Epidemiology of infectious diseases of public health concern for the Pacific

Axelle Ronsse, MD MSc PHD
Emerging Disease Surveillance and Response
World Health Organization

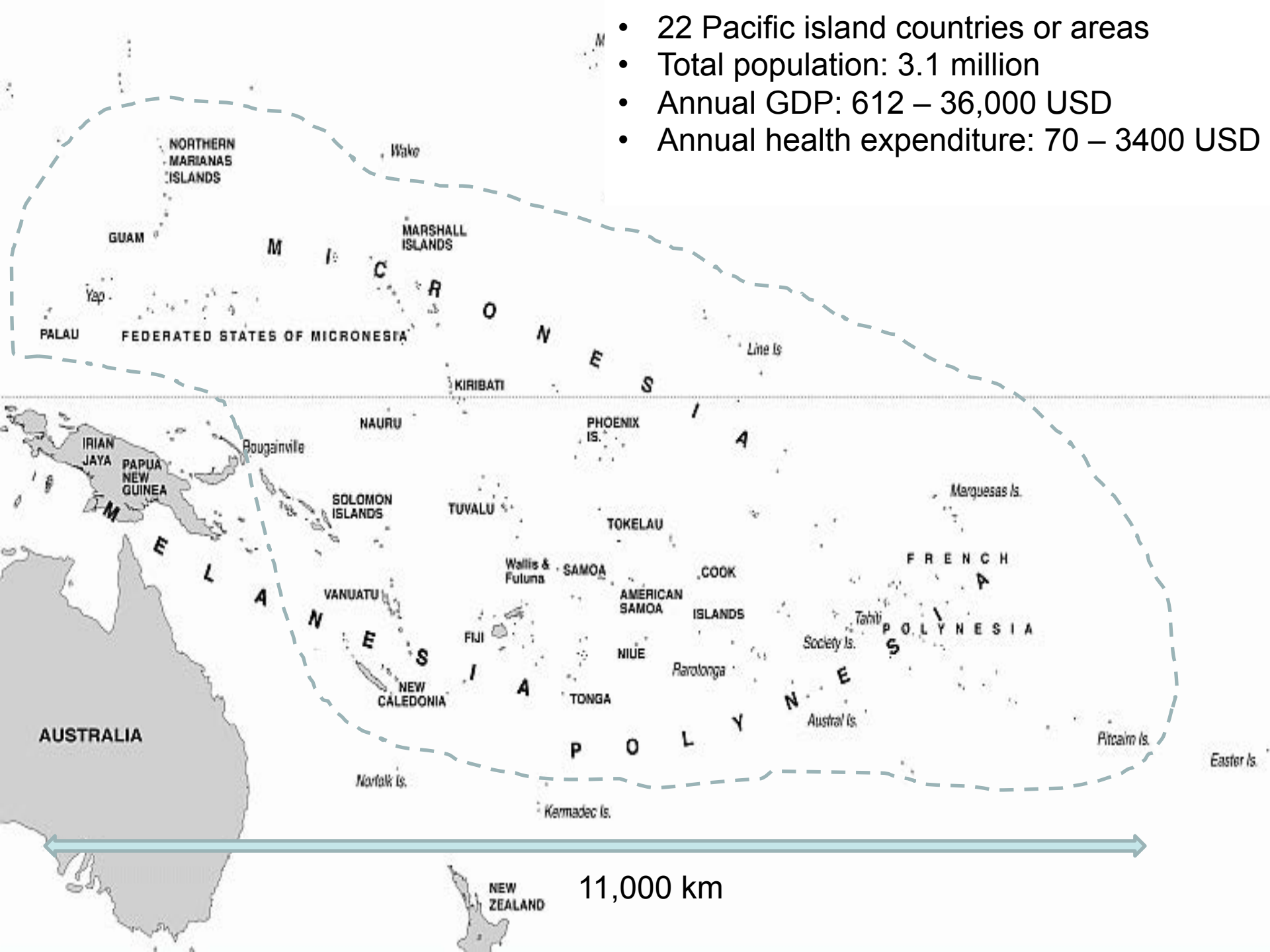
Outline

1. Dengue and arboviruses in Pacific

2. Post-disaster epidemics

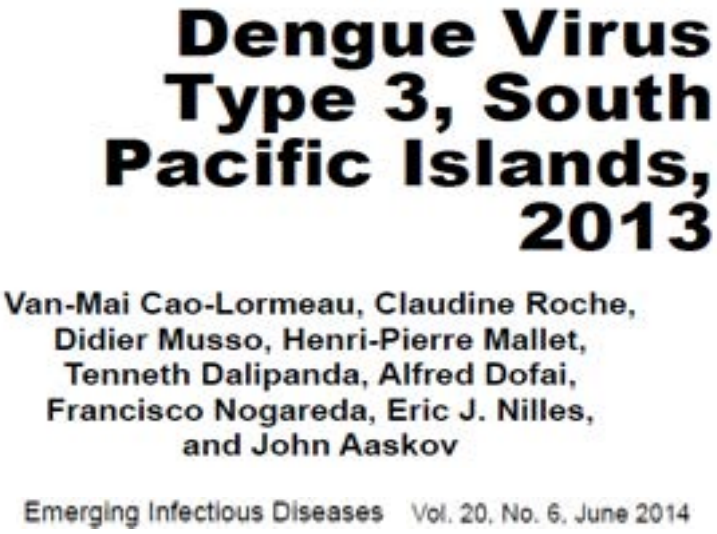
3. Pacific Syndromic Surveillance System

- 22 Pacific island countries or areas
- Total population: 3.1 million
- Annual GDP: 612 – 36,000 USD
- Annual health expenditure: 70 – 3400 USD

