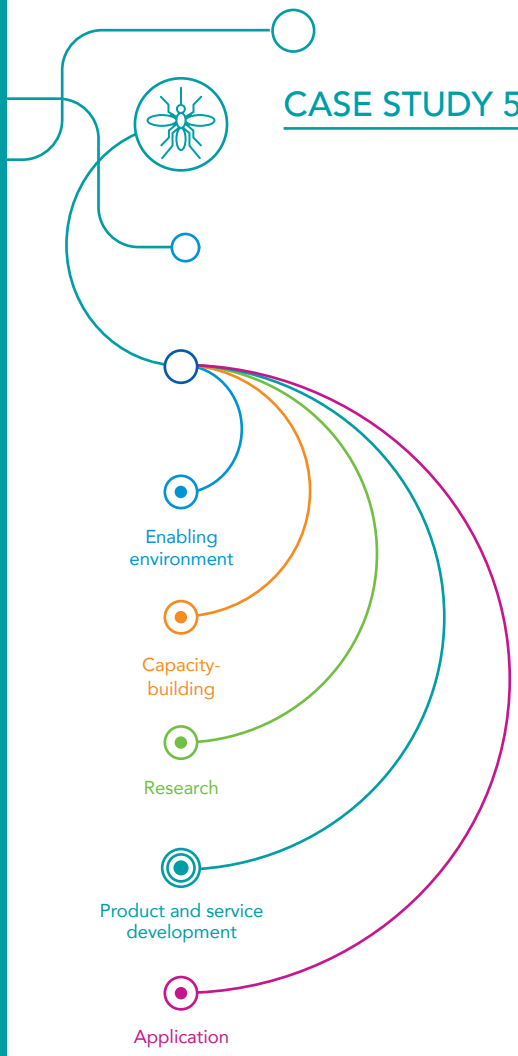

CASE STUDY 5J

RISK FORECASTS

BIO-CLIMATIC BULLETINS TO FORECAST DENGUE VECTORS IN PANAMA

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CONTEXT

Climate is an important health determinant. Human health can be directly affected by climatic conditions, particularly by extreme weather and climate events. Determining how climate variability impacts human health is a complex process, because of the different susceptibilities and vulnerabilities of different populations .

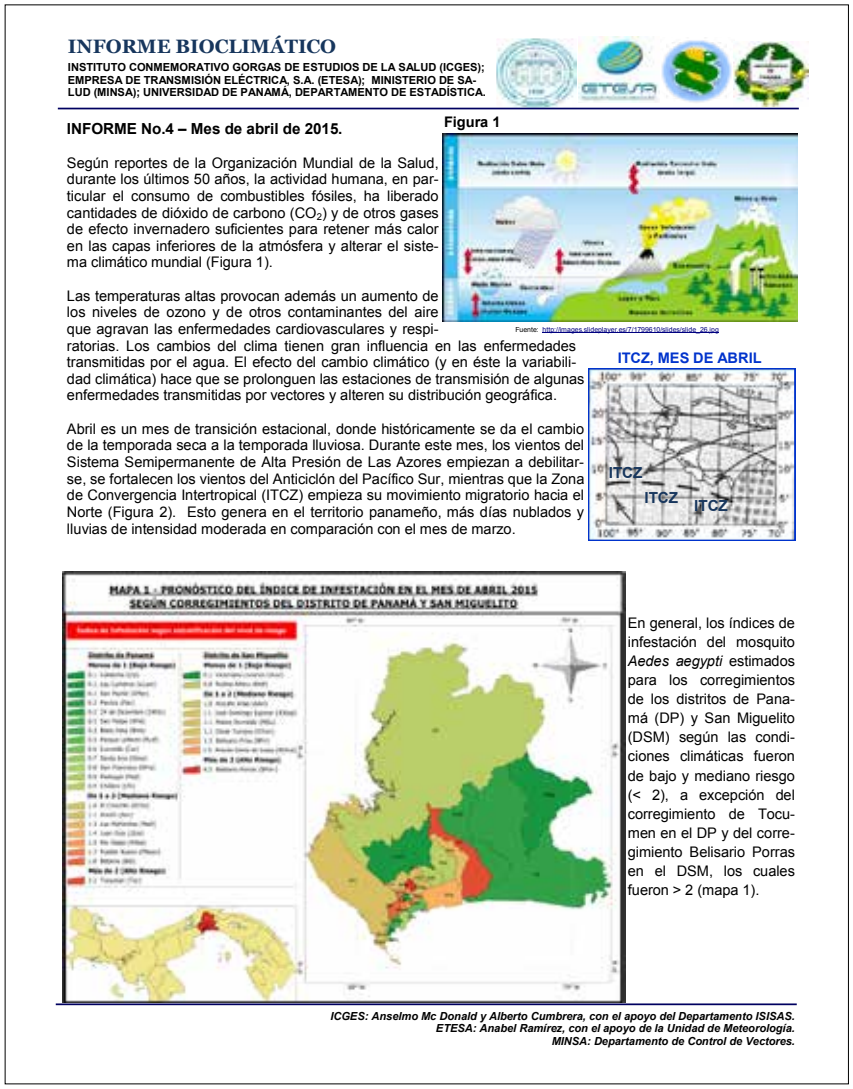
Climatic conditions can influence the transmission dynamics of communicable vector-borne diseases, water-borne diseases *(60)* and even of some noncommunicable diseases *(61)*.

