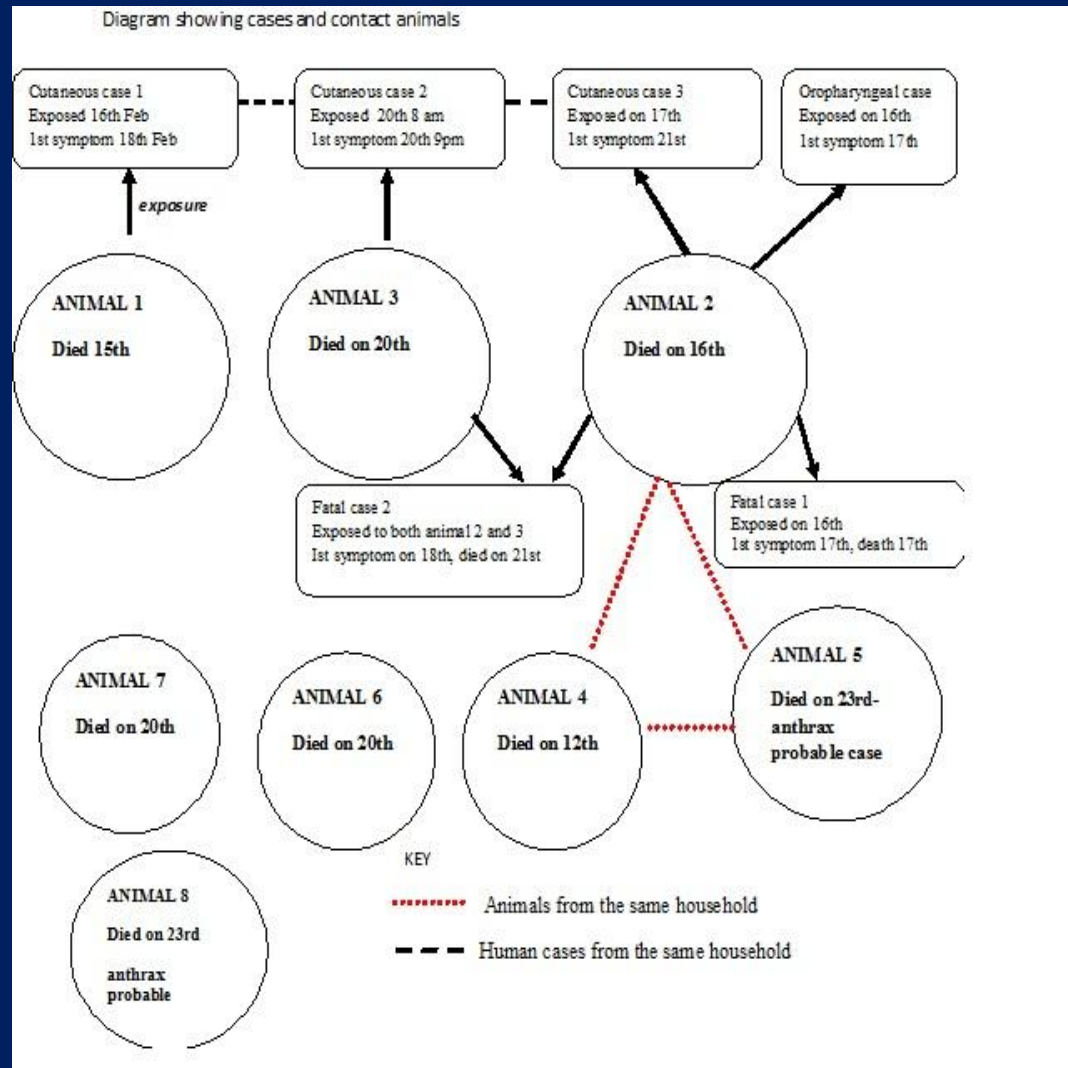


# Sampling of cutaneous cases





# Epidemiologic linkage





# Risk factor information

- 38% of those who were involved in either slaughtering and handling raw meat developed cutaneous clinical symptoms
- 17% of contacts who ate the meat from dead animals developed clinical symptom of GIT anthrax and one (8%) had oropharyngeal anthrax.
- Handling raw meat (RR 5.3,  $P \geq 0.05$ ) and lack of knowledge on anthrax (RR 5.4  $P \geq 0.05$ )

# Results- 2. Ecological sampling

- The global distribution of anthrax is largely determined by soils with high calcium levels and a pH above 6.1, which foster spore survival
- Anthrax Incubator area hypothesis (Van Ness)

pH range	6.24-7.3	Neutral to alkaline pH
% Na	0.28-0.49	Medium levels
% Organic matter	1.42-2.43	Slightly high
Cmol/kg K	2.5-3.8	Very high
Cmol/kg Na	0.6-1.2	High
Cmol/kg Mg	1.4-2	Very high
Cmol/kg Ca	5.84-7.1	Very High

# Results 3- Animal investigation

- A total of 8 animals died, 2 animals lab confirmed by microscopy
- None of the animals had been vaccinated for anthrax
- 7 (88%) production system was semi-zero grazing,
- source of water was borehole for 1 (12%) animal, the rest of the animals drank during grazing from river Njoro
- 5(63%) of the suspected anthrax cases were sexually mature and all were female; remaining 3 animals were male

# Dead cattle



# Control measures

- 5000 doses of anthrax vaccine-partner support (CDC, IHAP)
- Public education
- Disinfection of sites where animal died- Lime and commercial hypochlorite
- Referral of probable cases for free treatment



# Public education during a probable case funeral



# Referral of suspect cases for check-up



# Theories on source of outbreak

- Feeding next to Nakuru Commercial treatment plant
- Drinking from contaminated river Njoro
- Seasonal occurrence



# Cow feeding to sewage treatment pond



# Acknowledgments

- -FELTP -Office of the county director- MOH Nakuru
- -ZDU -Office of the county director-MALF,Nakuru
- -CDC -Medical superintendent, NPGH
- - DVO office Nakuru- East
- - OOP staff, Barut East
- -NPGH Public health office
- -Public health office Nakuru county