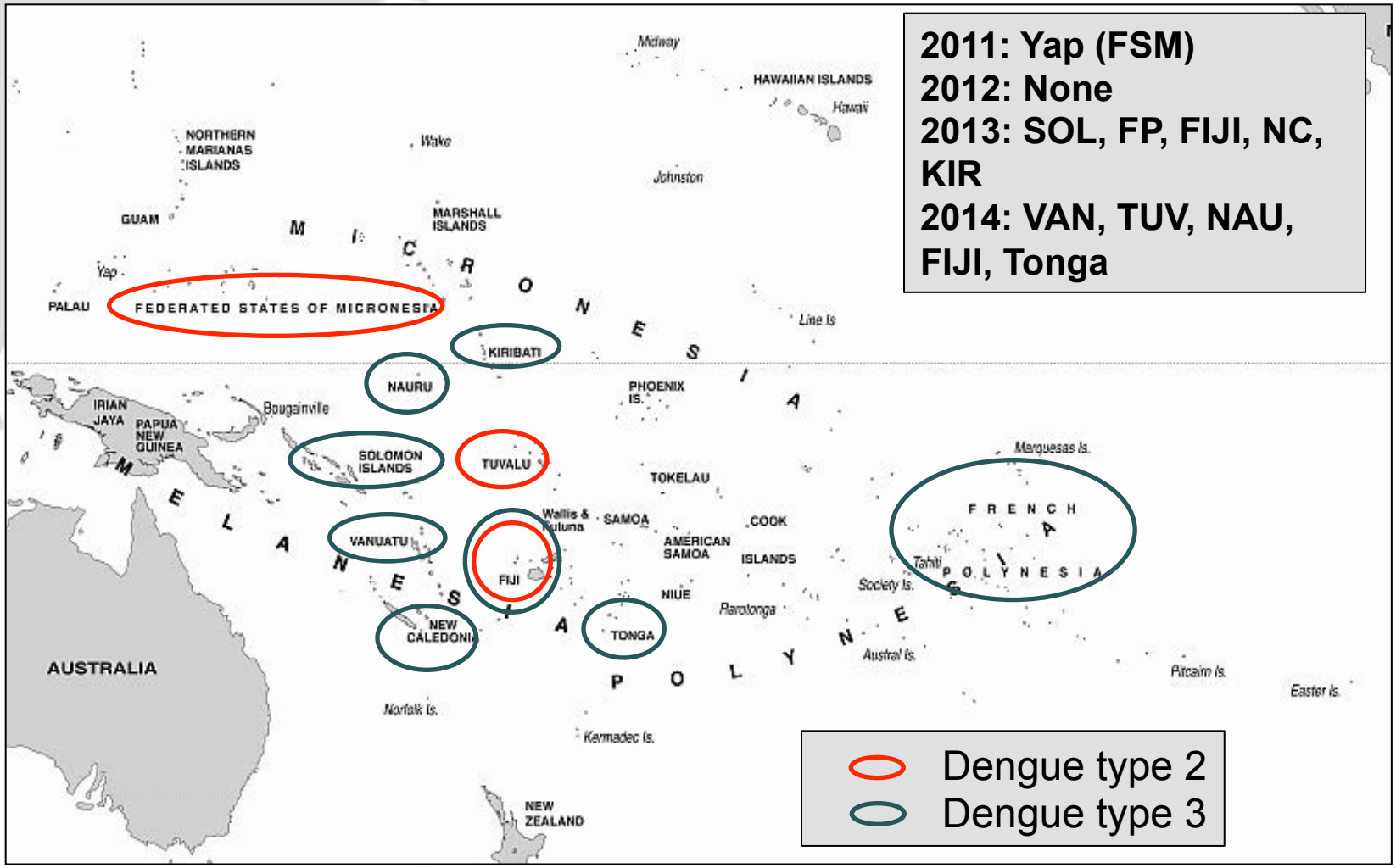


Dengue in the Pacific

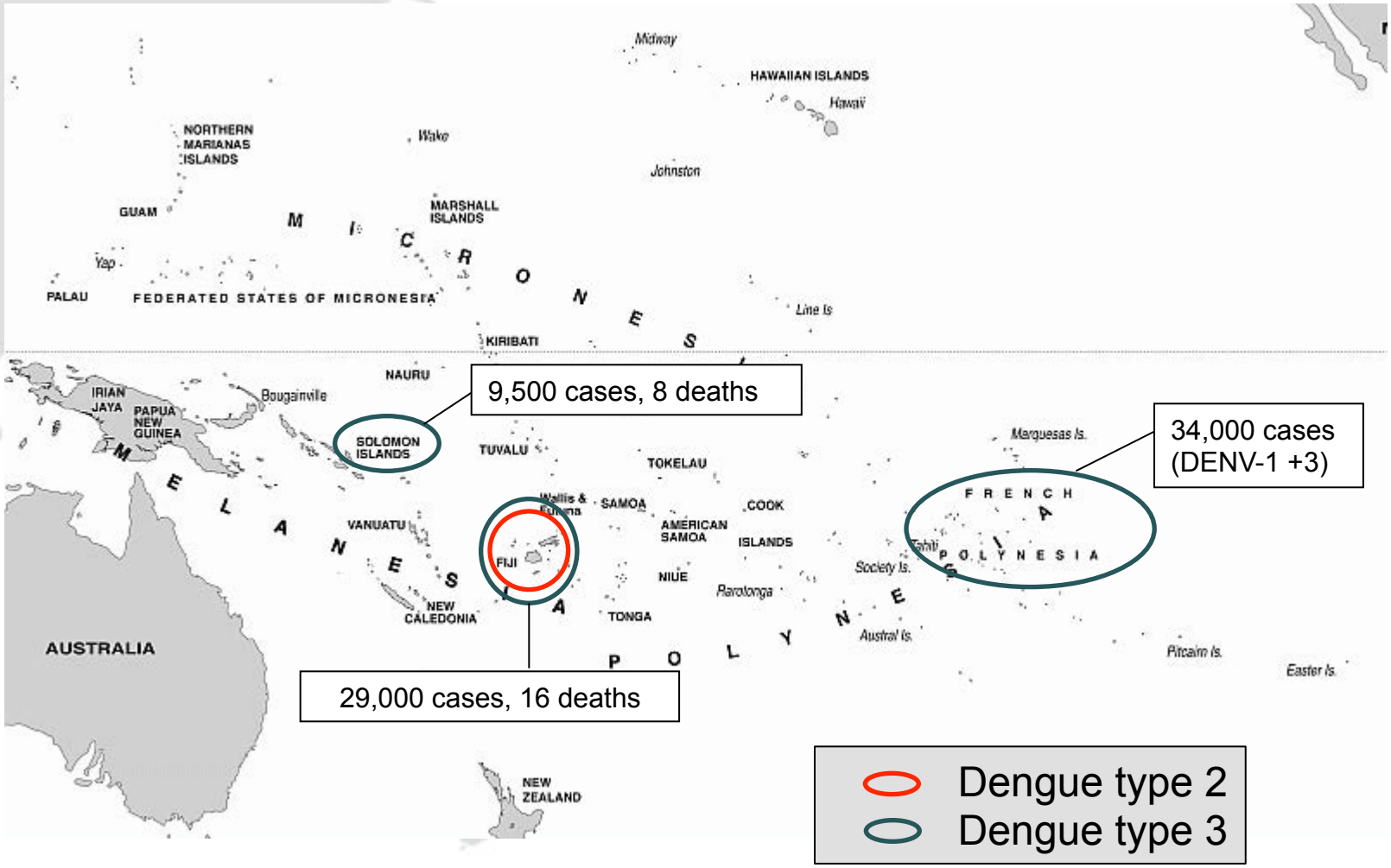
- Serotype 2: re-emerged after ~15 years
- Serotype 3: re-emerged after ~20 years



