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# Climate Change and Health Research in the Caribbean

Dr. Georgiana Gordon-Strachan

# Some Articles

## Climate and painful crisis of sickle-cell disease in Jamaica

ALVA M REDWOOD, EVADNE M WILLIAMS, PATRICIA DESAI, GRAHAM R SERJEANT

*British Medical Journal*, 1976, 1, 66-68

### Summary

In a 10-year retrospective study a close correlation was found between low temperatures and hospital admissions for severe painful crises of sickle-cell disease.

### Patients and methods

The patients attended the adult and paediatric wards of the University Hospital of the West Indies, and met the criteria for sickle-cell (SS) disease.\* Pain was defined as pain in the abdomen, chest, or limbs on a basis other than SS disease. Juxta-articular area most commonly affected, and pyrexia and red Pains associated with pregnancy or secondary to

*Am J Public Health*. 1994 March;  
84(3): 473-476.  
doi: [10.2105/ajph.84.3.473](https://doi.org/10.2105/ajph.84.3.473)

OPEN Potential influence of temperature  
ion on preterm birth  
Rico

PMCID: PMC1614825  
PMID: [8129070](https://pubmed.ncbi.nlm.nih.gov/8129070/) <sup>1,2</sup>, John D. Meeker<sup>3</sup> & Akram Alshawabkeh<sup>1</sup>

## Neural tube defects in Jamaica following Hurricane Gilbert.

[E M Duff](#) and [E S Cooper](#)

## Nonlinear and delayed impacts of climate on dengue risk in Barbados: A modelling study

Rachel Lowe<sup>1,2,3\*</sup>, Antonio Gasparrini<sup>4,5</sup>, Cédric J. Van Meerbeeck<sup>6</sup>, Catherine A. Lippi<sup>7</sup>, Roché Mahon<sup>6</sup>, Adrian R. Trotman<sup>6</sup>, Leslie Rollock<sup>8</sup>, Avery Q. J. Hinds<sup>9</sup>, Sadie J. Ryan<sup>7,10</sup>, Anna M. Stewart-Ibarra<sup>11,12</sup>



Acta Tropica

Volume 156, April 2016, Pages 137-143



## *Aedes aegypti* (L.) in Latin American and Caribbean region: With growing evidence for vector adaptation to climate change?

Dave D. Chadee Raymond Martinez



Contents lists available at [ScienceDirect](#)

Epidemics

journal homepage: [www.elsevier.com/locate/epidemics](http://www.elsevier.com/locate/epidemics)



## A comparative analysis of Chikungunya and Zika transmission

Julien Riou<sup>\*</sup>, Chiara Poletto, Pierre-Yves Boëlle

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# 1976 Sickle Cell Disease

## Climate and painful crisis of sickle-cell disease in Jamaica

ALVA M REDWOOD, EVADNE M WILLIAMS, PATRICIA DESAI, GRAHAM R SERJEANT

*British Medical Journal*, 1976, 1, 66-68

### Summary

**In a 10-year retrospective study a close correlation was found between low temperatures and hospital admissions for severe painful crises of sickle-cell disease.**

### Patients and methods

The patients attended the adult and paediatric sickle-cell clinics of the University Hospital of the West Indies, and all fulfilled the diagnostic criteria for sickle-cell (SS) disease.<sup>8</sup> A painful crisis was defined as pain in the abdomen, chest, or limbs unexplained on any basis other than SS disease. Juxta-articular areas of limb bones were most commonly affected, and pyrexia and red urine were frequent. Pains associated with pregnancy or secondary to an obvious disease

# Research From Development Biology and Extreme Events

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84(3): 473–476.

doi: [10.2105/ajph.84.3.473](https://doi.org/10.2105/ajph.84.3.473)

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## Neural tube defects in Jamaica following Hurricane Gilbert.

[E M Duff](#) and [E S Cooper](#)

### Abstract

An increased incidence of obvious live-birth neural tube defects (i.e., spina bifida cystica and encephalocele) occurred in Jamaica 11 to 18 months after Hurricane Gilbert. The conceptions of the affected babies coincided with a rise in megaloblastic change in sickle cell patients, suggesting a wide-spread drop in dietary folate intake. A detailed history was taken from each of the 17 affected mothers (case subjects) and 51 unaffected mothers (matched control subjects). The case subjects reported a significantly lower mean intake of dietary folate in the periconceptional period (154 micrograms/day) than did the control subjects (254 micrograms/day). The temporary increase in neural tube defects was associated with a diet comparatively low in folate in the periconceptional period, suggesting the dietary level of folate that fails to protect against neural tube defects under natural conditions.

