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THE IMPORTANCE OF QUARANTINE IN UKRAINE DURING COVID-19 PANDEMIC

According to the Official information portal of the Ministry of Health of Ukraine as of November 12, 2021, Covid-19 was detected in 24,058 people in Ukraine, 4,318 were hospitalized, 750 people died from the infection, 21,941 recovered. A total of 3 228 441 cases of infection, 77 147 deaths and 2 642 459 recoveries have been recorded since the beginning of the pandemic in Ukraine.

Ukrainian population is at a higher risk of infection and fatal outcome due to all three groups of risk factors.

- about one quarter of the population are above 60 years of age (around 10.9 million people);
- about one quarter of the adult population smoke (around 10.9 million people);
- NCDs account for 91 per cent of annual deaths (588,000 people); 1 in 10 Ukrainians suffer from diabetes; 1 in 3, from hypertension; and 1 in 4, from obesity.

In Ukraine the problem of general reluctance to wear masks in public places and keep social distance, as required by quarantine measures, is still relevant, and the share of vaccinated people is only 19.8%. It is also worth noting that at the time of writing, Ukrainians are experiencing a wave of Delta strain, which is considered the most contagious of all Covid-19 mutations. Considering this, I decided to show with a system dynamics model how quarantine affects the spread of Covid-19.

To do this, I made a complex CIR model and for clarity used it on the example of a population of 1000 people for a period of 200 days. So we have the following constants values: Covid-19 Infectivity, Immunity Ratio after recovery from Covid-19, Duration of recovery in mild case and Covid-19 Fatality Rate, which are as close as possible to real average values. These are values we cannot control at the moment due to a lack of information about the virus, so the only parameter on which we can act as a society is the contact frequency and that's why we are seeing quarantines all across the world. The share of vaccinated is not taken into account in the model.

The model we use is shown in Figure 1.

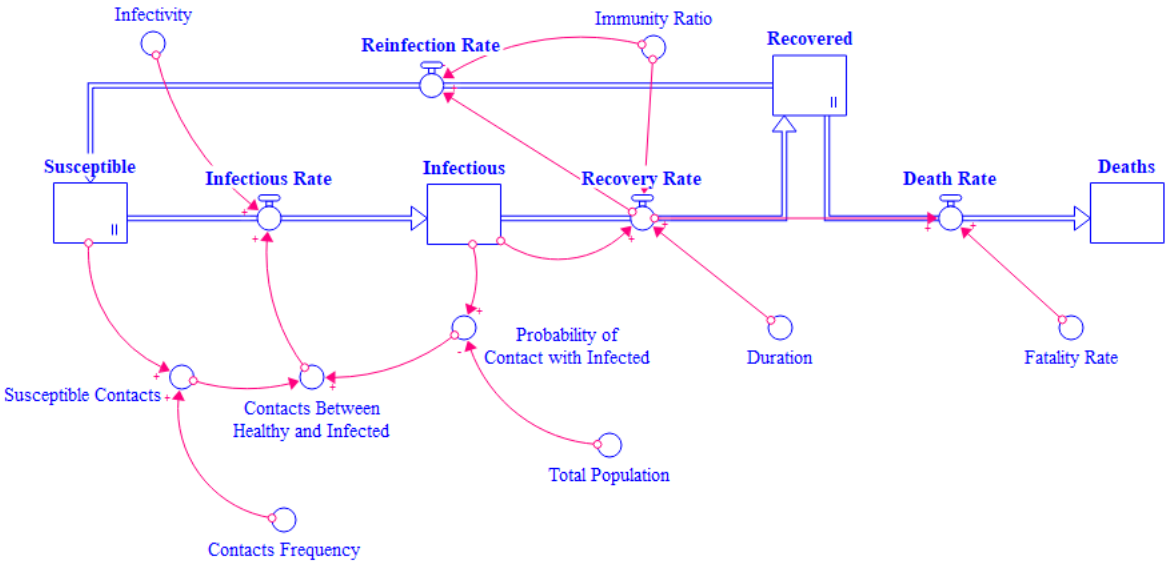

Figure 1. System dynamics model

In this model susceptible people gets infectious, then, some of them gets recovered and other deceased. Also, once you have recovered from Covid-19, you may still be infected a second time. This is represented by Reinfaction Rate flow.

