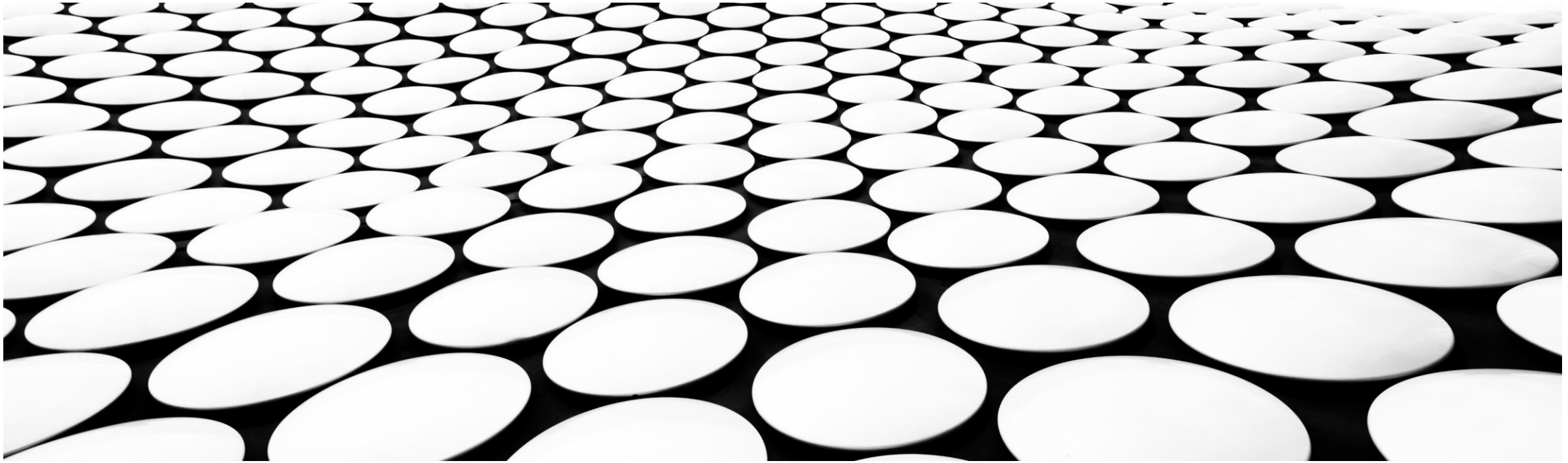
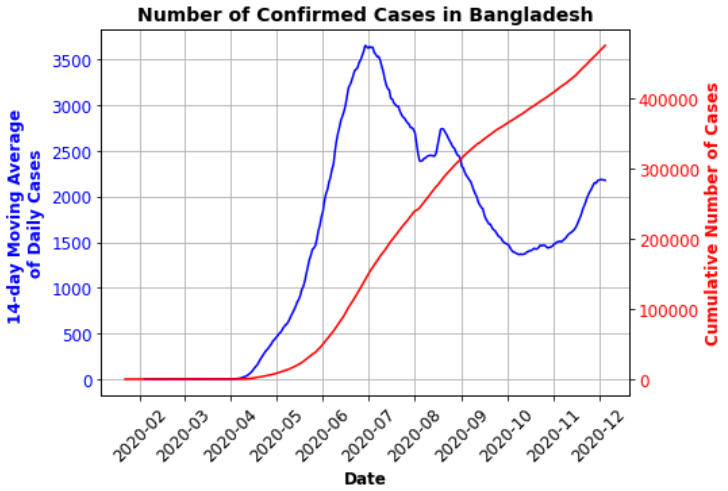
MODELING OF COVID-19 IN BANGLADESH

