Analysis on the Risk of Ebola

and

An approach to Modeling the Potential Impact

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International Actuarial Association

Analysis on the Risk of Ebola

- About the IAA
  - Worldwide association of professional actuarial associations
    - 67 Full Member Associations
    - 29 Associate Member Associations
    - Representing 60,000+ actuaries in 108+ countries
  - 7 special interest Sections for individuals
  - 750+ volunteer actuaries
  - Constituted in Switzerland based in Canada with 11 staff
  - Exists to encourage the development of a global profession. Acknowledged as technically competent and professionally reliable. To ensure the public interest is served.

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- IAA Vision

The actuarial profession is:

- Recognized worldwide as a major player in the decision-making process within the financial services industry in the area of social protection and in the management of risk
- Contributing to the well-being of society as a whole.

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- IAA Mission
  - To represent the actuarial profession and promote its role, reputation and recognition in the international domain
  - To promote professionalism, develop education standards and encourage research, with the active involvement of its member associations and Sections, in order to address changing needs

Health Committee

- Represents the IAA in discussions at the international level on matters relating to health systems, with a particular focus on actuarial aspects.
- Raises the profile of health actuaries in policy debates and research on health systems.
- Supports, through IAA Member Associations, actuaries working in the health systems field, both private and public.

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- Paper developed by South African Company
- 2,600,000 lives covered in South Africa
- Ebola is a virus - severe, often fatal to humans
- First discovered in 1976 in Africa
- Latest outbreak first noted one year ago this month
- Primarily Guinea then to Liberia and Sierra Leone
- Most recent figures show over 24,000 reported cases with nearly 10,000 deaths

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- Most significant modelling aspects
- High probability of death over a relatively short period of time – on average 21 days from exposure
- Low transmission
- One directional path suggests a multi-state model fed by assumptions on transitional probabilities and mortality rates based on available data and information

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- Transmission Characteristics
- Highest in very poor, underdeveloped countries
- In latest African outbreak
  - Lack of basic health infrastructure
  - Burial rituals
  - Fear and mistrust of government officials in part due to recent and almost constant civil unrest

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- Control through Intervention
  - Advice on travel restrictions to affected countries
  - Travel restrictions for foreigners from affected countries
  - Local financial support to affected countries
  - Assistance setting up testing laboratories in affected areas
  - Setting up isolation facilities
  - Training of laboratory staff in affected countries
  - Supporting volunteer programs for healthcare workers to support affected countries.

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- Further Internal Controls by Individual Countries
- Further screening for any suspicious cases based on specific clinical risk criteria with passage into next country managed by government
- All public health facilities and private(?) hospital facilities tasked to appoint designated areas for impacted patients
- Each suspected, probable and confirmed case would be reportable to government authorities

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- Role of private sector
  - Collaborate with governments for the national preparedness and response plan
  - Provide financial support
  - Possible role for insurers to play in this

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- Impact on a Health Insurer
  - The lower transmission probabilities of an Ebola type epidemic is typically easier to contain, and typically has a less significant population mortality impact than an epidemic with lower mortality rates and higher transmission probabilities, such as a full-blown avian flu epidemic
  - Thus, life insurers are more likely to be impacted to a greater degree than health insurer especially if public health facilities are more likely to be used for care

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- Even if the actuary makes extreme assumptions about herd immunity (the development of immunity as the disease passes through the 'herd'), and large influxes of Ebola positive people into a country, the modeling will typically not indicate an extreme population impact
- For actuaries working in countries where there are good national preparations for Ebola, as mentioned above, the results of the multi-state model would typically indicate that the risk to an insurer is fairly limited.

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- In general, for any health insurer offering a form of medical expense insurance, there are two mitigating factors even in the case of a widespread epidemic:
  - There would typically be limited private hospital capacity to isolate patients so governments step up to do so
  - Hospital admission rates will most likely decrease dramatically, because everyone who can, will postpone any form of elective surgery as no-one would want to be in hospital due to the perceived risk of contracting Ebola
  - In addition, the short symptomatic period and limited techniques for treatment limits health care expenditures

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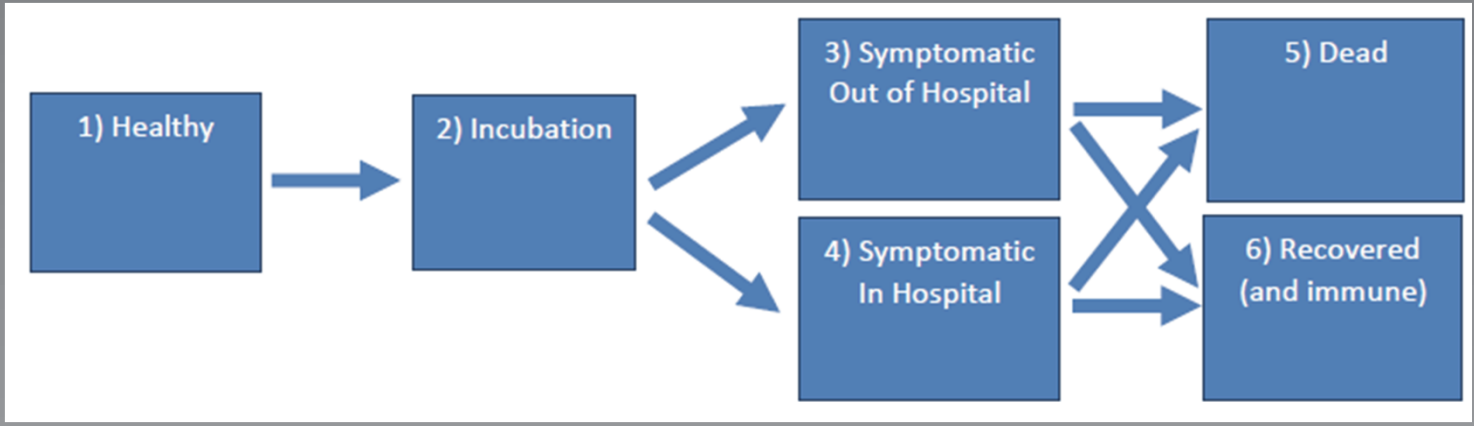
- This can be represented by the following diagram:



- The fundamental structure of this epidemic model is that movement occurs only in one direction.

