

FOCAL POINT ON GENOMIC MEDICINE IN THAILAND

PRODUCED IN PARTNERSHIP WITH THE THAILAND CENTER OF EXCELLENCE FOR LIFE SCIENCES

A TWISTED LADDER TO PROSPERITY

GENOMIC MEDICINE is being harnessed to address southeast Asian health concerns and to help Thailand climb into high-income status.

Compared with 30 years ago, life in Thailand is good. After enjoying the world's highest economic growth rate from 1985 to 1995, the proportion of the country's people in poverty decreased from more than 60% in the 1980s to 9.85% in 2018. Literacy rates are up, child mortality down, and quality of life indicators are all pointing in the right direction. Time to celebrate, then?

Not so fast. With increased prosperity, the challenges faced by the Thai people have shifted. Where once infectious diseases mostly occupied the attention of Thai healthcare professionals, now 'lifestyle diseases' such as diabetes and hypertension are on the rise. In the last 15 years in Thailand, those diseases have tripled and quadrupled, respectively.

Economically, too, Thailand faces new challenges. Having made it to 'upper-middle-income' status, it needs to make the notoriously difficult step up to high-income if it wants to continue its improvements to quality of life.

However, an alignment of needs and initiatives may offer Thailand a path forward. Genomic medicine uses DNA sequencing to provide information for diagnosis and disease management and is an increasingly important medical tool.

In 2019, the Thai government launched the Genomics Thailand Initiative to sequence the genomes of 50,000 Thai people and build infrastructure to harness genomic information. It represents a more comprehensive approach than



GENOMIC MEDICINE FUTURE

Driven by falling DNA sequencing costs, personalizing medicine through the analysis of patient genomes is making its way into healthcare systems globally. In addition to helping its own population, Thai competitiveness in genomic research and medicine will support its economic strategy of developing advanced industries to drive it into high-income status.

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As early as **2004**, Thai biotechnology policy identified genomic medicine as a key healthcare and economic strategy.



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Thailand's healthcare system has been one of the first in southeast Asia to adopt **PHARMACOGENOMIC TESTING**, in which genomic data is used to determine a patient's likely drug reaction.



recent initiatives in Malaysia and Singapore, the latter involving roughly 10,000 genomes.

One long-term hope is better preventative information for southeast Asian populations. Genetic risk scores already predict the probability of breast cancer, prostate cancer and type 1 diabetes in individuals of European descent more accurately than standard tests. But in Thailand, the global gaps in genomic research become more obvious, says Nares Damrongchai, one of the instigators of Genomics Thailand, and chief executive of the Thailand Center of Excellence for Life Sciences (TCELS). In 2019, relative to European ancestry samples, the performance of genetic risk scores was 95% as accurate for east Asian samples and only 60% as accurate for south Asian samples.

That's because fewer data points have been collected from Asian people. In 2016, only 14% of genome-wide association studies had been conducted on Asian populations, most commonly in east Asian countries (China and Japan). At the crossroad of multiple migratory paths and a trading hub going back centuries, Thailand's genetic origins are myriad. "Because of this diversity, it is harder for us to make assumptions based on global research," says Damrongchai. The long-term results of the Genomics Thailand Initiative will provide much needed insights. "We will really understand the region's genomic complexity."

Soranit Siltharm, permanent secretary at Thailand's Ministry of Higher Education, Science Research and Innovation, says the initiative will position Thailand as a genomic hub for the Association of Southeast Asian Nations (ASEAN), promoting collaboration and advances across the region.

The initial five-year sequencing project will be complemented by a 20-year roadmap for training staff, enacting appropriate legislation and building a new medical hub. Already a Genomics Thailand facility

is in the works, as part of the Thai Government's Eastern Economic Corridor, a special economic zone that is slated to have 1.5 trillion Thai baht (US\$43 billion) pumped into it over the next five years.

Thailand has a regional advantage in achieving its genomics goals on two fronts, says Nathorn Chaikunapruk, a Thai who has been appointed professor in the Department of Pharmacotherapy at The University of Utah, in the United States. Firstly, it already has one of the strongest healthcare systems in ASEAN, he says, with the most internationally accredited hospitals in the Asia-Pacific. This places it in a leading position to attract research funding and regional investment.

Secondly, "Thailand is a leader in 'health technology assessments,'" explains Chaikunapruk. "These are relatively fast turn-around studies designed to support policy around advanced healthcare." For the past 20 years, most of population's basic healthcare has been covered by the Thai government, meaning the bureaucracy has been schooled in promoting fiscally sensible innovation in clinical settings. Singapore, one of the few high-income countries in ASEAN, is now setting up a similar assessment model, he says, with Thai researchers travelling to consult on the project.

The Genomics Thailand Initiative is forecast to save the country more than 70 billion Thai baht (approx. US\$2.2 billion) in treating diabetes, HIV, acute coronary syndrome, cancer, and stroke. Meanwhile the global genomics market, from sequencing to using the genetic data for diagnostics, is set to almost double by 2024, reaching US\$38 billion, with Asia-Pacific predicted to be the fastest growing region.

Factor in Thailand's top-five global position for medical tourism spending, and it starts to seem that the ladder out of the middle-income trap for Thailand may be the twisted double helix. ■

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Thailand will sequence **50,000 GENOMES** by 2024, which will represent one of the biggest repositories in the region.



Nares Damrongchai, CEO of the Thailand Center of Excellence for Life Sciences.

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