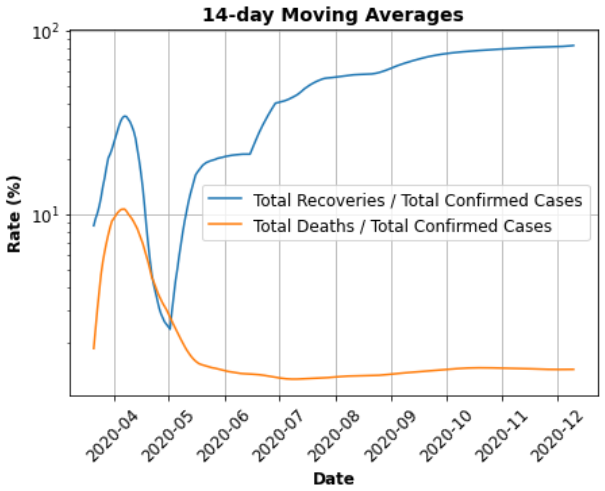
FAHAD IBN AZAM



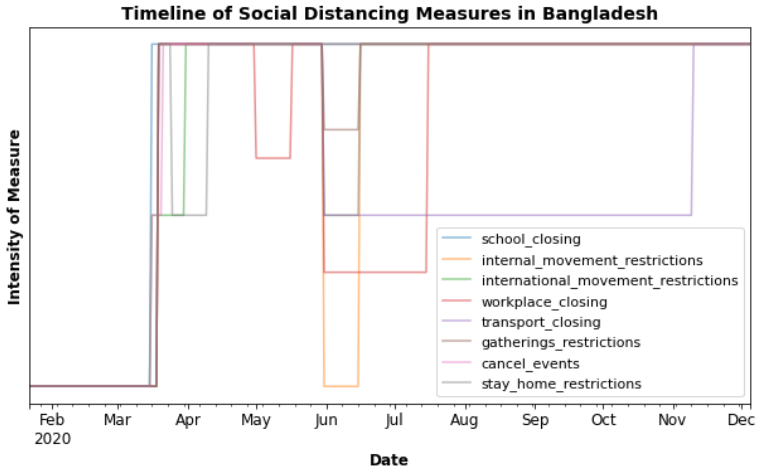
EXPLORATORY DATA ANALYSIS



- Daily number of new confirmed cases have reached a peak in Jul 2020, marking the end of the first wave of the pandemic
- Daily number of new confirmed cases have started to rise since the Oct 2020, indicating the beginning of a second wave



- The death rate has plateaued at approximately 1.4%
- May 2020 shows a high death rate above the recovery rate

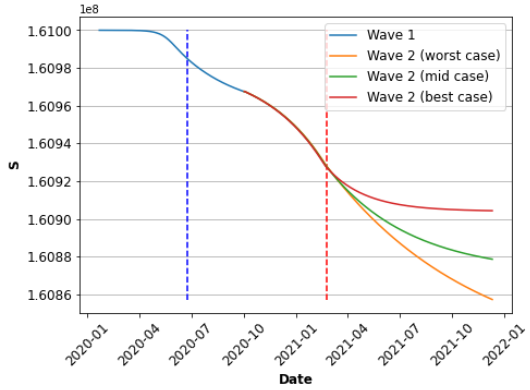


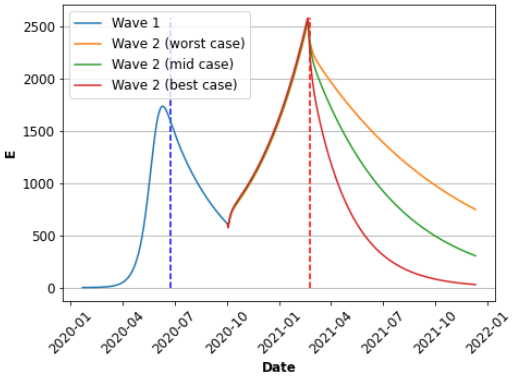
- Heavy relaxation of social distancing measures in Jun 2020, coinciding with the steep rise in recovery rate and the sharp drop in death rates (indicates underestimation of severity and contagiousness)

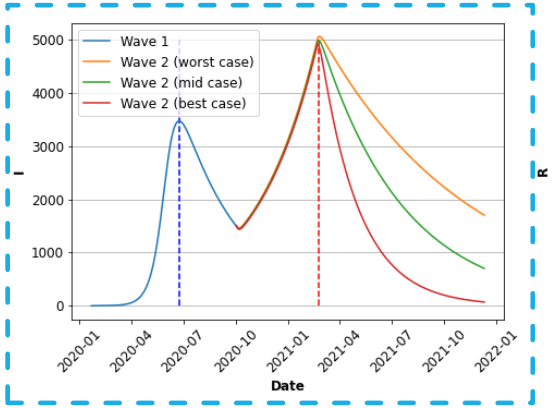
THE SEIRD MODEL

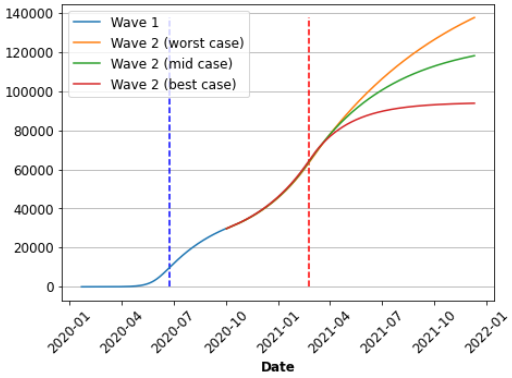
- Three cases simulated for wave 2:
  1. **Worst case** – social distancing measures are 10% less effective than in wave 1 (worsened by hospital overcapacity); mean infectious period remains the same
  2. **Middle ground** – social distancing measures are 5% less effective than in wave 1; mean infectious period shortens by 2.5%
  3. **Best case** – social distancing measures are 10% more effective than in wave 1; mean infectious period shortens by 5%
- The second phase of daily new confirmed cases is expected to reach an all-time high of around 5,000 on Feb 23, 2021, marking the end of wave 2
- Reproduction rate expected to drop below one in all three scenarios

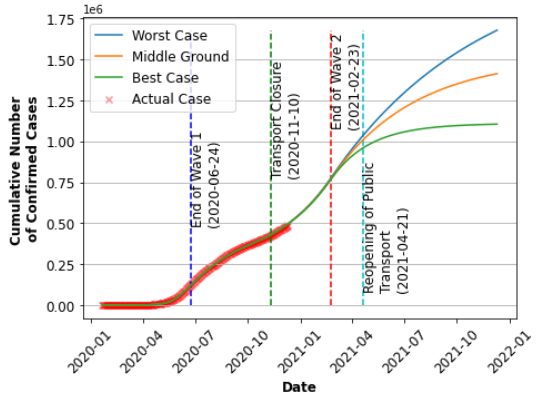
S = Susceptible Population
E = Exposed Population
I = Infected Population
R = Recovered Population
D = Deceased Population
R_0 = Reproduction Number
N = Total Population
N = S + E + I + R + D

