A Risk-based Mutual Insurance Framework to Generate National Vulnerability Indices for Agro-crime or Agro-terror Events Involving Infectious Disease Agents

H. Morgan Scott DVM, PhD
Professor of Veterinary Pathobiology, Texas A&M University
Mutual Insurance Framework

Automobile insurance premium: an imperfect analog

- Driving experience
- Driving history (5-year)
- Demographics (e.g., age, marital status, family)
- Credit score (income)
- Education-level
- Population density
- Climate and weather
- Crime rate
- Road conditions
- Age, make, model
- Safety features (e.g., air bags, anti-lock brakes, anti-theft)
- Size and trim-level
- Type of coverage
- Cost of repairs

Mutual insurance framework for agro/bio-crime or agro/bio-terror

Factors that may affect the mutual insurance premium paid by each Member State

- Pathogen
- Member State
- Host(s)
Conceptual Framework

The hazard was assumed to be pre-defined in the context of an intentional threat.

**Release domain**
- Targeted [animal] population value for public and trade
- Ongoing disease situation (absent or controlled)
- Ongoing international and domestic conflicts

**Exposure domain**
- Size and density of the targeted [animal] population

**Preparedness and response domain**
- Capacity and availability of technical tools used for disease detection, control, and prevention
- Personnel and laboratory capacity

**Resilience domain**
- Economy
- Good governance practices
- Social safety, and security
- Ongoing domestic and international peace
- Research and technology development and literacy

**WOAH Risk Analysis**

**RAND (Research AND Development) Corporation approach:**

195 Countries

**Identifying Future Disease Hot Spots**
Infectious Disease Vulnerability Index
Hazard identification and host selection

Wildlife, vectors, and other domestic animals (e.g., buffalo, deer, camel, turkey, duck) were excluded.

Due to the sensitive nature of this biological threat assessment, country names are not presented.
Framework and data sources

1. Release
   - Meat production (tonnes)
   - Export value ($)
   - 5-year disease history
   - Domestic and international conflict

2. Exposure
   - Veterinarians and paravets
   - Species controlled
   - Disease control and prevention parameters
   - Disease-specific national laboratories
   - Number of vulnerable animals
   - Density of vulnerable animals

3. Preparedness & response
   - Control of corruption
   - Rule of law
   - Regulatory quality
   - Government effectiveness
   - Voice and accountability
   - International and domestic peace
   - Societal safety and security
   - Economic stability
   - Political stability

4. Resilience
   - Research articles per person
   - Literacy rate
Vulnerability Score (Mutual Insurance Premium) = (Release + Exposure) - (Preparedness/Response + Resilience)

The most vulnerable countries are

- at the greater risk of release and exposure to an intentional release of a pathogen,
- less prepared for an agro-crime or agro-terrorism event,
- slower to respond,
- less resilient, and as a result they would have higher insurance premiums when compared to less vulnerable countries.
Vulnerability indices and rankings
FMD example

All four diseases
Discussion

- This work utilized traditional data sources from FAO and WOAH to inform the model, but also incorporated other nontraditional sources of data rarely utilized in work of this nature.
- The model can help to target capacity building efforts, thus ensuring return on investment for emergency preparedness funders and resource partners.
  - There is potential for this work to inform policy/advocacy for investment in veterinary services (in currently under-invested areas) and make explicit the link between health and security.
  - The conceptual framework is easy to understand and transparent and may be used for anonymous country self-evaluations and comparisons (benchmarking) which may improve risk management strategies against agro-crime or agro-terrorism.
- Deliberate release scenarios are more likely than ever before, with greater uncertainty in the world and non-state actors trying to find novel ways to create havoc for governments and society.
- Published in Transboundary and Emerging Diseases
  DOI: 10.1111/tbed.14721
Acknowledgements

This research was executed in the framework of the “Building resilience against agro-terrorism and agro-crime” Project No: FE-AD-LG-2019-103

Funded by: Weapons Threat Reduction Program of Global Affairs Canada

Special thanks to:
Daniel Donachie, WOAH-Emergency Management and Keith Hamilton, WOAH-Preparedness and Resilience Department
Thank you

H. Morgan Scott DVM, PhD
Professor of Veterinary Pathobiology, Texas A&M University
hmscott@tamu.edu

This event is supported by funding from: