Datasets:

1. population.csv: Population of each unit (estimated 2020).
2. timeseries.csv: Time series of unit-wise cumulative cases, recoveries, and deaths.
3. seroprevalence.csv: Round-1 serosurvey data (prevalence in Ballary alone has been corrected by 10% to account for an estimation error).
4. vaccinations.csv: Time series of unit-wise cumulative vaccinations.
5. tests.csv: Time series of the daily number of tests done in Karnataka.

Model:

U denotes the set of all units. For each unit $i \in U$, we have the state variables S_i, E_i, I_i, R_i, V_i . These evolve over time in the following fashion. The mobility matrix M couples their evolution.

$$\Delta E_i(t) = \beta_i(t) S_i(t) \sum_{j \in \mathrm{U}} M_{(i,j)}(t) \frac{I_j(t)}{N_j} - \alpha E_i(t),$$

$$\Delta S_i(t) = -\beta_i(t) S_i(t) \sum_{j \in \mathrm{U}} M_{(i,j)}(t) \frac{I_j(t)}{N_j} - \Delta V_i(t) + \Delta W_i(t),$$

$$\Delta I_i(t) = \alpha E_i(t) - \gamma I_i(t),$$
$$\Delta R_i(t) = \gamma I_i(t) - \Delta W_i(t).$$

In addition to the above, the vaccination time series needs to be updated from the given data.