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- Implicit Assumptions
  - Death can only happen due to Ebola
  - All persons infected will show symptoms of the virus
  - No reinfection occurs if person recovers
  - Once recovery occurs the person can not infect others
  - Patients are only infectious once symptomatic
  - These effectively contain many simplifying assumptions
  - All models assumed 2,600,000 potential patients

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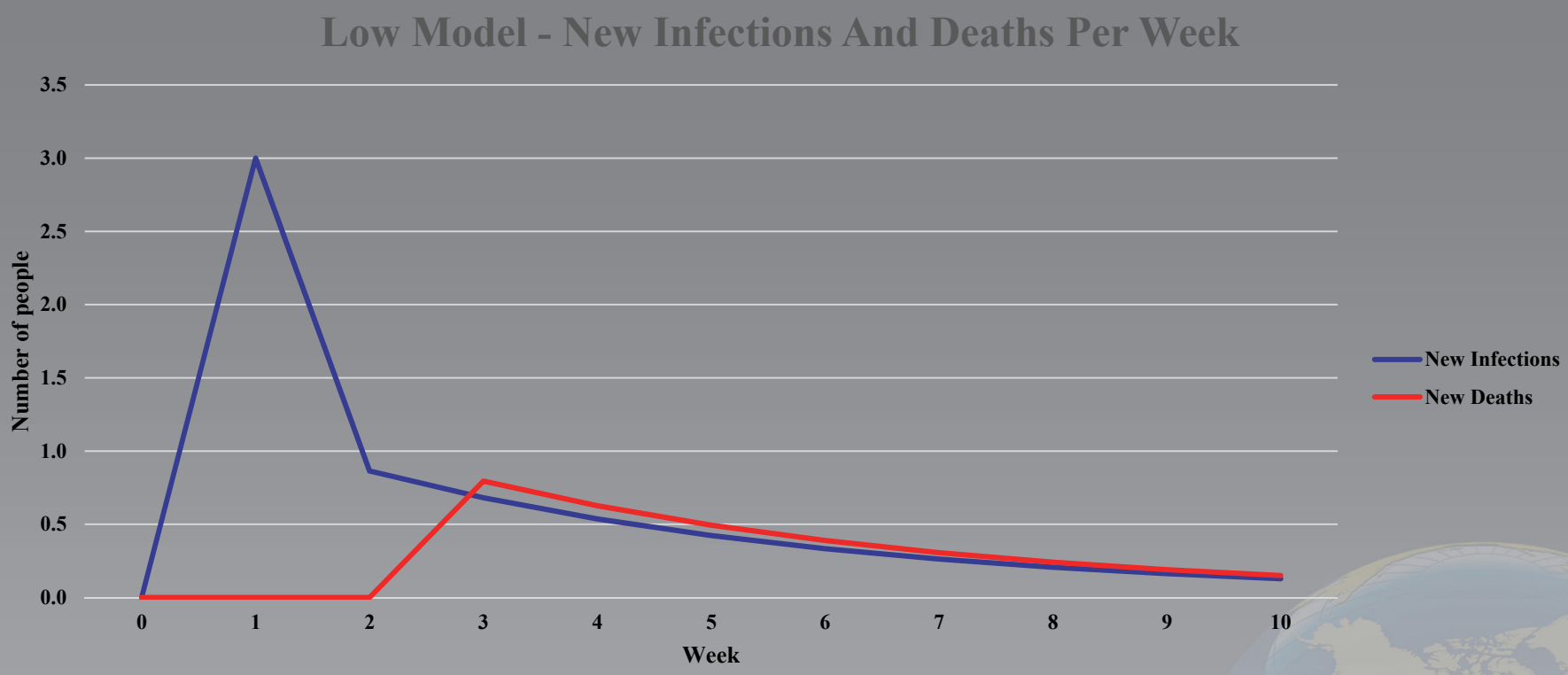

- 3 initial infections and 90% of patients are hospitalized after incubation.
- There will be 7 infections in total with a mortality rate of 47%.

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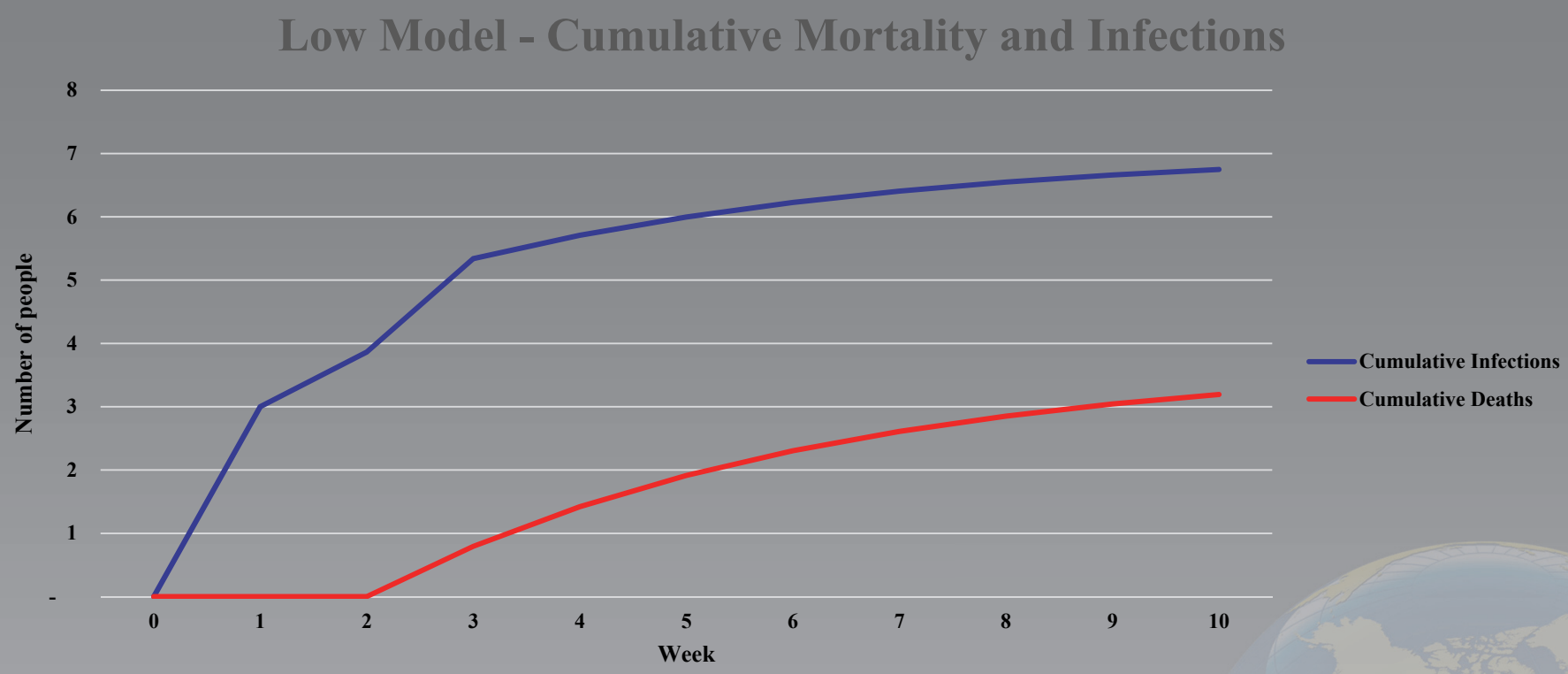

