

Scientific system accurately predicts spread of H1N1: study

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A new scientific system developed by a St. Michael's Hospital physician, designed to rapidly evaluate the world's air traffic patterns, accurately predicted how the H1N1 virus would spread around the world, according to research published in the *New England Journal of Medicine* today.

St. Michael's Hospital scientist and infectious disease physician Dr. Kamran Khan and colleagues analyzed the flight itineraries of the more than 2.3 million passengers departing Mexico on commercial flights during the months of March and April to predict the spread of H1N1. The findings show the international destinations of air travelers leaving Mexico were strongly associated with confirmed importations of the H1N1 virus around the world.

"The relationship between air travel and the spread of H1N1 is intuitive," said Dr. Khan. "However, for the first time, we can quickly integrate information about worldwide air traffic patterns with information about global infectious disease threats. What this means is that cities and countries around the world can now respond to news of a threat earlier and more intelligently than ever before."

The system, developed by Dr. Khan and supported by the Public Health Agency of Canada and the Ontario Ministry of Health and Long Term Care, is known as The BIO.DIASPORA Project. The Project, led by Dr. Khan, was created in response to the Toronto SARS crisis in 2003 to better understand the global airline transportation network and its relationship to the spread of emerging infectious diseases.

"While it is generally understood that air travel can transport infectious diseases around the world, the BIO.DIASPORA Project, has for the first time, provided a very accurate picture of not only where diseases will travel, but how often and when," said Dr. Michael Gardam, director of infectious diseases prevention and control for the Ontario Agency for Health Protection and Promotion. "This work provides the world with a potent early warning system for emerging infectious diseases."

Just prior to the onset of the [H1N1](#) epidemic, Dr. Khan and his colleagues submitted a 122-page report to the Public Health Agency of Canada entitled The BIO.DIASPORA Project: An Analysis of Canada's Vulnerability to Emerging Infectious Disease Threats via the Global Airline Transportation Network. Key findings from this report include:

- Toronto, Vancouver and Montreal - in that order - are Canada's most vulnerable domestic points to global infectious disease threats. These three cities receive more than 13 million international passengers from around the world every year.
- Sixty per cent of all passengers traveling to Canada from developing areas of the world use multiple flights to reach their destination. About half of these passengers - or 1.4 million people every year - make flight connections into Canada through just nine cities: London (UK), Hong Kong, Tokyo, Frankfurt, Paris, Miami, Amsterdam, New York City and Chicago. The airports in these cities represent potential sites for screening passengers to Canada during international epidemics.
- Four developing countries — China, Mexico, India and the Philippines - and nine industrialized countries — the U.S., the U.K., France, Germany, Italy, the Netherlands, Japan, South Korea and Taiwan - are the source of 80% of Canada's

international air traffic. These are important locations from which future infectious disease threats may originate or pass through en route to Canada. Canada should consider working with these countries to tackle shared risks of global infectious diseases.

- The emergence and local spread of [infectious diseases](#) is dependent on various factors, which when combined with high volumes of commercial [air traffic](#) may lead to global dissemination. These factors include but are not limited to:
 - poverty
 - high population density
 - close human-animal interaction
 - poorly developed infectious disease surveillance systems
 - limited health-care resources
 - health-care workforce shortage
- Considering the realities of living in a highly interconnected world, Canada will need to play a larger role in detecting and controlling infectious disease threats outside of its borders as a way to protect the health of Canadians.

For more information on The BIO.DIASPORA Project and access to the full report visit www.biodiaspora.com

Source: St. Michael's Hospital

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