Re-emergence of dengue types 2 and 3 in the Pacific



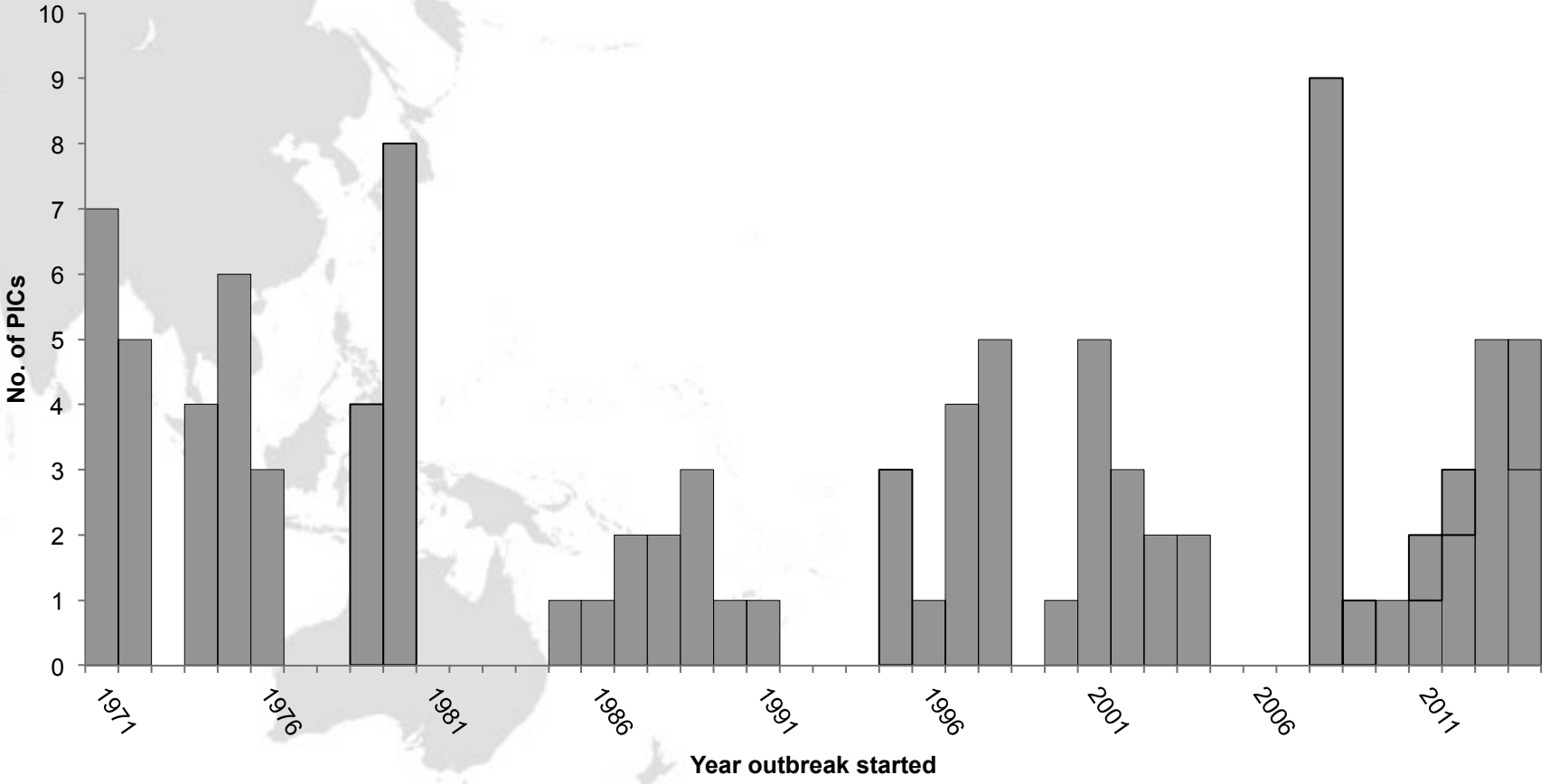
Re-emergence of dengue types 2 and 3 in the Pacific