# Dave Chadee –Adaptation of *Aedes aegypti*



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*Aedes aegypti* (L.) in Latin American and Caribbean region: With growing evidence for vector adaptation to climate change?

Dave D. Chadee Raymond Martinez

## Highlights

- An increase in collections of *Aedes aegypti* immatures from septic tanks and underground drains.
- Results from laboratory and field studies show for the first time high mortality of *Aedes aegypti* immatures when exposed to sunshine in artificial containers.
- The increase in extreme events including higher than normal temperatures may be responsible for this shift or adoption by mosquitoes to underground breeding sites and resting places.

# Mathematical Modelling Commissioned by CIMH



- A precipitation index used to monitor drought and extreme rainfall as
- model inputs from June 1999 to May 2016.
- Disease outbreaks were more likely to occur 4 to 5 months after periods of drought and 1 month after periods of excess rainfall.

## RESEARCH ARTICLE

### Nonlinear and delayed impacts of climate on dengue risk in Barbados: A modelling study

Rachel Lowe<sup>1,2,3\*</sup>, Antonio Gasparrini<sup>4,5</sup>, Cédric J. Van Meerbeeck<sup>6</sup>, Catherine A. Lippi<sup>7</sup>, Roché Mahon<sup>6</sup>, Adrian R. Trotman<sup>6</sup>, Leslie Rollock<sup>8</sup>, Avery Q. J. Hinds<sup>9</sup>, Sadie J. Ryan<sup>7,10</sup>, Anna M. Stewart-Ibarra<sup>11,12</sup>



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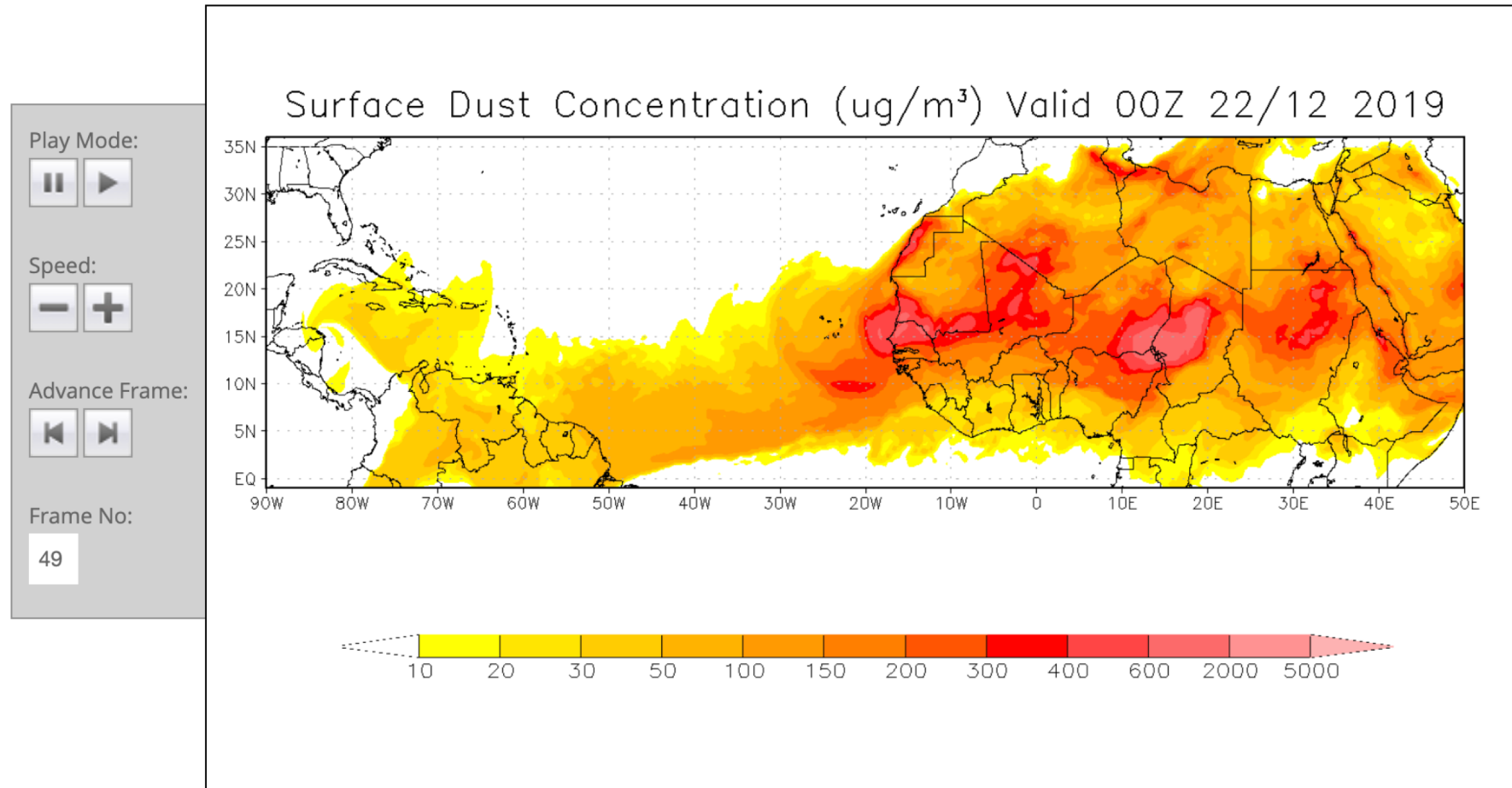
# Sahara Dust –From Research to Climate Product