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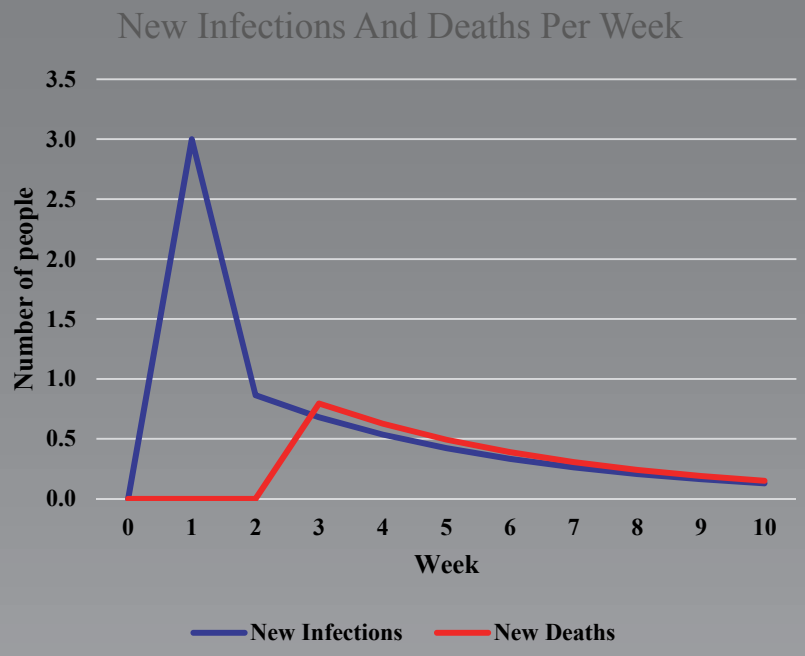

