



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

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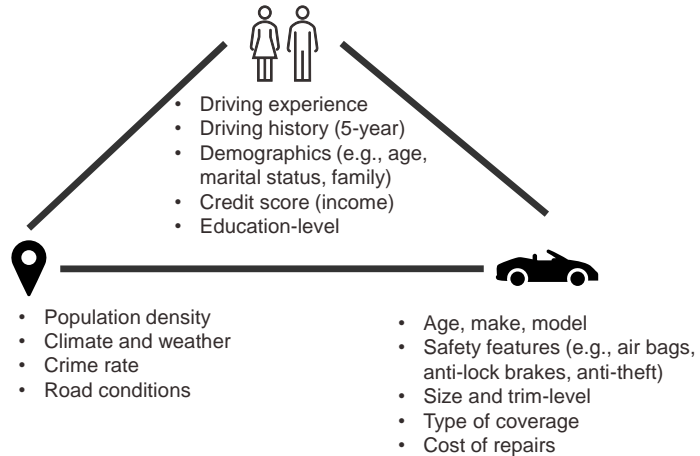


# Mutual Insurance Framework

## Automobile insurance premium: an imperfect analog



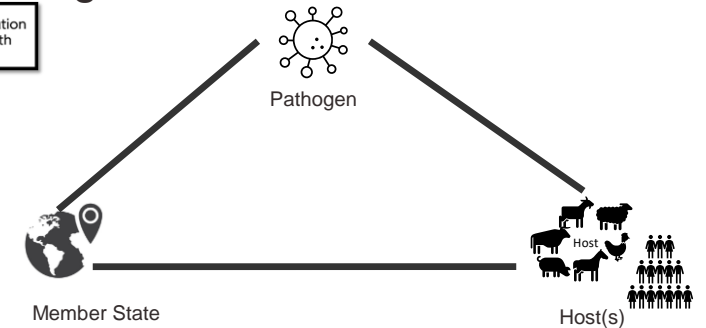
Factors that may affect the insurance premium?



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

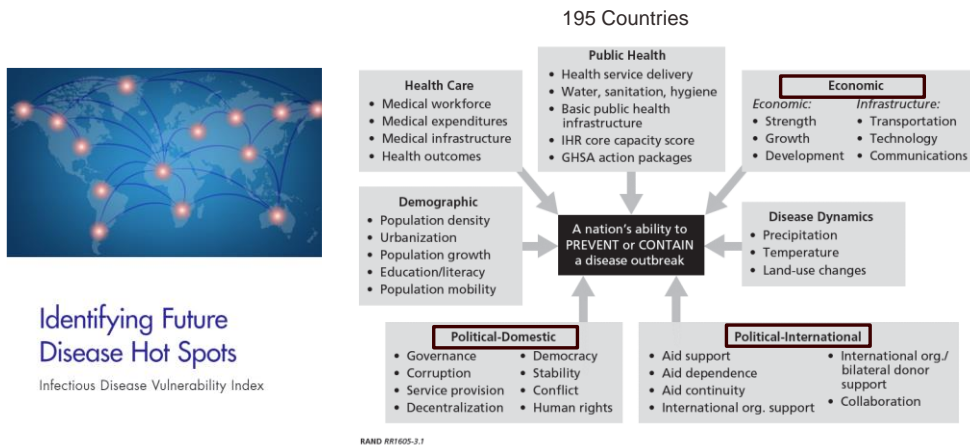


Factors that may affect the mutual insurance premium paid by each Member State



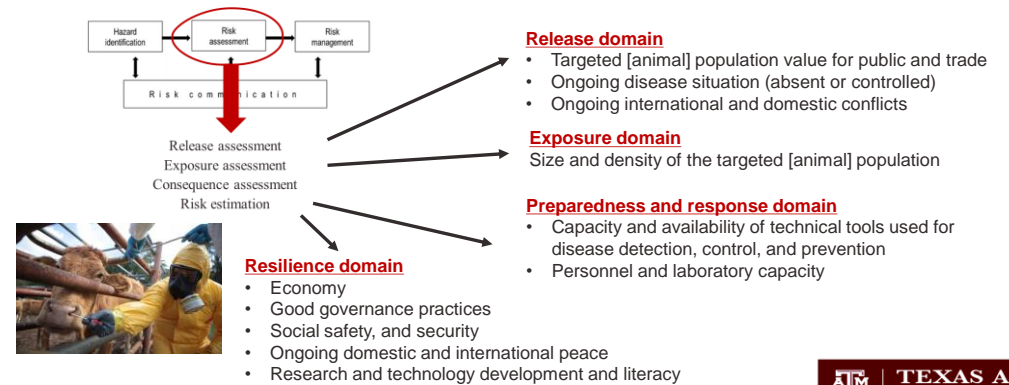
# Conceptual Framework

RAND (Research ANd Development) Corporation approach:



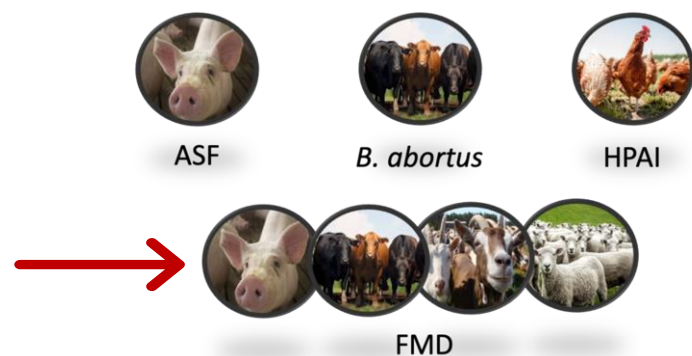
## Conceptual framework: WOA Risk Analysis

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



# Disease and Member State Selection

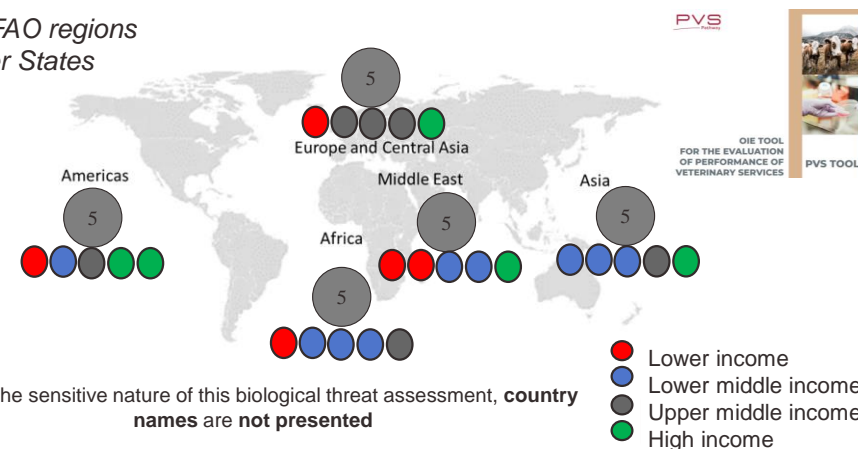
## Hazard identification and host selection