# Caribbean Institute for Meteorology and Hydrology

<http://dafc.cimh.edu.bb/dust-prediction/>

## 7-Day Dust Prediction





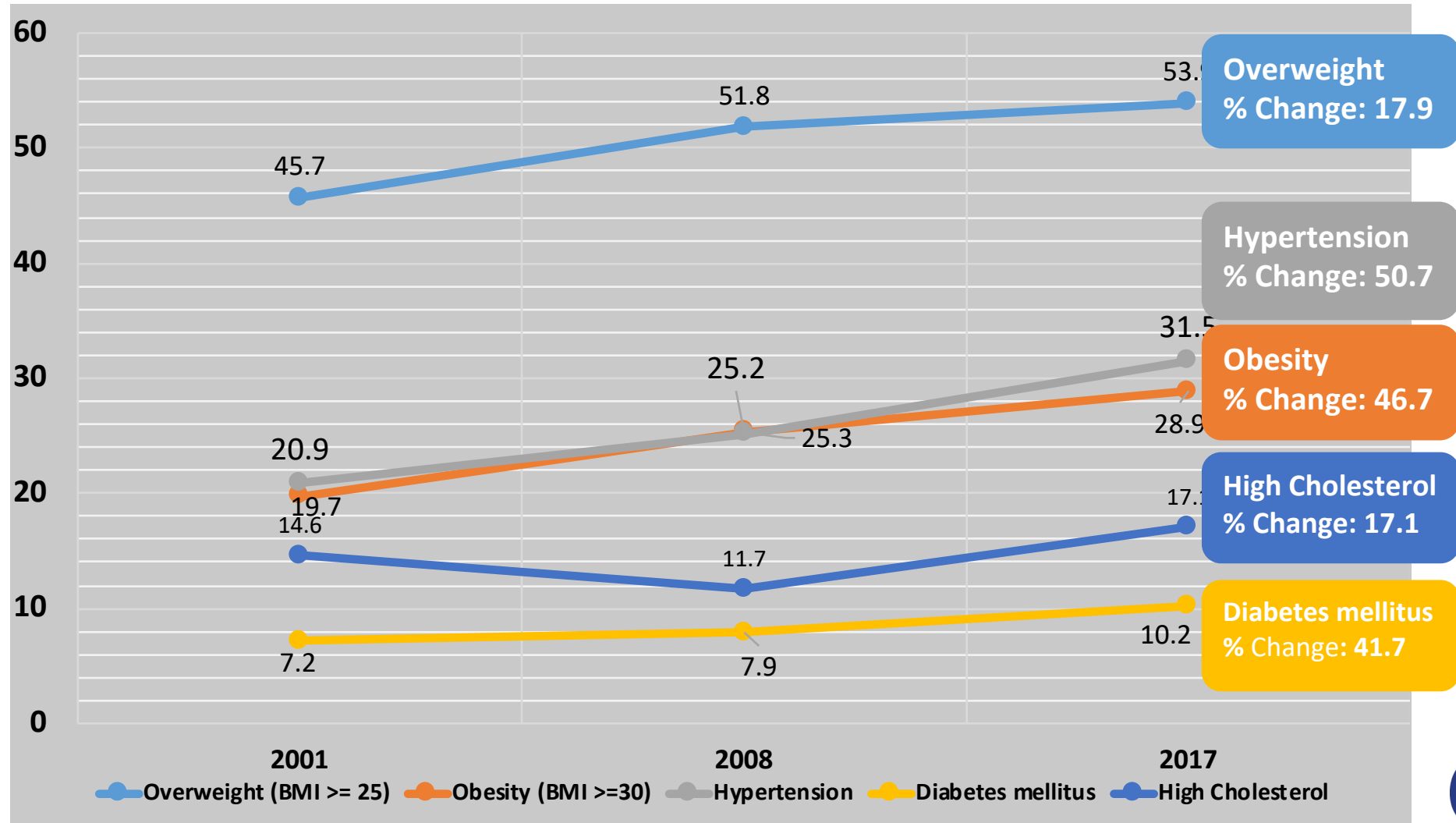


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# GAPS in Research and Future Considerations for Research

# Secular Trends among persons 15-74 years for 2001, 2008 & 2017 (JHLS)



# GAP 1

- Research which probes the Relationship between NCDs and Climate Change/Weather Variability in Tropical SIDS
- What we need?
  - CLIMATE AND HEALTH OBSERVATORY
  - Patterns of Hospital Admissions for Chronic Diseases, mental health and Trauma

# GAP 2 Heat Stress on a Tropical Island

- Assumption tropical dwellers are adapted to withstand heat.
- Climate Change brings unprecedented heat
- Research to determine the impact of global warming on the physiology of tropical dwellers

# GAP 3 Access to good Nutrition

- Food Insecurity –increased drought
- Caribbean has been able to reduce severe malnutrition
  - Research to determine the probability of re-emergence
  - Research to determine the levels of micronutrient deficiencies
- Food Quality –
  - We know smaller yields during droughts, but is the quality and quantity of nutrients also compromised?

# GAP 4 - Disease modelling and early warning systems development

- Sahara Dust
- Dengue Fever
- Chronic Diseases?

# GAP 5 – Development Biology

- Severe malnutrition in early life and its impact throughout the life course has been studied
- **Cohort Studies on children who had early life exposure to extreme events**
- Anecdotally, the cohort of children born during hurricane Gilbert have not done as well in standardized tests as the children born in the years before and after the hurricane
- *Identify vulnerable groups and expose them to stimulation programmes which have been shown to have sustained benefits*



# GAP 6: Health Systems Strengthening

- Energy needs of hospitals and health facilities
  - Barbados –Solar energy to power health facilities