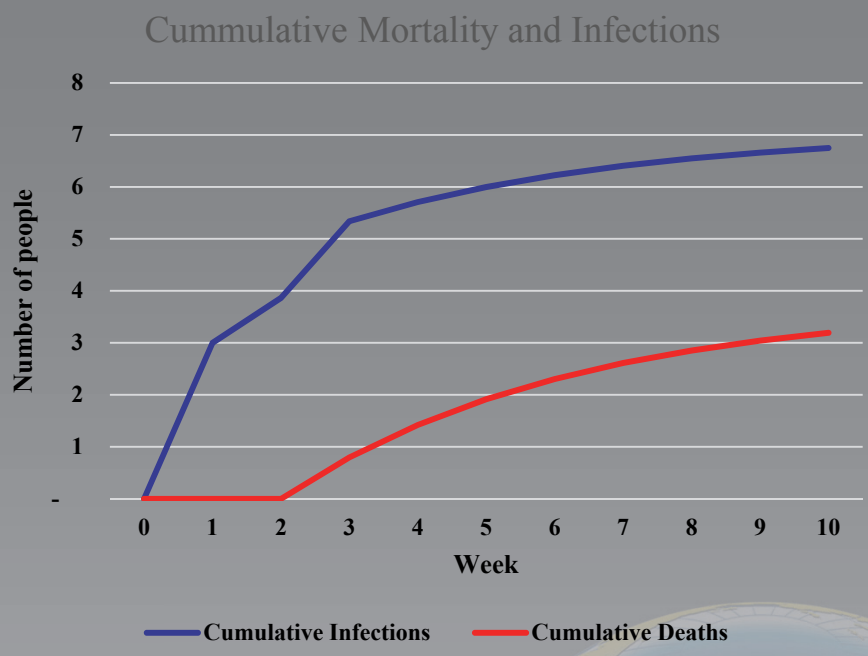

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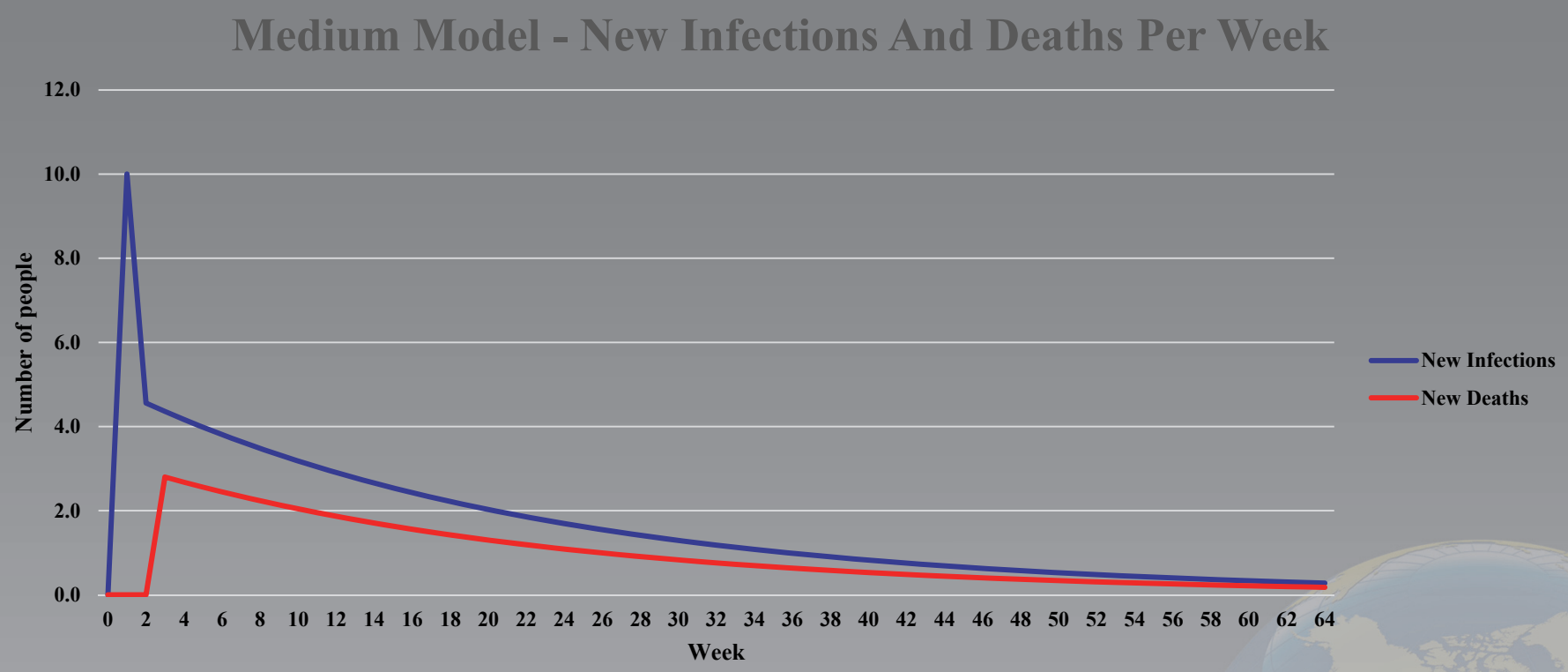

- 10 initial infections and 80% of patients are hospitalized after incubation.
- There will be 108 infections in total with a mortality rate of 55%.

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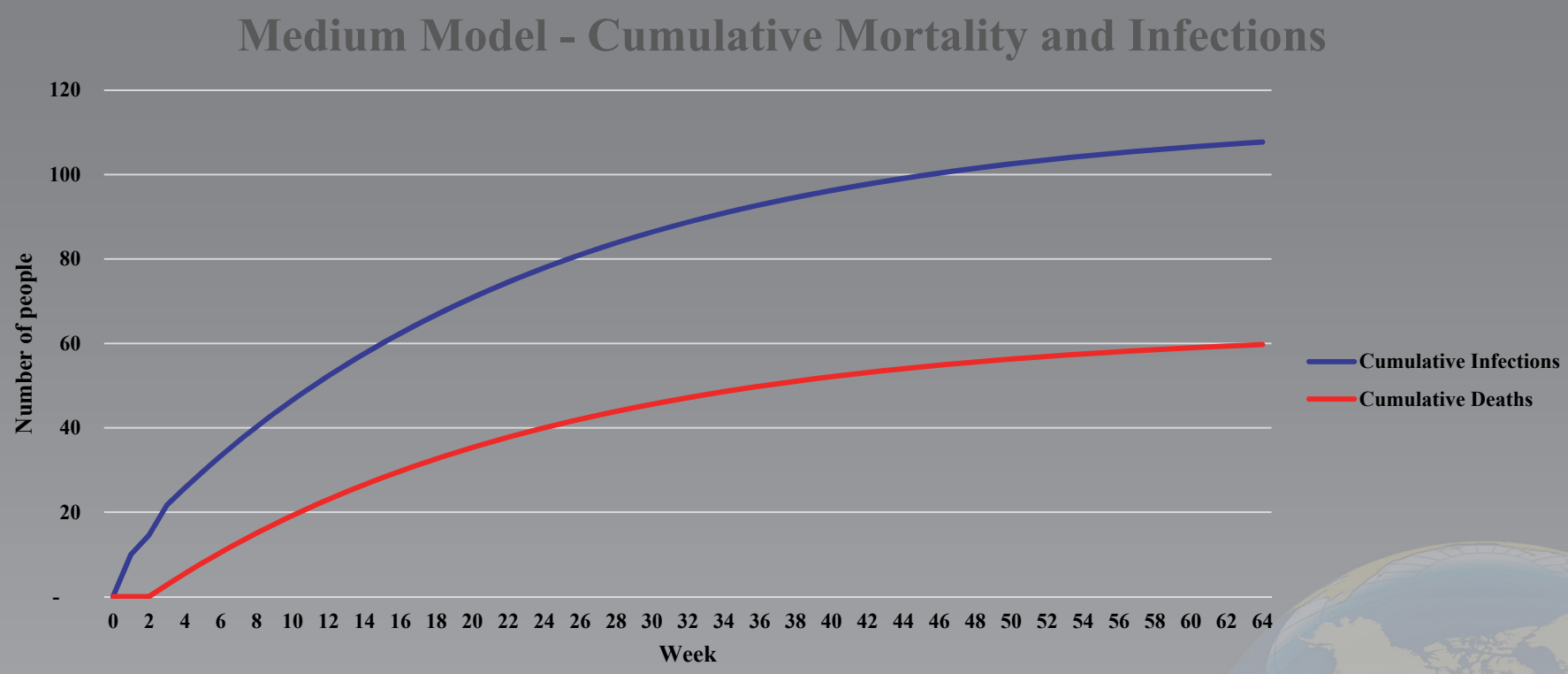

