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1 - 3 November 2021

Cost Effectiveness of Policy Options for Anthrax Vaccinations in Uganda

Amanya Geofrey, MSc. Epi

Epidemiologist

Ministry of Health Uganda

Introduction

Anthrax: Disease

- A zoonotic disease
- Bacillus anthracis is transmitted to humans through
  - Handling or
  - Eating meat from infected animal carcases
  - Breathing in spores
- In Livestock, high case fatality rate 80%

Introduction

Anthrax- Economic / Agricultural importance:

- 80% Ugandans relies on Agriculture
- Agriculture and animal husbandry contributes to 17% national Agriculture GDP
- 50% of Ugandan population depend on livestock
- Government loses $140 per person in the management of complex anthrax cases in humans
- <10% vaccination coverage of livestock, in at-risk areas in Uganda
- Less than 80% the WHO recommended coverage

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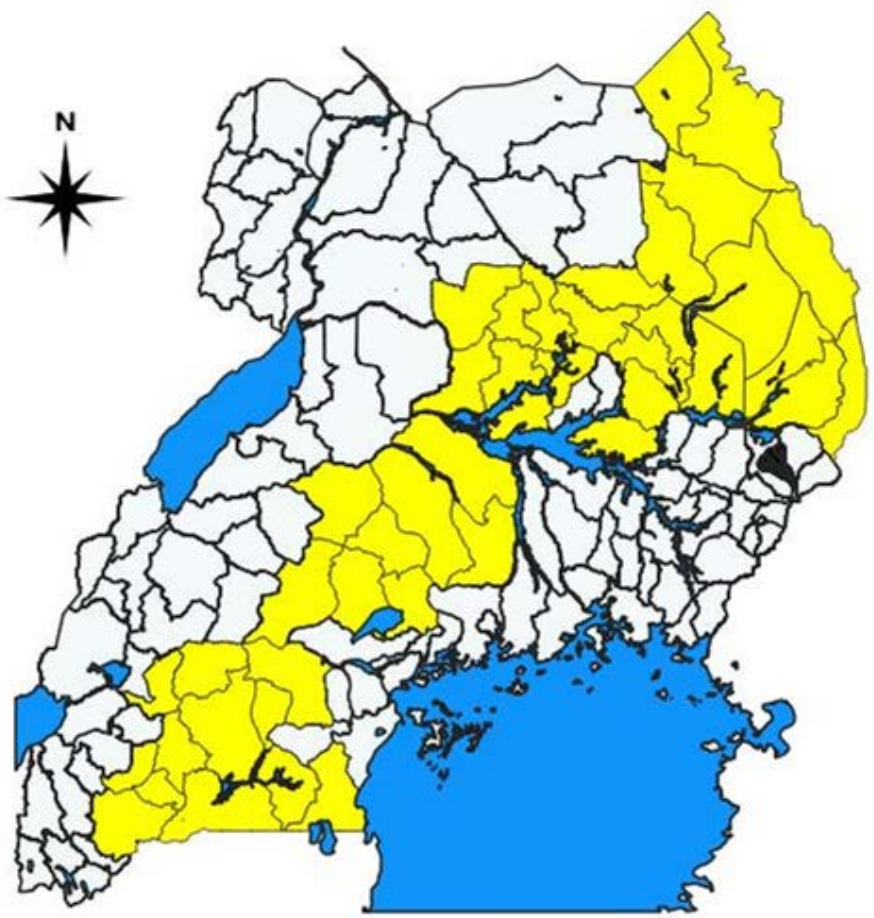
Introduction

Anthrax in Uganda



- Uganda lies in the East-West Anthrax Belt
- Re-occurrence of 3-5 anthrax outbreaks both in humans and animals since 1950's
- Anthrax is classified as a "private disease" Different from FMD and rabies.
- As a "private good disease"
    - - management of Anthrax is by farmers
- Re-classifying anthrax as a public good diseases would control anthrax

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Methodology

Policy Options Analysis and Economic Evaluation:

Option 1: Status- Quo

- Management and Care for animal left to farmers

Option 2: Vaccination of 100%

- 100% Vaccination of livestock
- Community Sensitisation
- Prophylaxis
- Safe carcass disposal

Option 3: Vaccination of 80%

- 80% Vaccination of livestock
- Community Sensitisation
- Prophylaxis
- Care & management for government

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Methods

Anthrax- Assumption	Value	Sensitivity Analysis (High, Low)
Population of Livestock in Uganda	34,000,000	-
Proportion of animals vaccinated Status QUO	0.17	-
Proportion of animals infected if Vaccinated	0.0014	0.001-0.002
Proportion of animals infected if NOT vaccinated	0.9	
Proportion of Animal Anthrax treated	0.015	0.010-0.020
Proportion of Anthrax Animal are slaughtered annually	0.1	0.010-0.970
Animal-Human Anthrax infections	2	1.000-3.000
Proportion of Human-Anthrax treated	0.95	
Proportion of Human -Anthrax death if treated	0.005	0.000-0.010
Proportion of Human -Anthrax death if NOT treated	0.125	0.050-0.200

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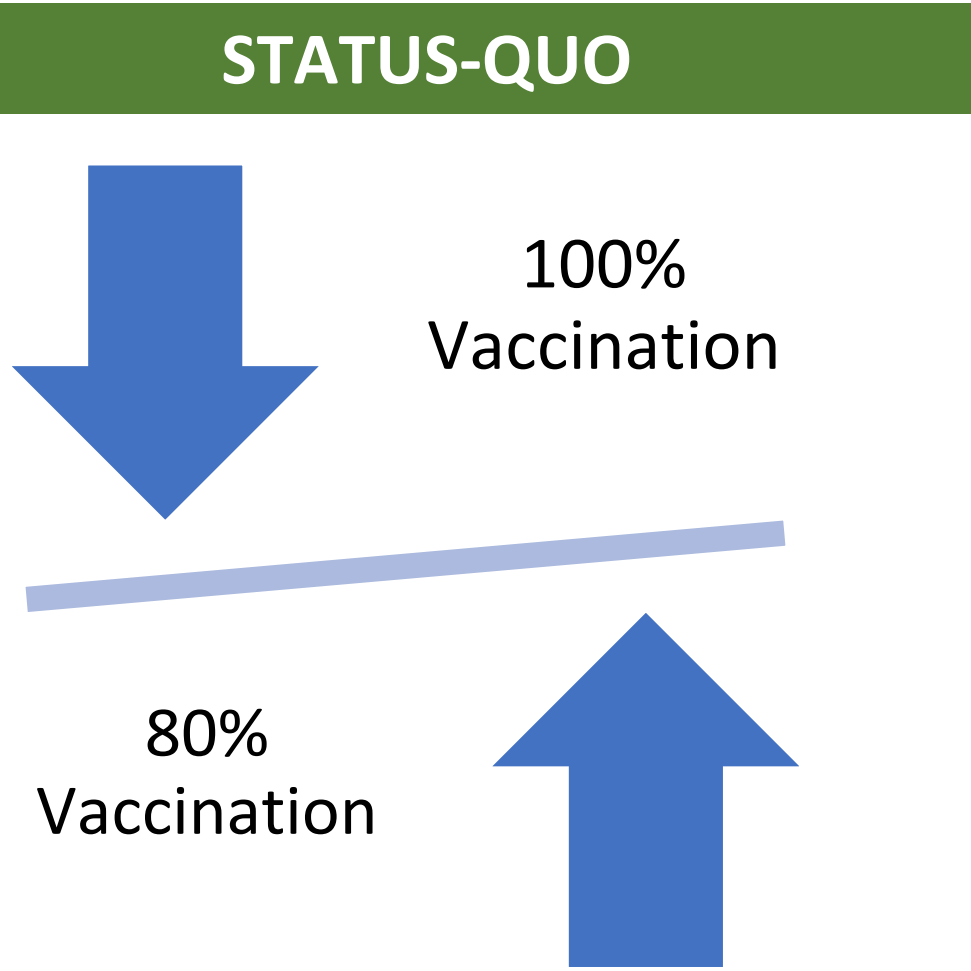
Methods

Economic evaluation and modelling:

- Multiple decision criteria
  Cost – Incremental Cost effectiveness ratio(ICER)

- **Outcomes**
  - Cases averted
  - Deaths averted
  - Averted transmission to humans

- **Payer Perspective**
  - Government Perspective



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Results: Cost effectiveness of the three Policy Options

Outcome	Status-Quo	100% Vaccination	80% Vaccination
Animal Cases	**22,460,483**	**47,101**	**581,681**
Animal Deaths	**2,246,048**	**4,4710**	**9,420**
Human Infections	**4,492,097**	**9,420**	**116,336**
Increment effect (Human Deaths)	49,413	104	1,280
Total costs for each intervention (US$)	-	**23,299,236**	**21,429,977**
ICER cost/case averted*	-	**473**	**445**

