

EPIDEMIOLOGIST QUIRINE TEN BOSCH:

‘Measures were relaxed too soon, and too many at once’

Epidemiologist Quirine ten Bosch thought up the model SamenSlimOpen (‘Open Smart Together’), which shows how human behaviour affects the spread of the coronavirus. She doesn’t think the way Netherlands opened up last summer was very clever: ‘In the decision-making before the summer, superspreading events were not sufficiently taken into account.’

TEXT ASTRID SMIT **PHOTOGRAPHY** BRAM BELLONI


Quirine ten Bosch has been much in demand as a guest speaker in the last year and a half. She has given interviews on radio and television, and the press have sought her out as well. Which is logical for an epidemiologist of infectious diseases who developed a simulation model for COVID-19 called SamenSlimOpen – Open Smart Together.

It is sheer coincidence that she ended up in this research field, says Ten Bosch. Fifteen

years ago, as a student of Medical Biology at Groningen, she was thinking of going into the neurosciences. But after her Bachelor’s she realized that global health was more up her street, and she started a Master’s in Epidemiology at Utrecht. Since then, she has done research on elephantiasis, dengue fever and the plague epidemic in Madagascar, the largest in recent history. In 2019, she was appointed assistant professor of Veterinary Epidemiology at Wageningen, where most

of her research has been on zoonoses – infectious diseases that jump from animals to humans.

When research financier ZonMw put out a call for Covid-related projects a year ago, Ten Bosch set to work with Delft University of Technology to develop a model that seeks to identify how human behaviour affects the behaviour of the coronavirus. How much of a problem is it if people don’t maintain one and a half metre’s distance from each other? >

A woman with shoulder-length brown hair, wearing a bright yellow blazer over a black and white patterned top, stands in a modern, brightly lit cafe. She has her arms crossed and is smiling warmly at the camera. The background shows other people seated at tables, some working on laptops, and large windows with a view of a city. The overall atmosphere is professional and relaxed.

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in the spread of viruses’**

‘At some point the virus and humans find an equilibrium’

QUIRINE TEN BOSCH

Quirine ten Bosch, assistant professor of Epidemiology of Infectious Diseases at WUR's Quantitative Veterinary Epidemiology chair group, researches the transmission of infectious diseases within and between groups of animals and humans using statistical and mathematical models, and turns these into tools for public health authorities.

2017: PhD Biological Sciences, University of Notre Dame

2009: MSc Epidemiology, Utrecht University

2006: BSc Life Science & Technology, University of Groningen

How risky is it to sing together? And which is the most effective measure for preventing transmission? To get clarity on this, the researchers developed an online tool that shows how restaurant owners can make their restaurants Covid-proof. The model can easily be used for other contexts such as festivals or conferences as well.

What is the added value of your model?

‘The models used by RIVM (National Institute for Public Health and the Environment) are based on averages of large groups of people, such as the elderly, children, or the working population. The disadvantage of this is that the scale of these models is too large for some questions. For instance, you can't use it to find out how many people can be allowed into a restaurant and where they should sit, or how people move around an area at a particular festival. Our model can do that.

‘We combine an epidemiological model of the coronavirus with a model that simulates people's movements in a space. That part of it is done by researchers from Delft University of Technology. They have a lot of knowledge about how people move around in public spaces such as high streets and stations. In this project, they monitored people's movements in a restaurant using 3D cameras and GPS trackers. People have a destination in a space like that, they go to the bar or to the toilet, they take the shortest route, and they have to move around obstacles. By documenting their movements in lots of settings, we can simulate and predict their behaviour.’

Has SamenSlimOpen been used a lot, to see whether it was sensible to let restaurants and bars open last summer, for instance?

‘The tool is available to restaurant own-

ers. They can see how they can lay out their restaurant as safely as possible. And it is available to experts who advise municipalities on events and the opening of hospitality businesses. We keep RIVM and the ministry of Health, Welfare and Sport updated on our findings. But in general, the Netherlands could have made much more use of scientists in the field of infectious disease control. In countries such as France and the United Kingdom, the collaboration between the universities and those countries' equivalent of RIVM was much more intensive. That makes much better use of the brainpower in academia.’

Is that a missed opportunity?

‘In the decision-making before the summer, superspreading events were not sufficiently taken into account. These are exceptional events at which the virus spreads very efficiently. You can predict them, but not by working with averages. The reproduction number, for instance, gives the average number of new infections transmitted by an average person. In reality, only about five percent of people match that profile. Most people don't infect anyone at all, and about 20 per cent of people are the source of 80 per cent of infections.

‘It's true that an average event doesn't lead to many infections, as policymakers assume. But when they relaxed measures last summer, they should have asked themselves: which of the thousands of upcoming events will lead to an awful lot of infections? If you do that, you realize that quite a lot of large outbreaks could take place. That is the kind of question our model can provide an insight into: events that are low-risk but have a big impact.’

A lot of measures had been relaxed by the end of September: one and a half



on before there were vaccinations: face masks, one and a half metres' distance, no large gatherings. You do have to realize that the virus will continue to circulate and that vulnerable people in these communities will become infected sooner or later and run the risk of serious illness and death.'

What research question would you still like to have the answer to, to improve your model?

'I would like to know what the role of aerosols, droplets and surfaces is in virus transmission. If you know more about how big a role they play, you also know which knobs you need to twiddle to combat virus transmission. Luckily technologies are on their way that are better at measuring virus particles in the air than the ones we have at present. That would make life as a modeller quite a lot easier.'

When can we expect to lead a normal life again, in Europe and worldwide?

'That's a difficult question, especially where global transmission is concerned. The virus is not going to go away, that is something scientists are agreed on. Then the question is: when will it stop putting a strain on hospitals? That is hard to say. It has a lot to do with the speed of vaccination campaigns worldwide, the immunity people build up, and the new variants that we are going to come across. At some point there will be an equilibrium between the virus and humans, just as there is with the flu. You would be hard put to find a 30-year-old who has never had the flu, or a country where there isn't any flu. In that situation, the virus and humans co-exist. I think with Covid, globally, it's going to take five to ten years before we reach that kind of situation.' ■

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metres' distance, face masks in shops and at stations, working from home. Was that sensible?

'You've got to be very cautious about easing measures, because as a government, you've only got a few knobs you can twiddle, and it is difficult to bring measures back again. I think measures were relaxed too soon, and too many at once. It would have been better to relax them one by one. Then you can still adjust the plan.'

'The vaccination rate in the Netherlands is high, but there is still a large group of people who can fall ill. And they get infected by both vaccinated and unvaccinated people: half of the new Covid cases are people who have had a vaccination. So even with a high vaccination rate, transmission goes on.'

'And the measures were relaxed in the autumn, the season in which respiratory viral infections always increase, and in a period when the infection pressure was already quite high. It makes a difference whether

you relax measures at a moment when 200 people are getting infected per day or 2000. In the latter case, the government has much less time to respond if it goes wrong.'

'We shouldn't have got ourselves into that situation in mid-September. It went wrong in July when we were advised by a politician to go "dancing with Jansen", a vaccination that only required one jab. That's the reason we had such high infection pressure by the end of the summer, so we didn't have enough of a buffer.'

More than 80 per cent of adults have been vaccinated. There were a few hotspots in the Netherlands where the vaccination rate was lower, so the virus flared up again there first. From a purely technical point of view, what could have kept that under control?

'Vaccination is the most logical solution. But if that isn't possible, then in those areas you have to turn to the methods we relied