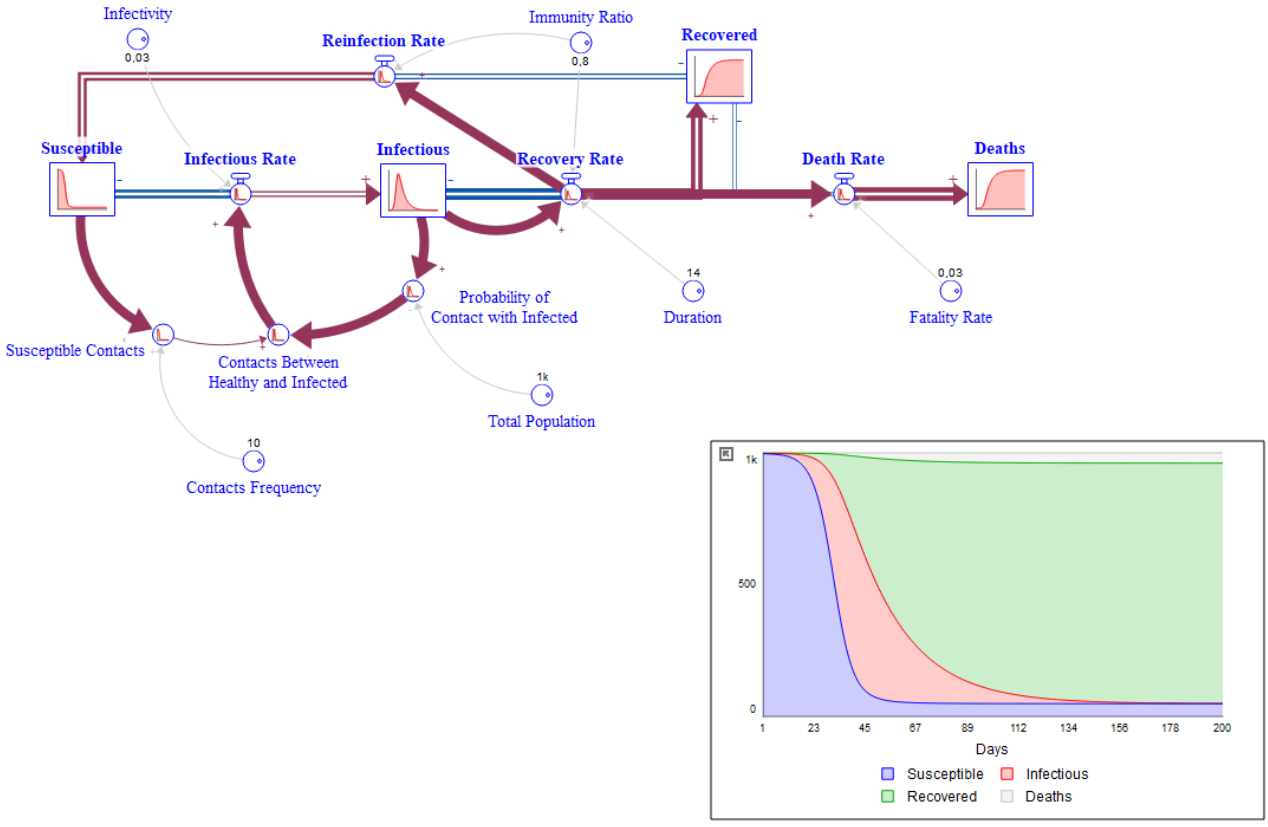

Figure 2. System dynamics model in progress

Now let's compare graphs (Figure 3) for Susceptible, Infectious, Recovered and Deaths stocks with the value of the Contact Frequency 10 and 5.

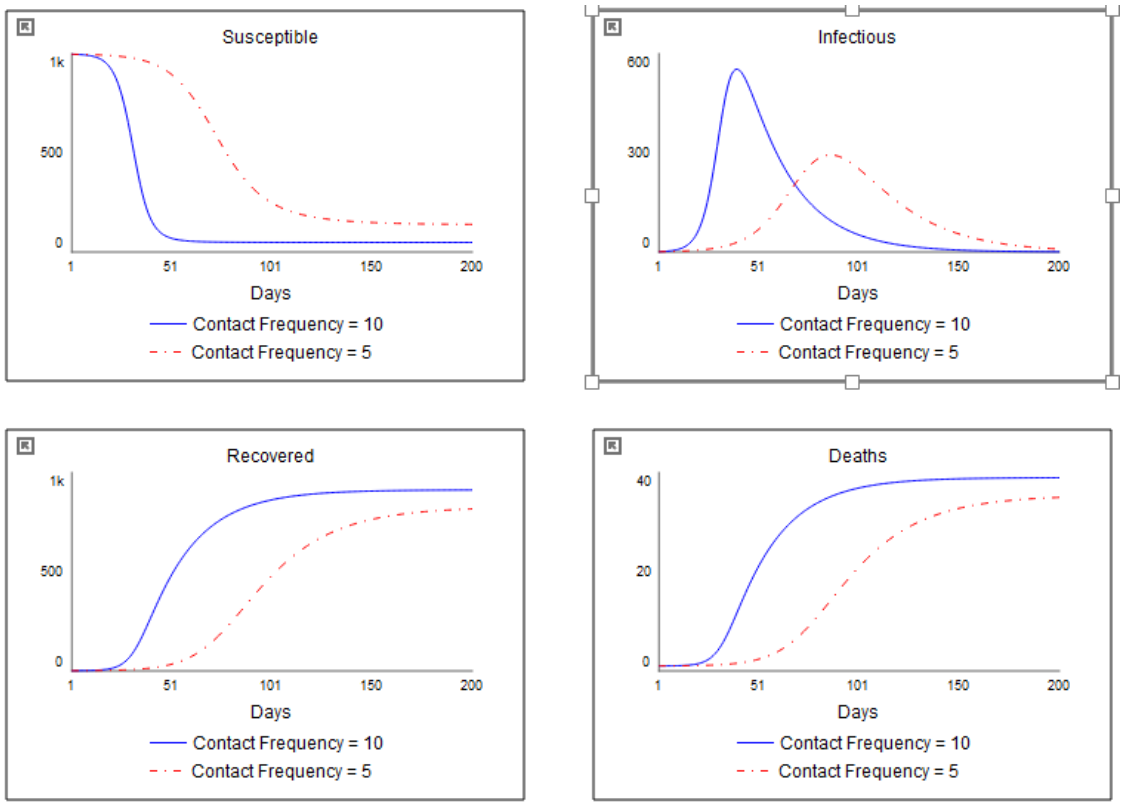

Figure 3. The dynamics of susceptible, infectious, recovered people

When the Contact Frequency is lower, the virus infects fewer people in a longer time and then the disease might not spread to larger segments of the population at all**.** This efficiency of halving the frequency of contacts is explained by the fact that the growth, as shown in the graph, is not linear but exponential. That is why it is actually very important to respect the quarantine rules.

Each of us can influence the spread of Covid-19 obeying precautions methods. Remember, wear a mask, clean your hands, keep a safe distance.

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