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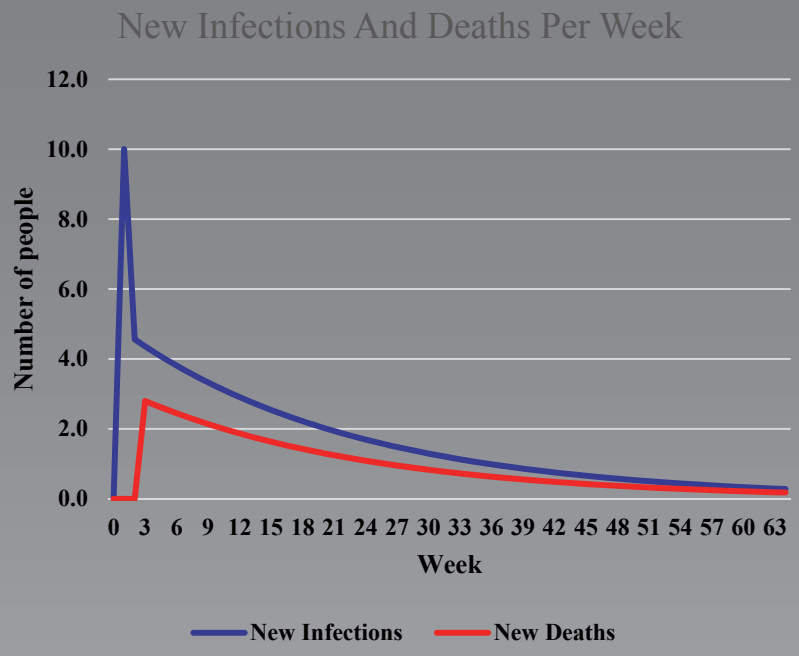

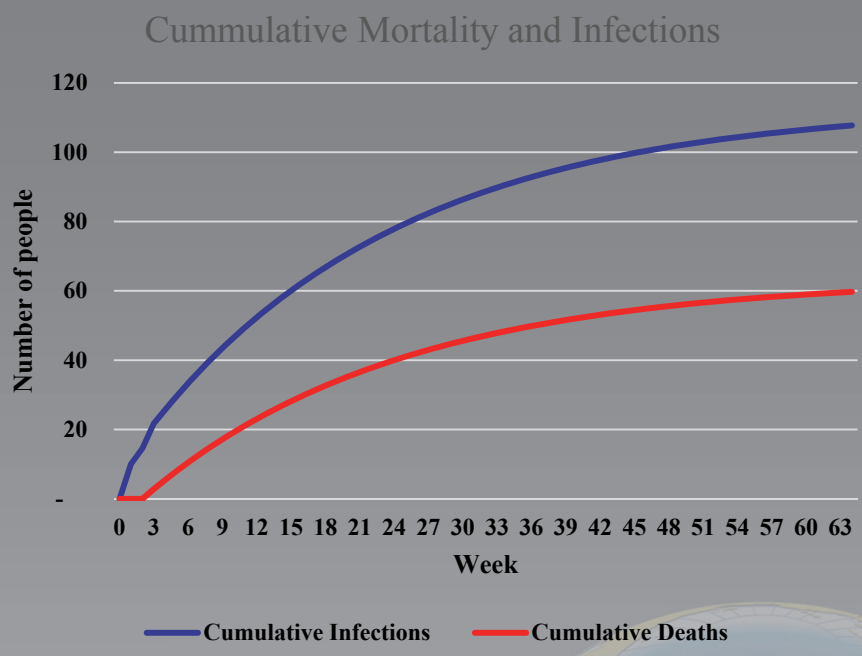

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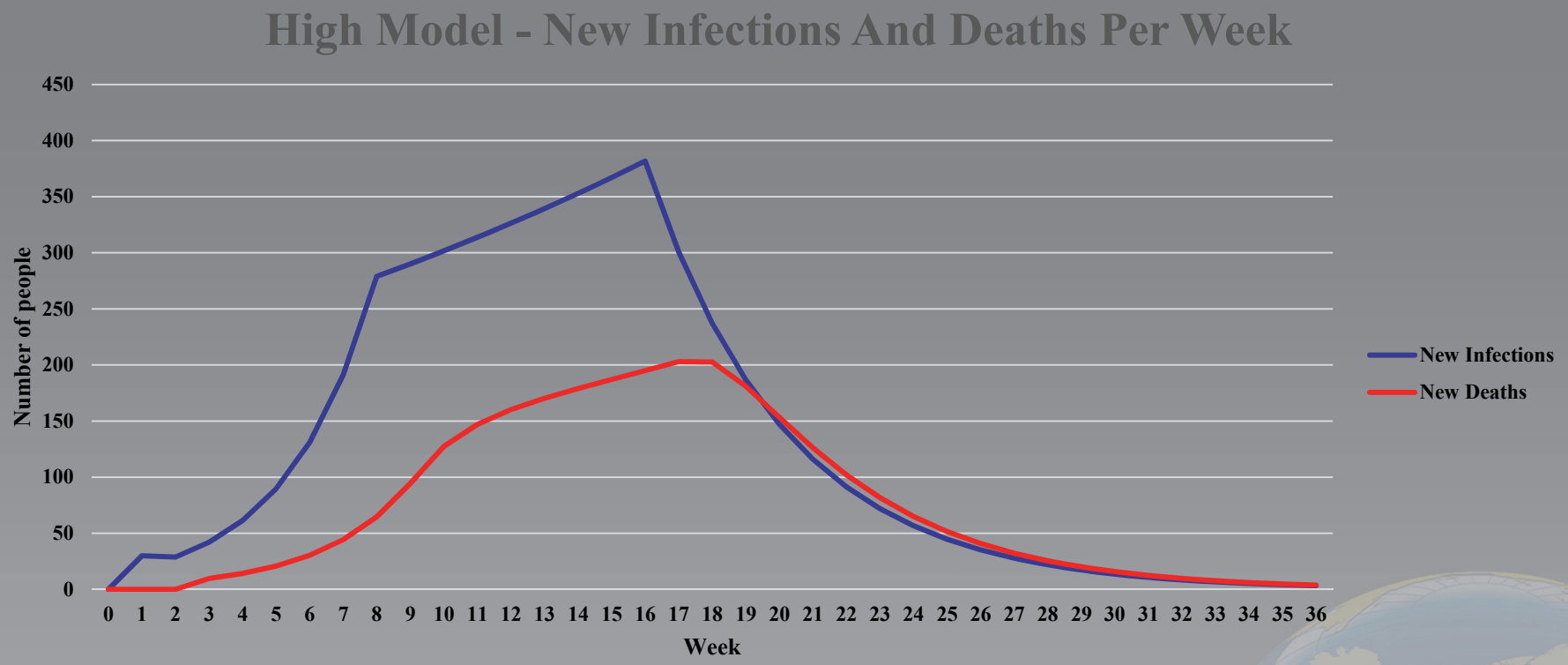

- 30 initial infections and 50% of patients are hospitalized after incubation first 8 weeks, then 75% for next 8 weeks and then 90% after that.
- There will be 4,900 infections in total with a mortality rate of 57%. Most like West Africa in 2014.

