Climate variability and malaria incidence in the Solomon Islands: Towards an operational early warning system

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Introduction

Malaria is one of the leading causes of morbidity in the Solomon Islands – with a malarial death rate of approximately 8% of total deaths.

This pilot project has demonstrated the close link between malarial incidence, rainfall and temperature.

COSPPac is working in partnership with the Solomon Islands Meteorological Service to develop and deliver an early warning system for malaria using seasonal climate forecasts.

Malaria incidence and climate in the Solomon Islands

The peak malaria season in the Solomon Islands occurs in the wet summer months – when rainfall, temperature and humidity create optimal conditions for mosquito breeding. There is significant year to year variability due to the effects of the ENSO phenomenon on local climate.

Above median rainfall during the peak period tends to reduce the number of malaria cases because their breeding sites are flushed out by the heavier than normal rainfall. Conversely, below median rainfall during the wet season tends to be associated with an increase in malaria incidence. These results indicate that malaria tends to be more prevalent during El Niño events and less so during La Niña events.

The incidence of malaria lags behind rainfall by approximately two months. This makes rainfall a useful parameter for forecasting malaria incidence with sufficient lead time for the healthcare sector to plan.

Temperature influence on the number of malaria cases tends to have a shorter lag period. Lower than normal rainfall from November to January followed by higher than normal temperatures in December and January triggers a high incidence of malaria.

How this project will help

The long term aim of this project is for the Solomon Islands Metrological Service develop and deliver seasonal climate forecasts and "malaria alerts" to the healthcare sector and communities.

Specifically the project aims to:

- Develop malaria outlooks based on the historical relationship between malaria incidence and rainfall and temperature. The outlooks could alert the health industry and communities when conditions are conducive periods of high malaria risk, giving them sufficient time to take mitigation measures and prepare.
- Strengthen the relationships between the Solomon Islands Metrological Service and the health sector to allow for rapid information sharing.

Progress so far

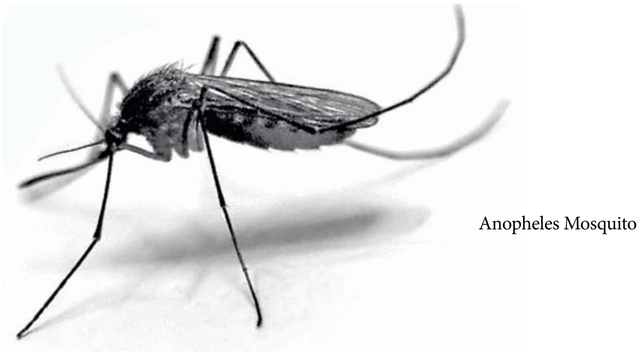
Several outcomes have already been achieved:

- Malaria incidence data across 9 provinces from 1975 to 2007 was mapped against the corresponding climate data for this period, including rainfall, maximum and minimum temperature and relative humidity.
- Health data was analysed and the malarial incidence was calculated as a Positive Incidence Ratio, which is the number of positive films per 1000 head of population.
- A prototype early warning system has been developed, allowing the Solomon Islands Meteorological Service to issue bulletins for periods where upcoming climate conditions are favourable for high malaria incidence, thus allowing medical services and residents to take measures to minimise risk of infection.
- The project has raised the profile of the National Meteorological Service in the Solomon Islands and has fostered closer collaboration between the NMS and health service organizations in the country.

How this project is contributing the Global Framework for Climate Services in the Pacific

This pilot project has contributed to the GFCS by:

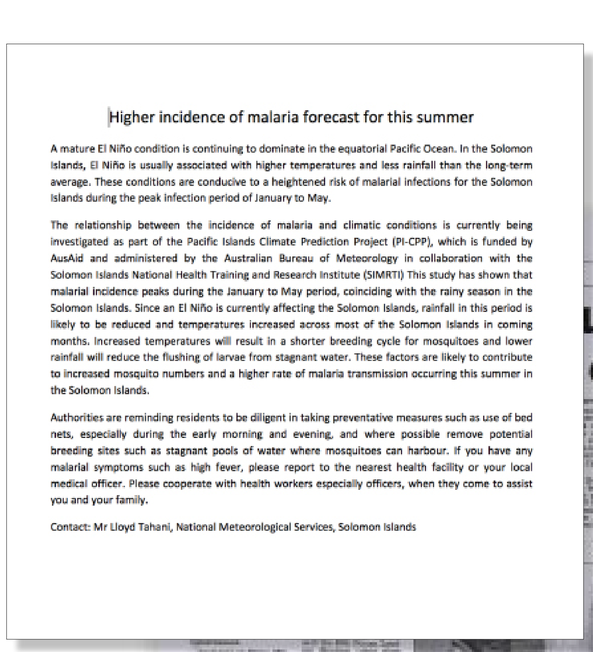
- Enhancing the capacity of the Solomons Islands Meteorological Service in producing customized climate fore-casts which enable the health sector to incorporate climate information into their malaria control strategies.
- Facilitated the exchange of data and expertise between the Solomons Islands Meteorological Service and the health sector.
- Working towards the implementation of operational systems in developing countries.



Anopheles Mosquito

Children on the river in the Solomon Islands. Rivers often provide prime mosquito breeding habitats.

Pilot Project Workshop in the Solomon Islands. unknown, but sourced from COSPPac photo folder, August 2005.



Higher incidence of malaria forecast for this summer

A mature El Niño condition is continuing to dominate in the equatorial Pacific Ocean. In the Solomon Islands, El Niño is usually associated with higher temperatures and less rainfall than the long-term average. These conditions are conducive to a heightened risk of malarial infections for the Solomon Islands during the peak infection period of January to May.

The relationship between the incidence of malaria and climatic conditions is currently being investigated as part of the Pacific Islands Climate Prediction Project (PI-CPP), which is funded by AusAid and administered by the Australian Bureau of Meteorology in collaboration with the Solomon Islands National Health Training and Research Institute (SIMRTI) This study has shown that malarial incidence peaks during the January to May period, coinciding with the rainy season in the Solomon Islands. Since an El Niño is currently affecting the Solomon Islands, rainfall in this period is likely to be reduced and temperatures increased across most of the Solomon Islands in coming months. Increased temperatures will result in a shorter breeding cycle for mosquitoes and lower rainfall will reduce the flushing of larvae from stagnant water. These factors are likely to contribute to increased mosquito numbers and a higher rate of malaria transmission occurring this summer in the Solomon Islands.

Authorities are reminding residents to be diligent in taking preventative measures such as use of bed nets, especially during the early morning and evening, and where possible remove potential breeding sites such as stagnant pools of water where mosquitoes can harbour. If you have any malarial symptoms such as high fever, please report to the nearest health facility or your local medical officer. Please cooperate with health workers especially officers, when they come to assist you and your family.

Contact: Mr Lloyd Tahani, National Meteorological Services, Solomon Islands

Trial bulletin for prototype early warning system, Lloyd Tahani, December 2009.

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assists local church

Today's weather

Climate forecasting can help predict malaria outbreaks

Newspaper report covering results of malaria study performed for the PICPP pilot project, Solomon Star, 1 August 2009.

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[5] Image courtesy of Royal Perth Hospital (RPH)
[6] 'Millennium Development Goals Progress

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