



Surveillance and early warning systems for climate-sensitive diseases in Vietnam: Key findings from the Pestforecast project

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Background

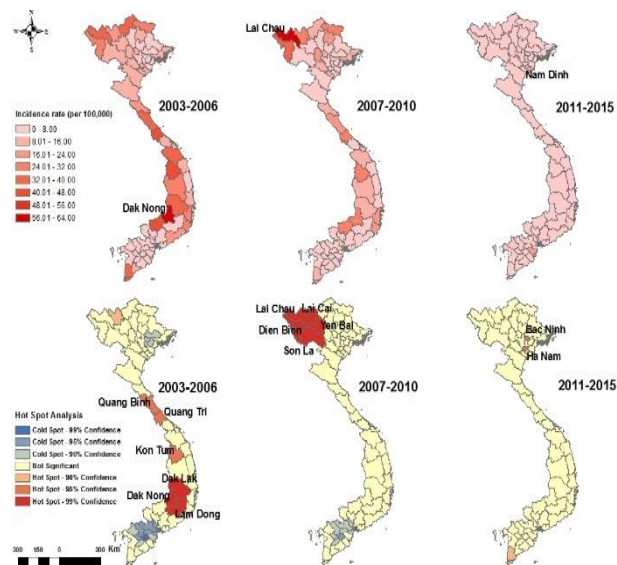
Vietnam is a tropical country with high temperatures and precipitation, providing good conditions for climate-sensitive diseases. Given global climate and land use changes, there is a need to determine the distribution and burden of climate-sensitive diseases to improve disease management. Moreover, studies are needed to evaluate people's perceptions and knowledge of climate-sensitive diseases in Vietnam. Therefore, the Pestforecast project used health and climate secondary datasets to evaluate the seasonality of selected climate-sensitive diseases and other climate risk factors associated with disease incidence. Risk maps were developed to aid surveillance and management. The project also evaluated the prevalence and level of Japanese encephalitis and leptospirosis in pigs and aflatoxins in maize, and perceptions and knowledge of climate-sensitive diseases among people in the study areas. Aflatoxins are poisonous carcinogenic substances produced by certain moulds in crops such as maize and groundnuts. There are limited studies on aflatoxicosis in Vietnam.

Viral encephalitis, dengue fever, shigellosis and malaria

We obtained national surveillance data for notifiable infectious diseases in Vietnam from the Ministry of Health for the last 30 years. In addition, meteorological data (precipitation, temperature and humidity) were obtained for the study period. Average incidence rates (per 100,000 people) for viral encephalitis, dengue fever, shigellosis and malaria were calculated monthly and associations with season and other climate risk factors were assessed (Figure 1). The different geographic regions under our studies were found to have different seasonal patterns and trends. Overall, increased incidence rates were observed during the wet season (May–October). There were associations between incidences of these diseases and temperature, humidity and precipitation in Vietnam. Our findings help better understand the geographical and seasonal patterns of diseases as well as the associated climate risk factors in Vietnam. Our studies provide evidence to help public health system planning and can be used by clinicians to

improve diagnosis and foresee the timing of outbreaks. They can help raise public awareness during the peak seasons to prevent or reduce further potential outbreaks or onward transmission during an outbreak.

Figure 1. Average incidence rates (per 100,000) (upper maps) and hotspot analysis (lower maps) of malaria in Vietnam from 2003 to 2015.



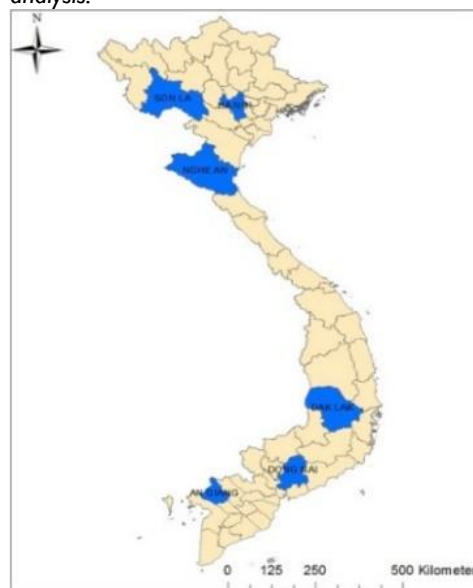
Aflatoxin in maize and pigs

A total of 2370 maize samples were collected from six provinces and analysed for the presence of aflatoxin B₁, a highly carcinogenic mycotoxin (Figure 2). Of the collected samples, 799 (33.7%) had over 2 parts per billion (ppb) of aflatoxin B₁ and 687 (29.0%) had over 5 ppb. Five ppb is the maximum acceptable level of aflatoxin B₁ in maize for human consumption in Vietnam. We also interviewed 551 people from six provinces.

The survey found that many people lacked awareness of aflatoxins, although awareness was slightly higher in southern Vietnam (25% in An Giang, 23% in Dak Lak and 6% in Dong Nai) than in provinces in northern Vietnam.