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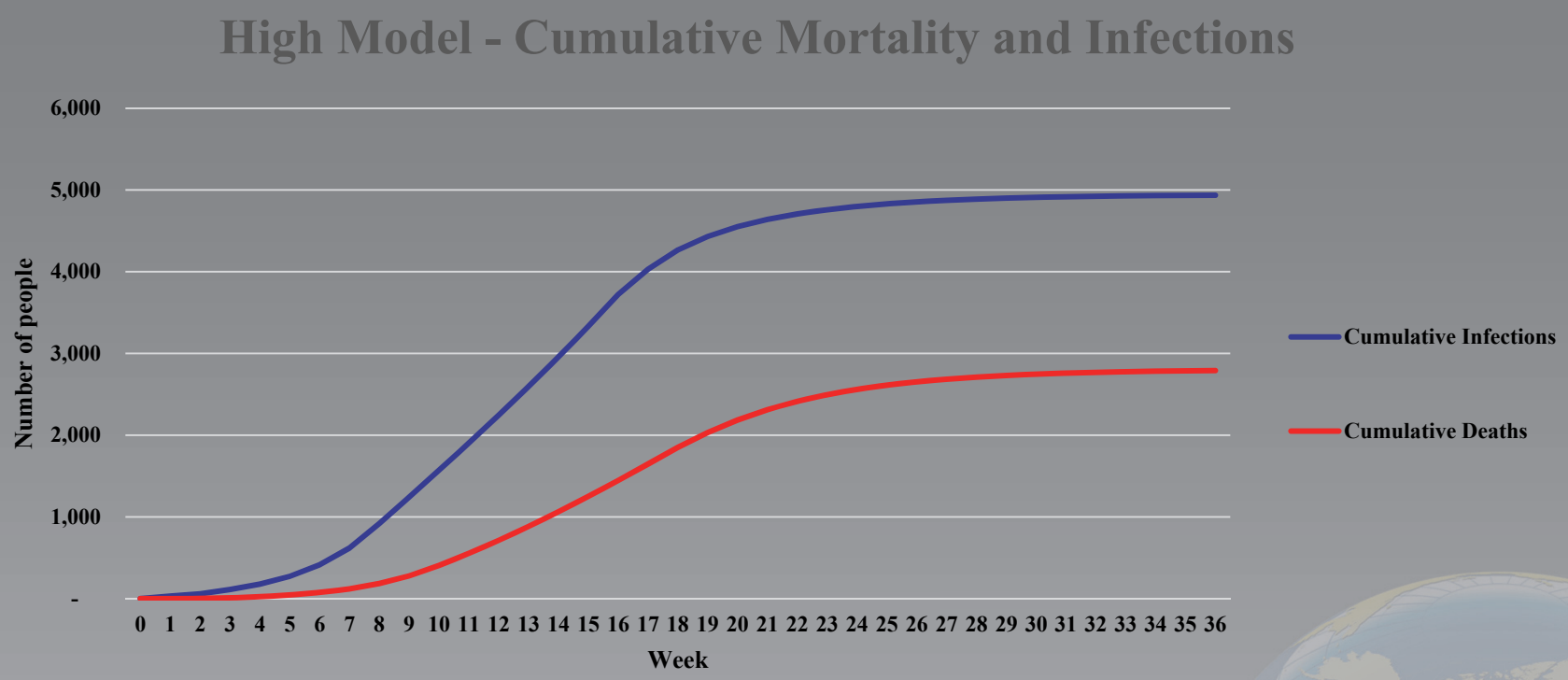

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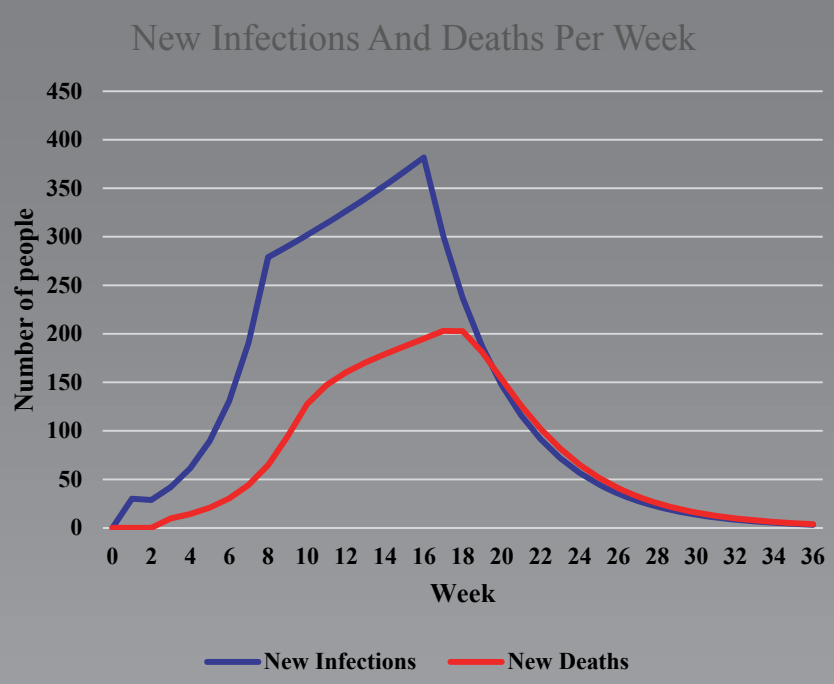