NEW APPROACHES

Prior to 2008 in Panama, no projects investigating the relationship between climate and health existed. Therefore, the Gorgas Memorial Institute of Health Studies (GMIHS), and its Department of Health Systems, Environment and Society Studies (ISISAS) addressed this gap and defined this new area of national research by formalizing two scientific collaborations – one with the Cuban Institute of Meteorology (INSMET) for its experience in climate and health, and the other with the Panamanian Electric Transmission Company (ETESA), responsible for the administration of meteorological information in Panama.

On the basis of these partnerships, an inter-institutional working group was established composed of medical researchers with public health expertise (GMIHS), statisticians (University of Panama), specialists in geographic information systems (GMIHS) and meteorologists (ETESA). The groups were trained in health-specific statistical methods (primarly time-series analysis), GIS and climate information management systems to ensure equal levels of capacity were attained across team members.

Figure 5.23 Monthly bio-climatic bulletin, Panama.



INFORME BIOCLIMÁTICO

INSTITUTO CONMEMORATIVO GORGAS DE ESTUDIOS DE LA SALUD (ICGES); EMPRESA DE TRANSMISIÓN ELÉCTRICA, S.A. (ETESA); MINISTERIO DE SALUD (MINSA); UNIVERSIDAD DE PANAMÁ, DEPARTAMENTO DE ESTADÍSTICA.

INFORME No.4 – Mes de abril de 2015.

Figura 1

Según reportes de la Organización Mundial de la Salud, durante los últimos 50 años, la actividad humana, en particular el consumo de combustibles fósiles, ha liberado cantidades de dióxido de carbono (CO_2) y de otros gases de efecto invernadero suficientes para retener más calor en las capas inferiores de la atmósfera y alterar el sistema climático mundial (Figura 1).

Fuente: http://images.slideplayer.es/7/17996/10/slides/slide_26.jpg

Las temperaturas altas provocan además un aumento de los niveles de ozono y de otros contaminantes del aire que agravan las enfermedades cardiovasculares y respiratorias. Los cambios del clima tienen gran influencia en las enfermedades transmitidas por el agua. El efecto del cambio climático (y en éste la variabilidad climática) hace que se prolonguen las estaciones de transmisión de algunas enfermedades transmitidas por vectores y alteren su distribución geográfica.

ITCZ, MES DE ABRIL

Abril es un mes de transición estacional, donde históricamente se da el cambio de la temporada seca a la temporada lluviosa. Durante este mes, los vientos del Sistema Semipermanente de Alta Presión de Las Azores empiezan a debilitarse, se fortalecen los vientos del Anticición del Pacífico Sur, mientras que la Zona de Convergencia Intertropical (ITCZ) empieza su movimiento migratorio hacia el Norte (Figura 2). Esto genera en el territorio panameño, más días nublados y lluvias de intensidad moderada en comparación con el mes de marzo.

MAPA 1 - PRONÓSTICO DEL ÍNDICE DE INFESTACIÓN EN EL MES DE ABRIL 2015 SEGÚN CORREGIMIENTOS DEL DISTRITO DE PANAMÁ Y SAN MIGUELITO

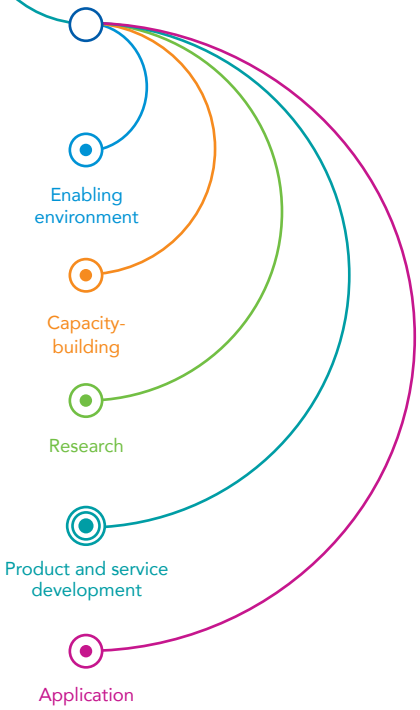
En general, los índices de infestación del mosquito *Aedes aegypti* estimados para los corregimientos de los distritos de Panamá (DP) y San Miguelito (DSM) según las condiciones climáticas fueron de bajo y mediano riesgo (< 2), a excepción del corregimiento de Tocumen en el DP y del corregimiento Belisario Porras en el DSM, los cuales fueron > 2 (mapa 1).

