Check In 2 - Group 14: Yukiko Nakada, Victoria Ngo, Kalp Patel, Pam Potempa-Rivers

Question 1: Epi Curve

When was the peak of the outbreak?

The employed method to create our epidemiological curve is to first clean and organize our data to remove duplicates or missing ones. Next, we will decide what type of case definition we want to use and meaningful time intervals (hours, days, weeks). We will use the case numbers of data and filter by dates to create the epi curve.

Data needed:

Probable cases (caseID) and days as our time interval (Date_Time_Onset).

Question 2: Natural History

What is the average duration of the infection period? How do we see this in our serial interval? How might this impact our R0?

We are uncertain about pathogen detection, but we have information about symptom onset. Therefore, as natural history parameters, we can calculate the incubation period, duration of illness, and serial interval. For each parameter, calculate the min, max, median, and mean to summarize the data.

Data Needed:

Incubation Period: (Date_of_Onset – Date_of_Exposure)

Duration of Illness: (Date_of_Recovery – Date_of_Onset)

Serial Interval: (Date_of_Onset – Date_of_Onset_primary).

Question 3: Calculating R

What is the basic reproductive number (R_0) and time-defined reproductive number (R_t) during the outbreak?

We will estimate R_0 by calculating the daily contact rate (α), transmission probability (β) and duration of illness (d) using the formula $R_0 = \alpha \beta d$. The daily R_t will be estimated using the Wallinga-Teunis method.

Data needed:

R_0: Infection count, exposure count, symptom onset, and recovery status from RFF data.

R_t: Daily incidence and serial interval parameters.

Question 4: Simulation Modeling

How would the dynamics of the infectious disease outbreak change if individuals no longer acquired complete immunity after infection?

We will create an SIR model to simulate the infectious disease outbreak with complete immunity after infection. We will create a SIRS model to simulate the transmission of the outbreak with waning immunity at various waning immunity rates.

Parameters	Symbol	Description
Population Size	Λ	Total population size
Contact Rate	α	Average number of contacts an individual has per unit time
Transmission Rate	β	Probability that a contact between a susceptible and infectious individual results in the transmission of the disease
Recovery Rate	σ	Rate at which infectious individuals recover and move to the recovered state
Waning Immunity Rate	ω	Rate at which individuals lose immunity after recovery from an infection

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Question 5: Evaluating susceptibility and transmissibility

What proportion of those infected are asymptomatic versus symptomatic? What does this conceptually indicate about our incubation period, latent period, serial interval, infectious period?

We would work within the SIR framework to analyze this data. To calculate the symptomatic proportion, we would remove missing data and take our number of symptomatic probable cases (Did you have symptoms?) over the cleaned total cases (caseID) and then calculate symptomatic individuals using the complement rule.

Data needed:

Symptomatic probable cases (` Did you have symptoms?` = yes) and total cases count (sum CaseID).

Final Assignments

Analysis and presentation

Task	Group Member
Introduction (Presentation)	Victoria
Question 1. Epi Curve (Analysis and Presentation)	Pam
Question 2. Natural History (Analysis and Presentation)	Yukiko
Question 3. Calculating R (Analysis and Presentation)	Victoria
Question 4. Simulation Modeling (Analysis and Presentation)	Kalp
Question 5. Evaluating susceptibility and transmissibility (Analysis and Presentation)	Pam