Mathematical Exploration of Taiwan's COVID-19 Control Success: Assessing the Control Strategy with Delay and Multi-Strain Models

王烽彬

長庚大學（通識教育中心）

ABSTRACT

"Taiwan's COVID-19 success stands as a model, demonstrating how meticulous detection and timely isolation, without lockdowns, can effectively control the virus and offer a powerful lesson to the world. In this talk, I present an exploration of Taiwan's COVID-19 control success through two mathematical models. First, I present a delay model that examines how the timing and proportion of case detection and isolation influence disease transmission. We assess how Taiwan's rapid response, together with a high proportion of case detection and timely isolation, kept the virus under control during the first two years of the pandemic, and how relaxing these policies influenced later waves. Second, we analyze a multi-strain model that captures the dynamics of three Omicron variants circulating after the strategic relaxation of control measures. We examine how multiple variants interacted, competed, and contributed to new waves of infection. Together, these models provide a comprehensive assessment of Taiwan's strategic control measures through mathematical insight, from timely intervention to the management of variant-driven transmission dynamics.

This talk is based on the ongoing works joint with Drs. Khagendra Adhikari (Tribhuvan University, Nepal and Chang Gung University), Chang-Yuan Cheng (NKNU), Kuang-Hui Lin , Naveen K. Vaidya (San Diego State University, USA)."