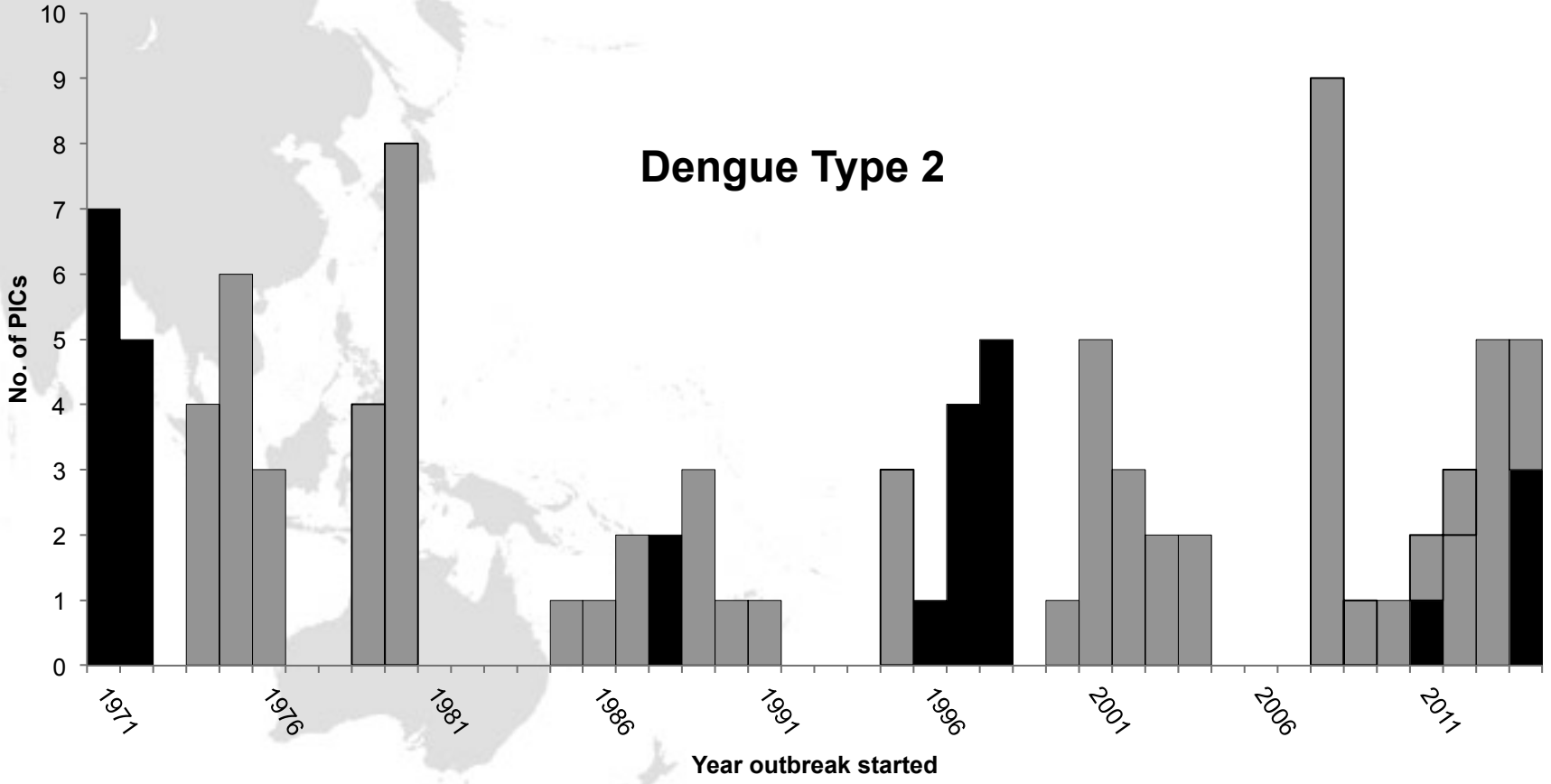
Dengue in the Pacific

Current surge in Pacific dengue unusual or unexpected?