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

## Member State selection

5 WOA/FAO regions  
25 Member States

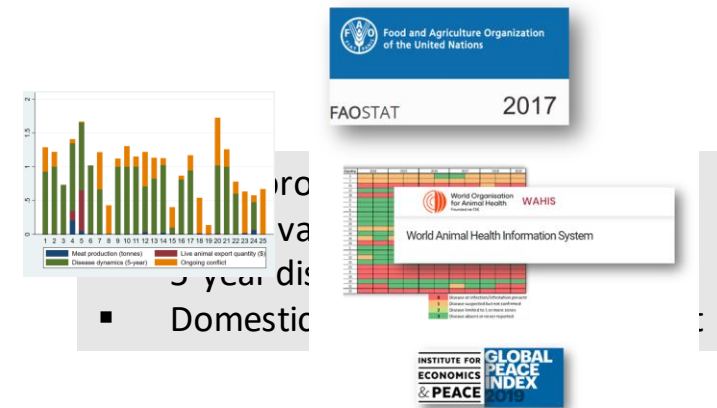


# Framework and data sources

## 2. Exposure



## 1. Release



## 4. Resilience

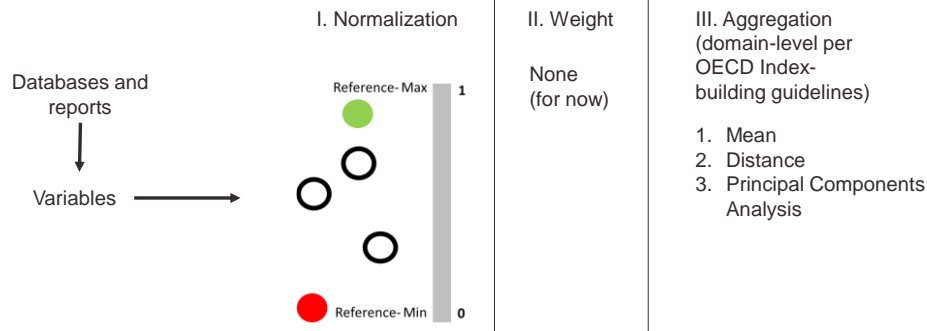


## 3. Preparedness & response



# Vulnerability Score (Mutual Insurance Premium) = (Release + Exposure) - (Preparedness/Response+ Resilience)

## Risk estimation



The **most vulnerable countries** are

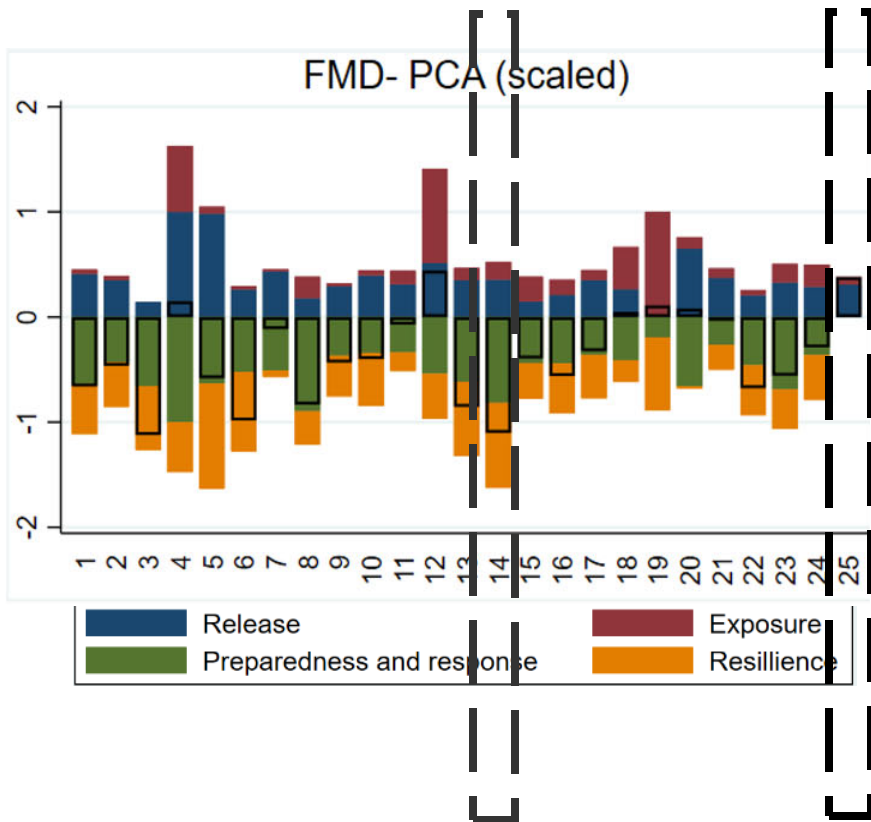
- at the greater risk of **release and exposure** to an intentional release of a pathogen,
- **less prepared** for an agro-crime or agro-terrorism event,
- **slower to respond**,
- **less resilient**, and as a result they would have **higher insurance premiums** when compared to **less vulnerable countries**



# Vulnerability indices and rankings

## FMD example

All four diseases



Code	Release			Exposure			PrepRes			4.ABY			4.B.4b/c			4.FMD		
	Mean	Dist.	PCA	Mean	Dist.	PCA	Mean	Dist.	PCA	Release	Exposure	PrepRes	Release	Exposure	PrepRes	Release	Exposure	PrepRes
1	5	6	6	21	20	21	7	6	7	23	23	23	6	8	5			
2	7	10	12	20	19	20	15	14	15	19	20	19	21	16	18			
3	18	20	24	25	25	25	6	7	6	11	11	11	11	11	11			
4	3	3	1	3	3	3	1	1	1	2	2	2	19	20	19			
5	2	2	2	17	18	17	8	9	8	11	8	12	15	14	16			
6	15	15	19	23	23	22	12	13	12	2	2	2	2	2	2			
7	9	5	5	24	24	24	11	8	12	23	23	23	6	8	5			
8	23	21	22	6	5	7	2	2	2	19	20	19	21	16	18			
9	14	12	16	22	22	23	19	18	18	15	14	16	11	11	13			
10	4	4	7	18	16	18	21	19	21	8	9	7	10	12	15			
11	11	11	14	10	9	11	22	20	22	22	21	22	4	7	6			
12	8	9	4	2	2	2	10	12	10	14	15	12	3	2	3			
13	12	17	11	14	10	12	9	19	9	4	5	4	20	21	21			
14	13	13	9	8	8	9	3	4	3	2	2	2	25	24	25			
15	24	23	23	5	7	5	13	11	15	18	18	18	15	18	10			
16	16	19	20	12	12	10	16	16	14	9	8	9	17	19	17			
17	10	14	10	15	15	14	18	21	20	16	16	15	9	9	12			
18	22	18	18	4	4	4	17	17	17	21	22	21	7	6	4			
19	25	25	25	1	1	1	24	24	24	5	4	5	8	4	9			
20	1	1	3	13	14	13	5	5	5	24	24	24	2	3	2			
21	6	7	8	14	13	15	23	23	23	20	19	20	5	5	7			
22	17	22	21	19	21	19	14	15	13	10	12	10	18	20	19			
23	20	16	13	9	11	8	4	3	4	17	17	17	19	14	16			
24	21	24	17	7	6	6	20	22	19	13	11	14	14	15	11			
25	19	8	15	16	17	16	25	25	25	25	25	25	1	1	1			

# Discussion

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- This work utilized traditional data sources from FAO and WOAHA 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.
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# Thank you

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