ICGES: Anselmo Mc Donald y Alberto Cumbrera, con el apoyo del Departamento ISISAS.
ETESA: Anabel Ramírez, con el apoyo de la Unidad de Meteorología.
MINSA: Departamento de Control de Vectores.

The main goal of the Panama Climate and Health Groups is to generate scientific evidence on climate impacts of specific diseases at the national level. This information serves as a technical asset for the ministry of health to make decisions and develop public health interventions.

With dengue an important public health concern Panama, the GMIHS initiated a project with state financing and support of Cuban INSMET to develop and validate a statistical model to estimate the infestation of the mosquito *Aedes aegypti*, the vector that transmits the disease. The model was used to estimate the infection rates two months ahead to help the district of Panama, the capital of the country, plan for vector surveillance and control.

CASE STUDY 5J



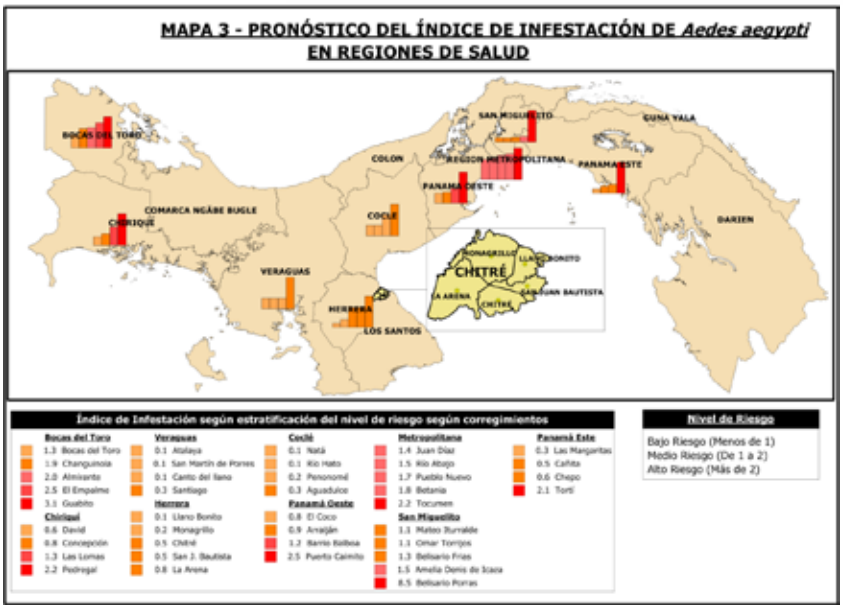
BENEFITS AND LESSONS

Based on this validated model, the GMIHS and the ETESA now publish the monthly *Bio-climatic Bulletin*. It describes the current influence of climate on health, and specifically the model predictions of indexes of vector infestation, and maps of the geographic distribution of vectors. This bulletin is sent to all relevant decision-making actors (such as the ministry of health, city mayor, academics, environmental authorities and researchers) to provide evidence and up-to-date information that can be used as the basis for disease control efforts.

Since 2011, the group has been progressively investigating the availability of data in other areas of the country, with the aim of extending the use of this climate and health product to different districts in nine of the 14 health regions *(62)*.

In addition, the Department of Hydrometeorology of ETESA has actively participated in the project to provide meteorological data; the Ministry of Health Department of Vector Control has provided entomological data, and the School of Statistics of the University of Panama has provided technical expertise.

Figure 5.24 Forecasts of the *Aedes aegypti* infestation index, extracted from the *Bio-climatic Bulletin*, April 2015.



ACKNOWLEDGEMENTS

The Ministry of Health, Vector Control Unit and ETESA Department of Hydrometeorology (Meteorological Service) are highlighting the importance of the data generated by vector control inspectors during community visits, and meteorological observations provided by ETESA. This continuous process of participation and sensitization has enabled the tool to be endorsed and used by health authorities. The staff of the meteorological services have been similarly empowered through their engagement with health partners.

To evaluate the use of the *Bio-climatic Bulletin*, each year a working meeting is held with members of the Climate and Health Group and the technical health authorities of the sanitary areas where the project is being developed. This helps maintain awareness about the project and availability of the tool.

In the future, we seek to expand the *Bio-climate Bulletin* to provide evidence regarding other climate-sensitive diseases that can help the health system with planning health promotion and disease prevention strategies. We also hope to extend this information to the community level via social media and conduct knowledge. Attitudes and practices studies can identify community groups with high-risk behaviours that can be targeted by community health promotion and prevention activities.

This project has demonstrated the importance of forming multidisciplinary and intersectorial research teams, and developing community participation that increases awareness of protective and high-risk behaviours.

Resources and efforts from several institutions were brought together with the health sector for the first time, enabling a regional network to collaborate in Central America and elsewhere to address vector-borne diseases through climate change and health initiatives.