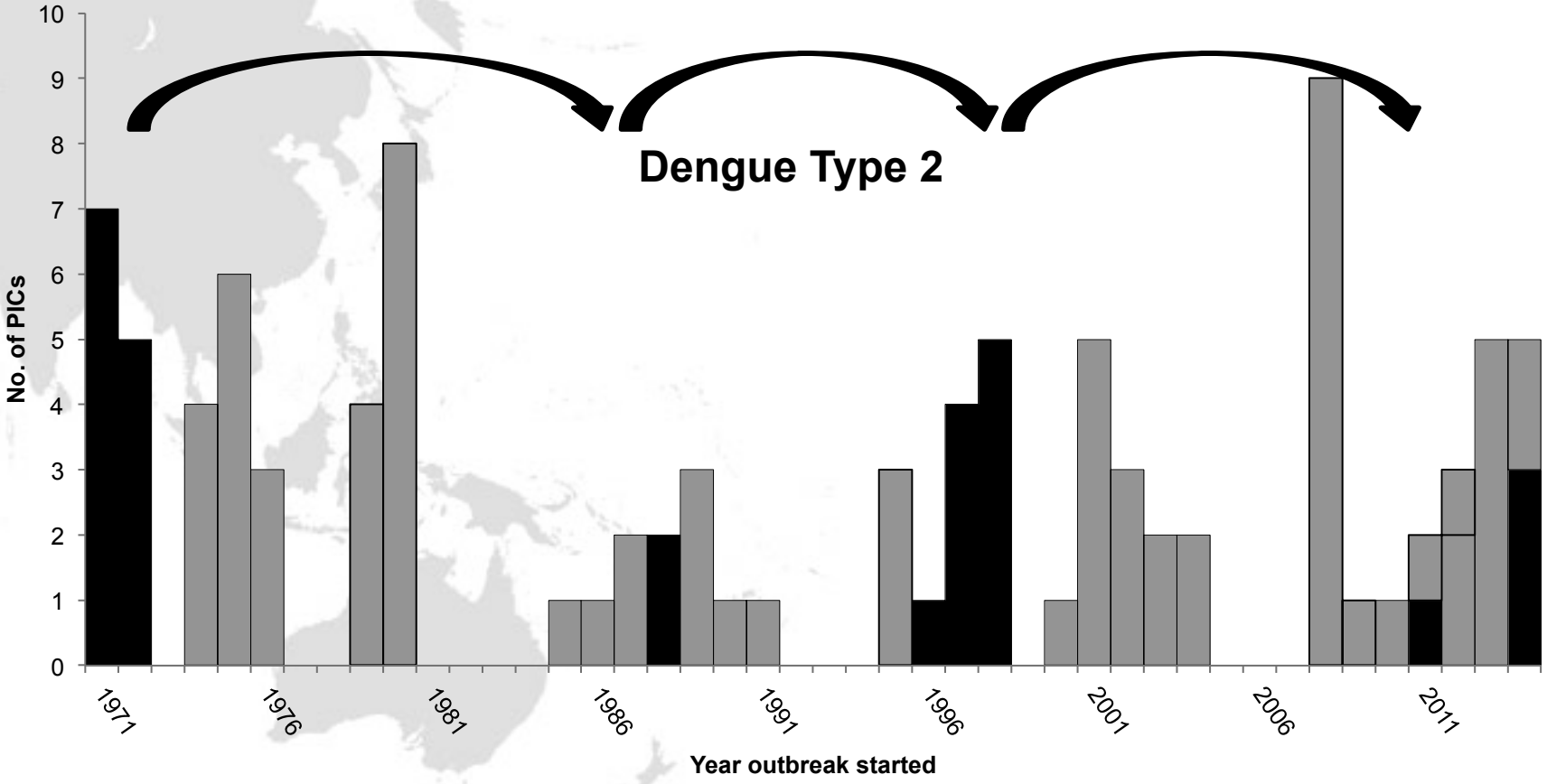
Pacific island dengue outbreaks 1971 to 2014



