

The stats behind the medical science

What does crunching numbers have to do with public health? It's all about population genetics, says this Singaporean



PHOTO BY DON WONG

PUSHING THE BOUNDARIES

SPOTLIGHT ON NRF SCIENTISTS

In the final instalment of a series of interviews with scientists under the National Research Foundation umbrella, **JUNE YANG** meets Professor Teo Yik Ying, a statistician who says Singapore is the ideal representation of Earth's diverse populations.

SINGAPORE — To the uninitiated, the lab of Professor Teo Yik Ying (picture) betrays little indication that it is a cutting-edge research facility. There are no bubbling flasks, no complicated whirring machines. In fact, it looks like an ordinary workplace, with rows of desks and computers. Work days, too, sound familiar: Troop in, make a cup of coffee, work on the computer crunching numbers.

Under this calm, unassuming exterior, however, magic with numbers takes place.

Prof Teo's work does not fall into easily-classifiable boxes. A statistician by training, his work primarily falls under the purview of the National University of Singapore's Saw Swee Hock School of Public Health, an entirely new faculty set up only in October last year. Combining the disciplines of medicine, genetics and number-crunching, Prof Teo's lab is breaking boundaries in population genetics.

"While the Faculty of Medicine looks at the health of public individuals, the School of Public Health is actually very different," he said. "It's trying to look at the health of Singapore as a whole — what needs to be done to prevent a person from falling ill in the first place."

In simple terms, that means he takes data about the genes and lifestyle of large samples of Singapore's population, runs it through computer programs and studies the patterns that show up.

The areas of study covered by his lab seem incredibly vast. Biomedical research labs usually specialise in very narrow interests — in one aspect of a disease, for example, or the workings of one metabolic pathway. But this lab does a diverse range of work — from calculating your risk of developing Type 2 diabetes to studying the difference between ethnic populations in response to medicine, and the human spread of dengue.

Explaining the work he does, Prof Teo told TODAY: "Public health will involve elements in terms of nutrition advice, in terms of lifestyle modification, even simple things like: Should the Government put in place more exercise stations and where should they put them? When designing a shopping centre, how should the elevators be structured such that people are made to do a bit more exercise by walking in a bigger circle?"

That's the joy he takes from his job, he said. "When I look at a series of numbers, we really try to find out what is the story behind that. It's all there, it's how you make sense of it, how you learn from it."

SINGAPORE, THE GLOBAL MICROCOSM

The multi-tasking Prof Teo does not only work for the good of Singapore's public health, but that of the entire world. This is no hyperbole: His lab is one of four that the United States' National Institute of Health picked to develop statistical research — the others being in Cambridge, Oxford, and Michigan.

The key to his lab's contribution is the multi-ethnic nature of Singapore's population. In terms of disease studies and drug reactions, for example, there are differences in the way different ethnic groups respond. Yet, a lot of medical and scientific research tend to focus on Caucasians.

"In fact, the Caucasian population in

the world is actually very small," said Prof Teo, who was born and bred in Singapore. "Because they happen to be the richer nations, a lot of the research tends to be European-centric. But they are now looking at Asia because they realise they are stuck. How useful or applicable are those findings — discovered for European populations — for other non-European populations?"

This is where his group comes in. "Singapore itself is like a representation of the world's population. We have Chinese, we have Malays, we have Indians. Just these three groups already cover about two-thirds of the world's population," he said. "We are leaders in the game of trans-ethnic studies."

To run a lab that is at the forefront of global research is a mighty feat for any scientist, but this is more impressive given his relatively young age — Prof Teo is just 34 years old. He credits his success to a lot of hard work, and a bit of luck.

He spent 11 years working in the United Kingdom and at some points, he said, he was essentially working three jobs — lecturing, full-time research in Britain, as well as leading projects based in Singapore. He said sheer hard work as one of the reasons he has done so well.

"Before I had kids, my work hours were 7am to 10pm," he told me. "When you work three jobs at once, you tend to accomplish in three years what people would normally accomplish in five to eight years."

Despite all this, he still manages to balance work and family life. His return to Singapore, in part, was spurred by a desire to raise his children here. And he tries, as much as possible, to make sure evenings and weekends are family time.

"It helps that I have a very supportive family," he said proudly of his wife, three-year-old daughter and year-old son.

MATHS RUNS IN THE FAMILY

That he is a family man is not surprising. After all, it was family that got him into his line of work in the first place — he comes from a family of mathematicians.

"Both my parents were Maths teachers," he said, adding that it was his parents who taught him not to think of mathematics as rote learning, such that even in his teaching now, he stresses the importance of the fun side of statistics and numbers. "They taught me the fun side of mathematics."

Prof Teo's love for finding the story behind the numbers is what drives his passion for his work: Passion he says is necessary when working in the research sector.

"Research can be very lonely and geeky," he said. "You're really spending a long time thinking about the same research topic for three to five years. There will definitely be very down moments in research when things aren't looking up and you ask yourself: Why am I doing this?"

It is at those down points, he said, that passion is needed to tide you through. "It's really your inner conviction that will tell you: I know why I'm doing this. If you cannot find a reason to do it, you will suffer a lot in research."

And, for Prof Teo, that passion is his belief that he is truly changing the world. "I really believe in what I'm doing. Because I feel what I'm doing will not only help public health but also personal health, individually.

"I keep telling people that it may just be within three to five years that everyone will be carrying their genetic code on their iPhone, so the doctor can immediately tell what drugs to avoid giving you in an emergency.

"That kind of advancement won't come entirely from geneticists or from medicine, but because people like myself are working on it."