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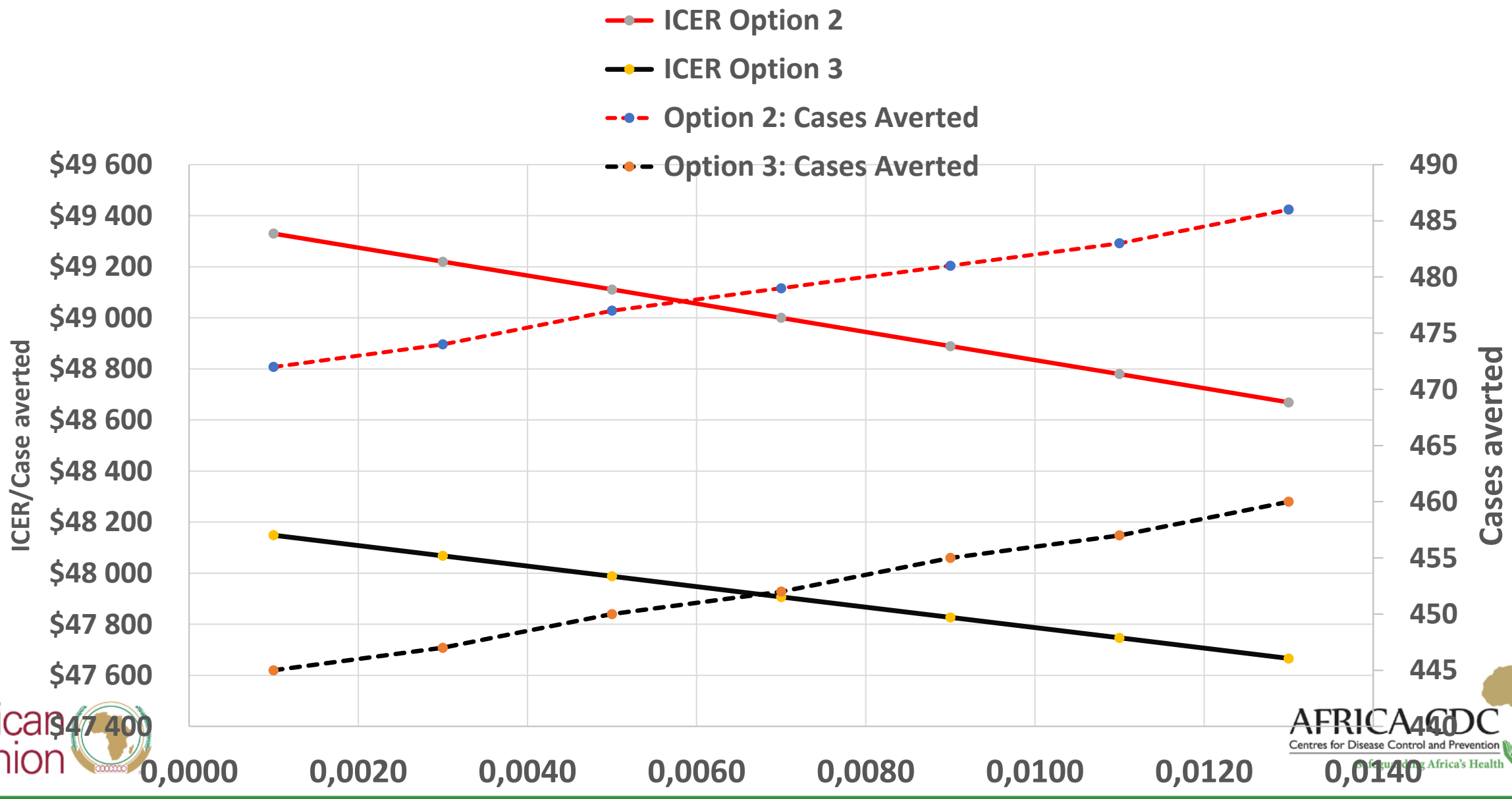
Sensitivity Analysis, with varying prevalences of anthrax



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Conclusion

Compared to status quo-(option 1)

100% vaccination of livestock-(option 2) and 80% vaccination of livestock-(option 3) provide better alternatives to the control of anthrax in livestock over a ten-year period.

References

1. WHO/FAO. Anthrax in humans and animals Fourth edition FAO of the United Nations World Organisation for Animal Health.

1. Blackburn JK, et al. High Case-Fatality Rate for Human Anthrax, Northern Ghana, 2005-2016. Emerg Infect Dis. 2021 Apr;27(4):1216-1219. doi: 10.3201/eid2704.204496. PMID: 33754993; PMCID: PMC8007318.

2. Kisaakye E. et al. Outbreak of anthrax associated with handling and eating meat from a cow, Uganda, 2018. *Emerg Infect Dis*. 2020;26(12):2799-2806. doi:10.3201/EID2612.191373

1. CDC. Experts Team Up to Tackle Deadly Anthrax Across Uganda | Division of Global Health Protection | Global Health | CDC. Accessed August 24, 2021.

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Acknowledgement

1. Ministry of Agricultural Animals and Fisheries(MAAIF)
2. National Animal Disease Diagnostics and Epidemiology Centre (NADDEC).
3. Ministry of Health Uganda (MoH)
4. National One health Platform (NoHP)
5. One Health Sector Uganda
6. Uganda Districts One health Committees
7. CDC Foundation CDC- Bloomberg Data for Health Initiative

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THANK YOU

Geofrey Amanya

Phone: +256 777 100 032

Email: geofreyamanya@gmail.com