System Dynamics (SD) philosophy emphasizes capturing real world processes and causal pathways and feedback. The structure of the model must correspond to real world entities at certain level of abstraction and aggregation. The entity flows in the model must respect conservation laws, resource constraints, and known delays in real life. The parameters of the model must come from domain knowledge, or, when estimated from data, must fall within plausible range. That is, data validation must be done before estimating parameters.

Despite the inherent limitations in data validation under the current circumstances, we have calibrated the model parameters against the data from public Covid-19 tracking websites. The optimization gives a set of parameter value that gives a good match with the reported numbers while the sensitivity analysis gives a range of parameter combinations that envelop the reported data. We have combined the optimization and sensitivity runs with expert knowledge from ICMR and WHO to estimate the model parameter values.

The ICMR and WHO publications have also been used to validate the model structure.

While the accuracy of absolute numbers generated by the model depend greatly on how accurate input data and therefore estimated parameters are, as long as the input data gets relative numbers and trends right, we can compare the relative impact of various policy interventions and learn which interventions or intervention combinations are most likely to take the system to desired state.

For the Covid-19 pandemic in India, our model shows that, even after a 49 day lock-down, some non-trivial number of infections (even asymptomatic) will be left and the pandemic will resurface. Only intervention that works against the pandemic is the high rate of testing those who show covid-19 like symptoms, isolating them if they are positive and contact tracing all contacts of +ve patients and quarantining them. In combination with use of face masks and personal hygiene, Contact tracing and isolation need not be super accurate. A wide range of combination of contact tracing, isolation, quarantining and personal hygiene measures keep the pandemic at bay and imperfections in one sphere are easily compensated by better implementation of other measures. This works if we keep just the schools closed for 90 days and allow all other activities with reasonable social distancing (only 20% improvement compared to base is sufficient). This works well if we open work but reduce non-essential contacts to half, while keeping schools closed for 90 days.