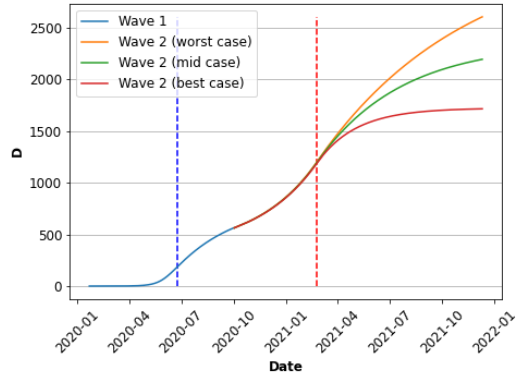


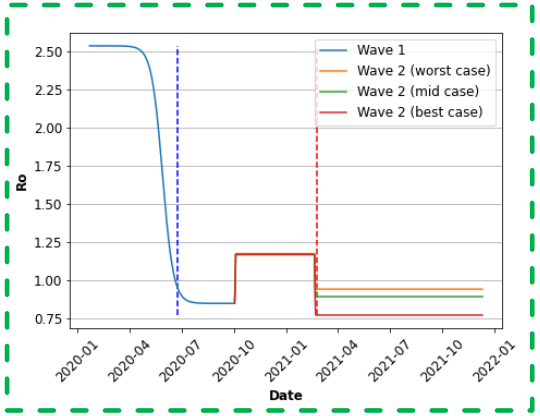






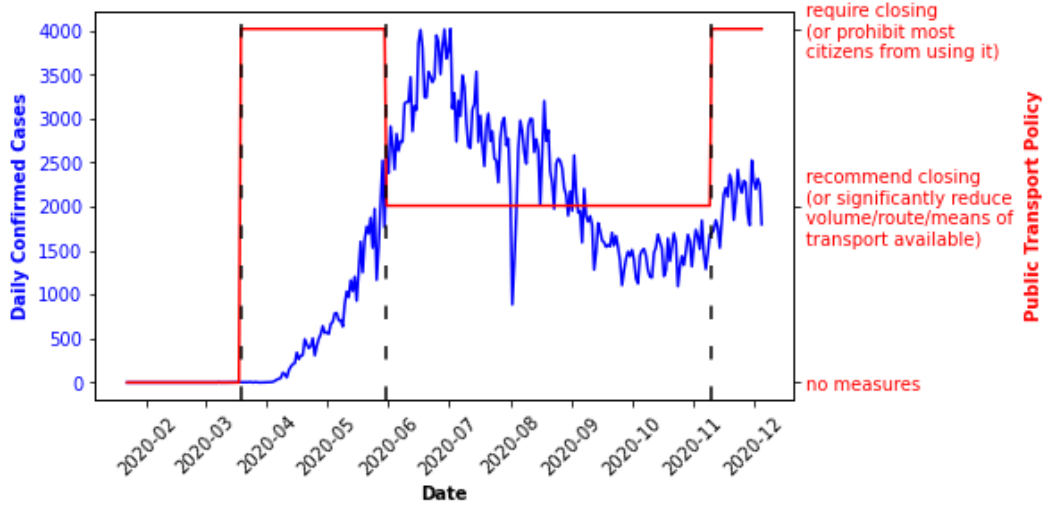


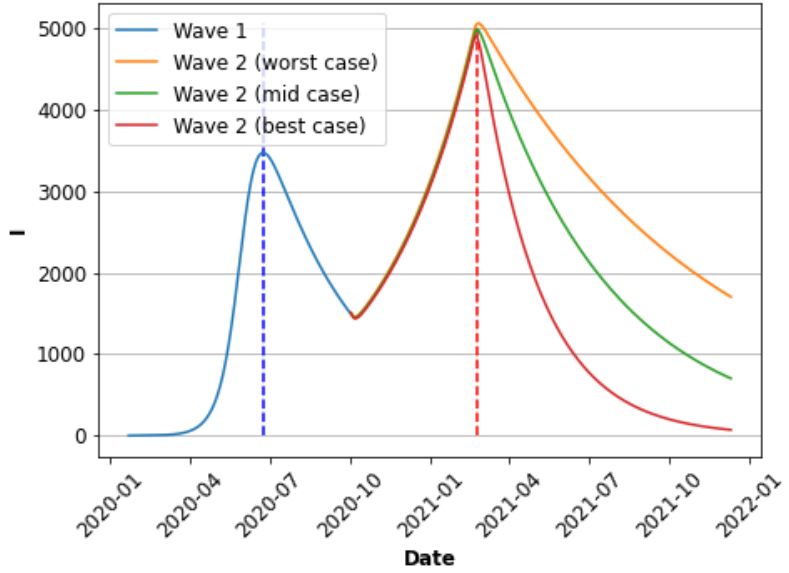




EFFECT OF PUBLIC TRANSPORT CLOSURE

- In the first wave, the time lag between full transport closure and the peak in daily confirmed cases was 105 days
- In SEIRD modelling of wave 2, this information was used to model the temporal position of the second wave peak; wave 2 peak occurs 105 days after the latest implementation of public transport restrictions
- In the first wave, public transport restrictions were relaxed prematurely before the peak in daily new confirmed cases was reached
- Even though there were other social distancing measures in place, the availability of public transport allowed infected people to move across regions in the country





POLICY ADVICE ON PUBLIC TRANSPORT

- Maintain the existing full closure of public transport at least till the peak of wave 2, which is expected to occur on **Feb 23, 2021**
- Since wave 2 peak is expected to be much higher than phase 1 peak, it is prudent to keep public transport closed until the daily number of new confirmed cases return to the level of the previous high, which is expected to be in **Mar 2021** based on the middle ground scenario
- The internal movement restrictions and social distancing policies should follow the public transport restrictions