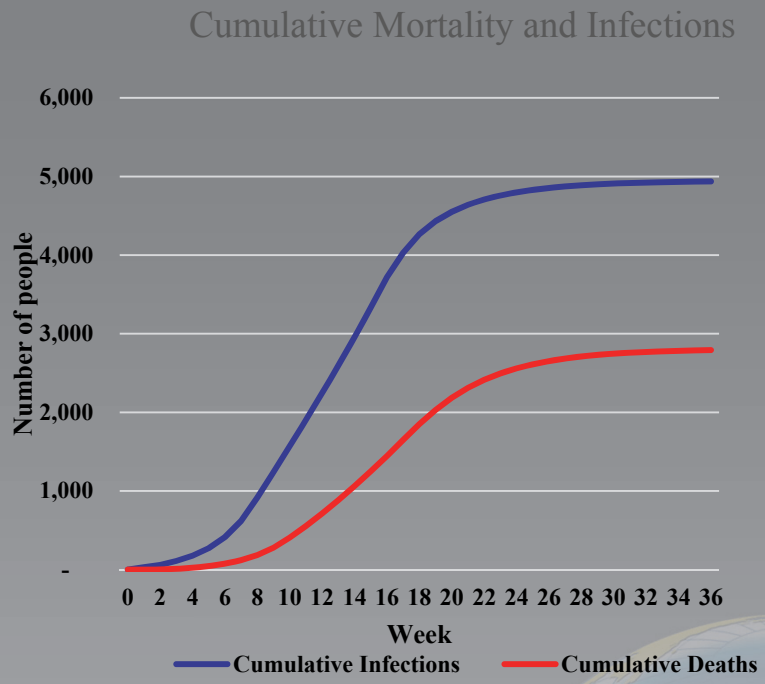

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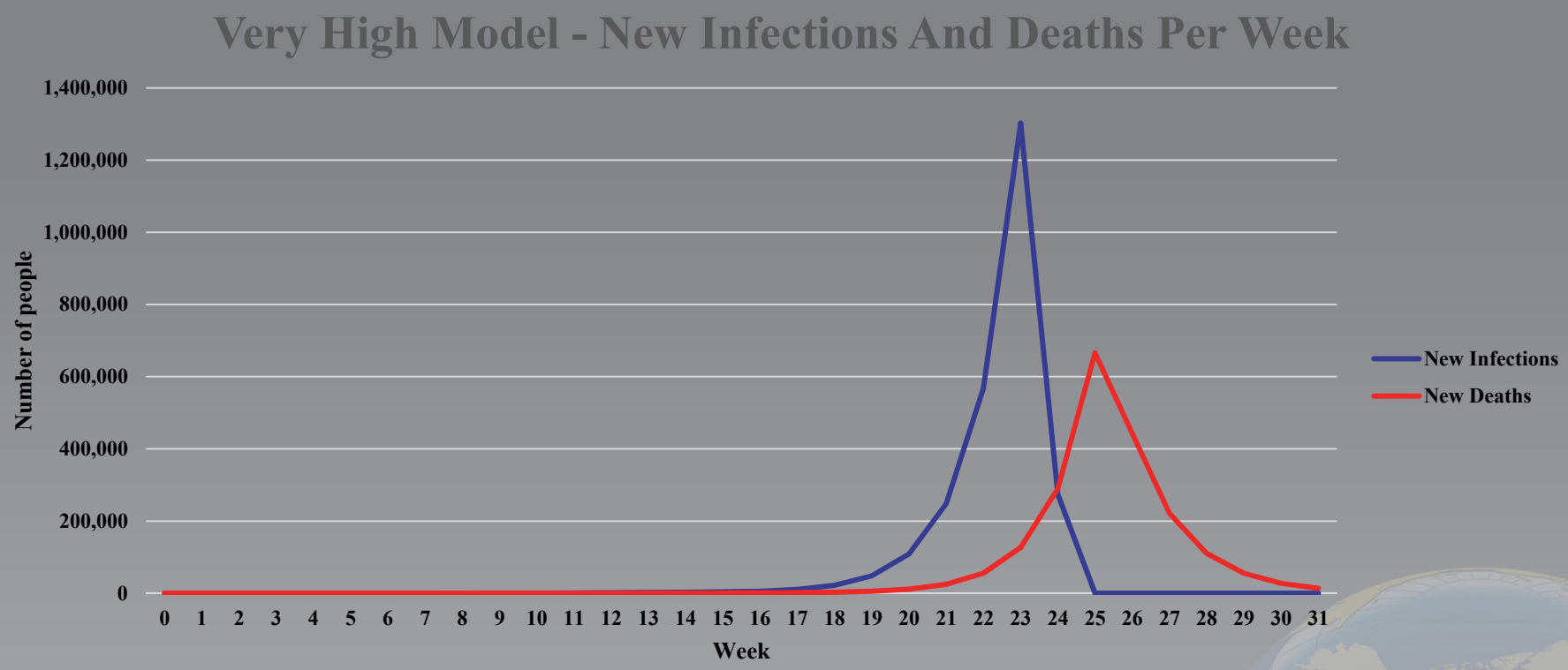

- 30 initial infections and 50% of patients are hospitalized after incubation throughout with a limitation of hospital beds introduced at 3,000 beds.
- Everyone will be infected with a mortality rate of 79%. Extremely unlikely.