- The role of Technology
  - Most countries still use paper based medical records prone to flooding
  - Explore the use of technology in digitizing these records and including data collection systems to enhance surveillance and research
  - Monitoring Health
- Pharmaceuticals
  - Disease modelling to re-examine and redefine drug needs
  - Quality of pharmaceuticals -shelf-life studies to determine potency of medications exposed and stored in open shelves

# GAP 7: Extreme EVENTS –Chronic Diseases

- Hospital admissions significantly higher 0-3 months post hurricane for Medicine Ward compared with the same period in year prior without hurricane
- **Research on the effect of extreme events on the exacerbation of chronic conditions**
- We have the data!!

# RESEARCH Building Blocks for Climate and Health

- Climate modeling – Super computer funded under the PPCR project
  - Climate Studies Working Group Mona
- Real time meteorological data
  - Improved the number of weather stations regionally (CIMH)
  - Historical weather data for some countries
- Surveillance of diseases and risk factors
  - Notifiable Diseases
- Chronic Diseases
  - Some Administrative data

# Improving and increasing research capacity

- Further research is needed in quantifying future risks that the health sector will face as a result of climate change
- **There are opportunities** to implement changes that will reap long term goals
- In the face of the uncertainties, *research will help to direct the decisions that need to be taken now*

# Hippocrates

- *“Whoever would study medicine aright must learn of the following subjects. First, he must consider the effect of the season of the year and the differences between them. Secondly, he must study the warm and the cold winds, both those which are in common to every country and those which are peculiar to a particular locality. Lastly, the effect of water on the health must not be forgotten”*