A total of 1920 samples of pig urine were collected from slaughterhouses in five provinces. Overall, 53.9% of samples contained aflatoxin M₁ at levels above the 0.15 ppb limit of detection (maximum 13.66 ppb; median 0.2 ppb; mean 0.63 ppb).

Figure 2. Provinces selected for sampling of maize (all six provinces) and pig urine (all but Dong Nai) for aflatoxin analysis.

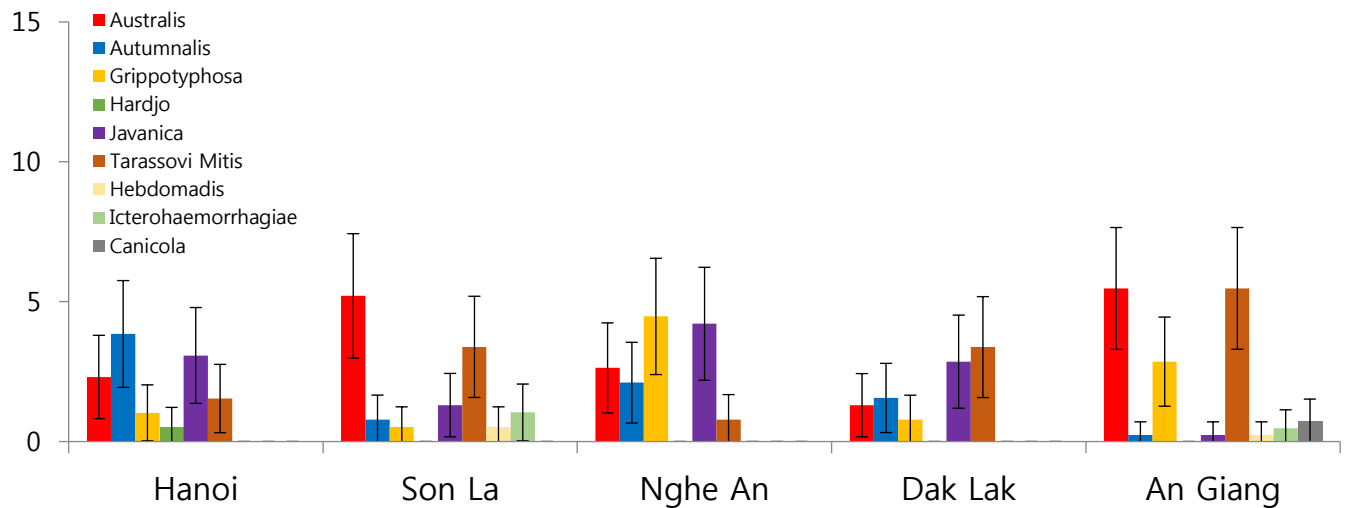


Our studies confirm that aflatoxin B₁ is present in maize in Vietnam at low levels and that pigs are exposed to it through feed; this may have implications for pig production as aflatoxins are known to have a range of negative effects on productivity at the levels found in our study. There was low awareness among farmers, indicating a need to boost awareness-raising efforts among the public and conduct more research in the region. Further investigation is needed on the possible health impacts of potential aflatoxins in pork; this will help in establishing regulations for animal feed.

Leptospirosis

Leptospirosis is an infectious disease that causes symptoms such as fever, headaches and chills in people and a serious reproductive disease in pigs. A total of 1959 samples of sera from fattening pigs were randomly collected from slaughterhouses in Son La, Hanoi, Nghe An, Dak Lak and An Giang provinces. Serovars were identified by the microscopic agglutination test. Overall seroprevalence was 8.17% and serovar Tarassovi Mitis had the highest prevalence (2.19%) followed by Australis (1.94%), Javanica (1.68%) and Autumnalis (1.17%) using a cut-off titre $\geq 1:100$ (Figure 3). Leptospirosis in pigs may be a useful indicator of the human and animal burden in Vietnam and a risk assessment tool. The presence of some of the identified serovars suggests that wildlife may play an important role in the transmission of leptospirosis to domesticated pigs in Vietnam. Therefore, strengthened monitoring and surveillance systems are needed to better understand the epidemiology of the disease and prevent or reduce infection in humans and animals.

Figure 3. Percentage of seropositive samples by serovar in each province using cut-off titre ≥ 100 (95% confidence interval).



Conclusion and way forward

The findings of the Pestforecast project provide insights into the geographical and seasonal patterns of infectious and non-infectious climate-sensitive diseases in humans and animals and the associated climate risk factors in Vietnam, which can help target interventions to detect and prevent these diseases. The results of these large-scale studies help better understand the prevalence and epidemiology of aflatoxins, Japanese encephalitis and leptospirosis in different provinces. Further investigation is needed in each region into the possible roles of

environmental conditions and interaction with hosts in contributing to climate-sensitive diseases. The way forward includes developing decision support tools for animal and human health workers and policymakers at central and local levels to understand the risks of climate-sensitive diseases and thus help promote targeted prevention and interventions. The approach of this project could be used to study climate-sensitive diseases in southeast Asia and is already being applied in a project in Indonesia.

Photo credits

Page 1 (left): ILRI/Stevie Mann

Page 1 (right): ILRI/Jo Cadilhon

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