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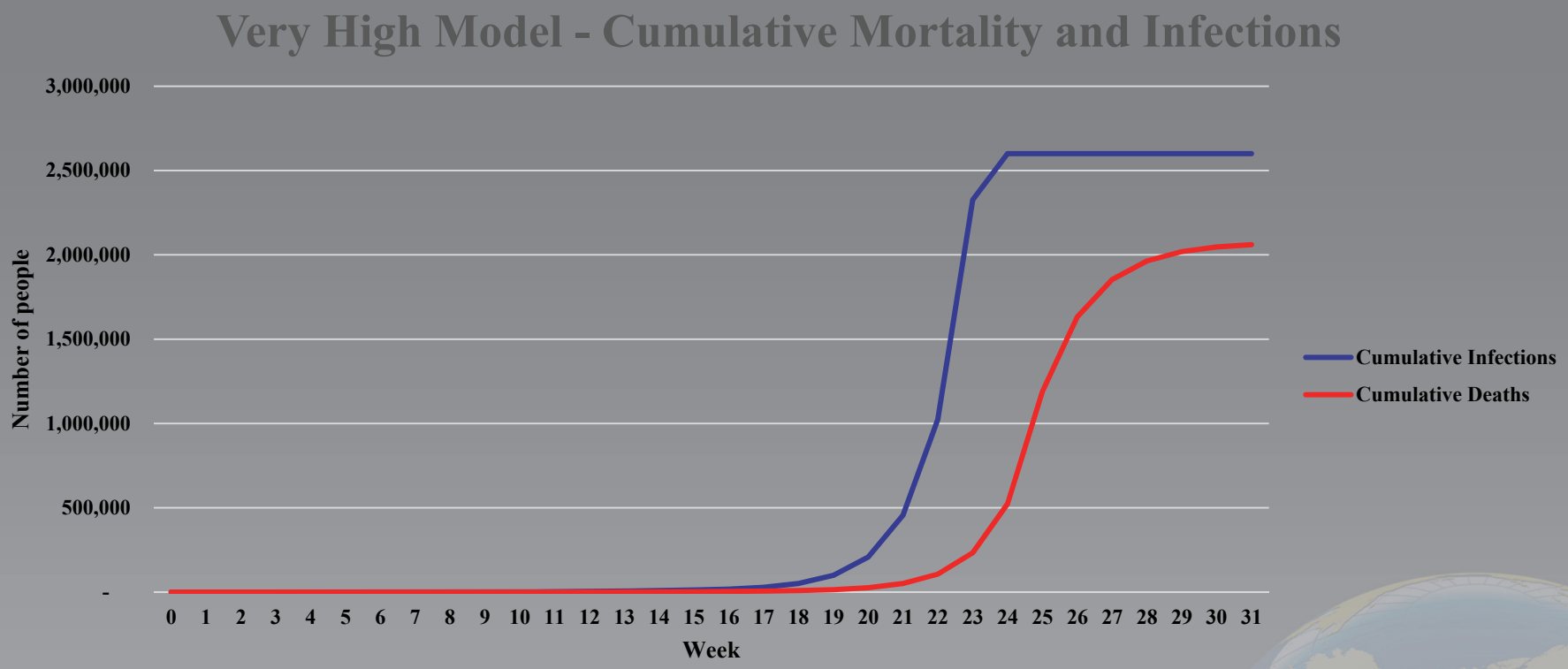

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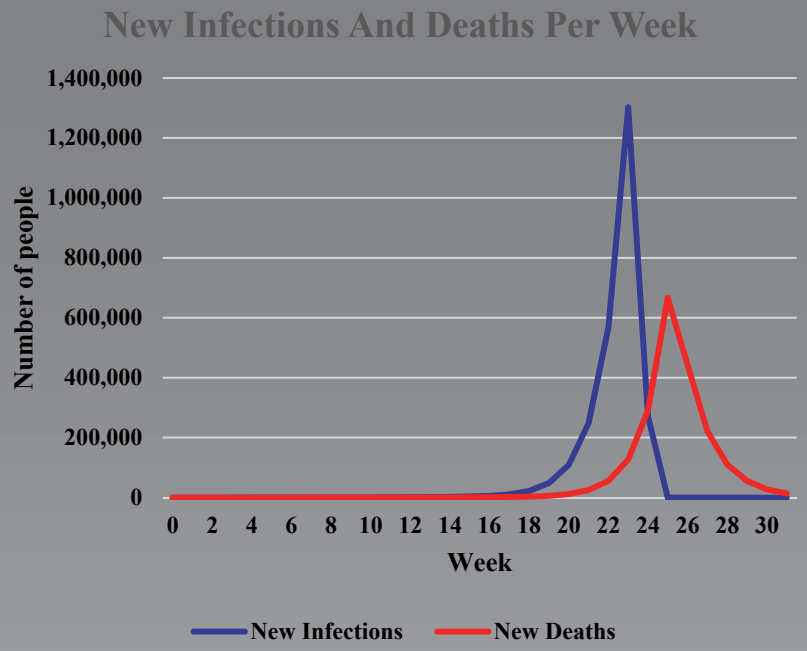

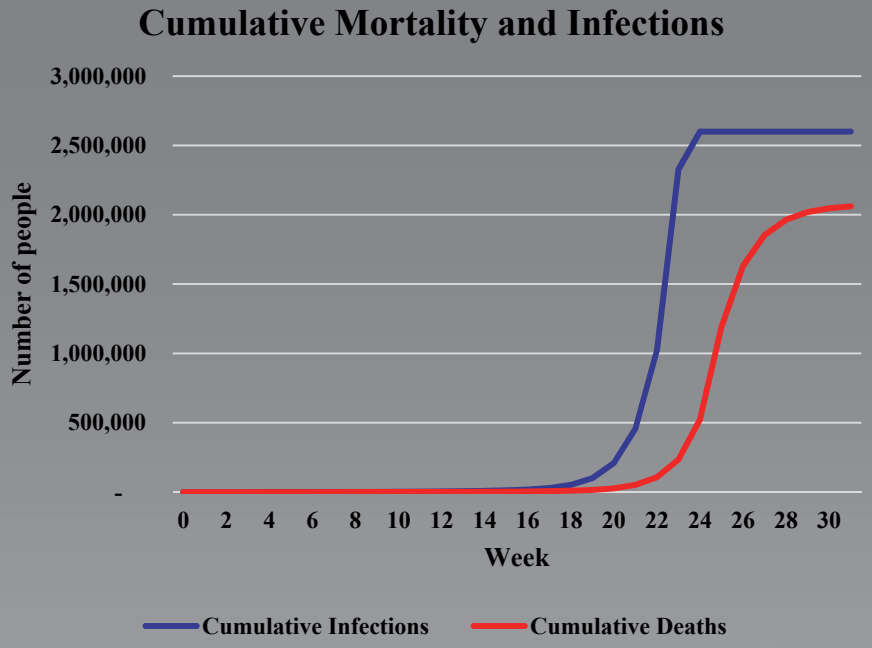

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- Key findings of Ebola study
  - Low transmission coupled with high probability of infection
  - Boarder control is critical for controlling the disease
  - Health insurers have limited exposure particularly in well-developed countries like the United States
    - In addition, to the extent that care is provided through public facilities the financial impact on the insurers is limited
    - The very short infectious period and limited treatment ability limits the ultimate cost

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Questions

http://www.actuaries.org/CTTEES_HEALTH/Documents/Risk_of_Ebola_Paper.pdf