Pacific island dengue outbreaks 1971 to 2014



Pacific island dengue outbreaks 1971 to 2014



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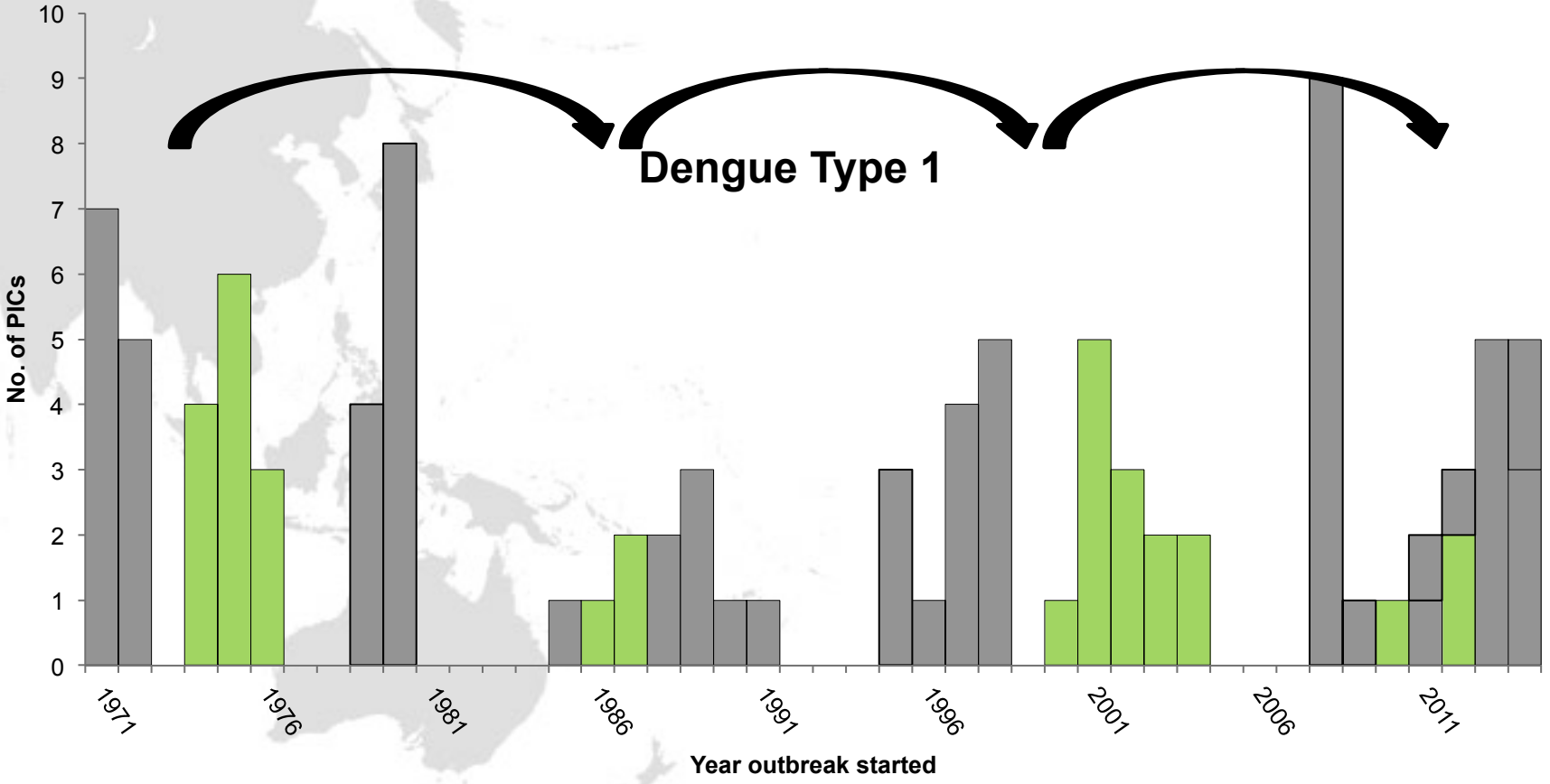
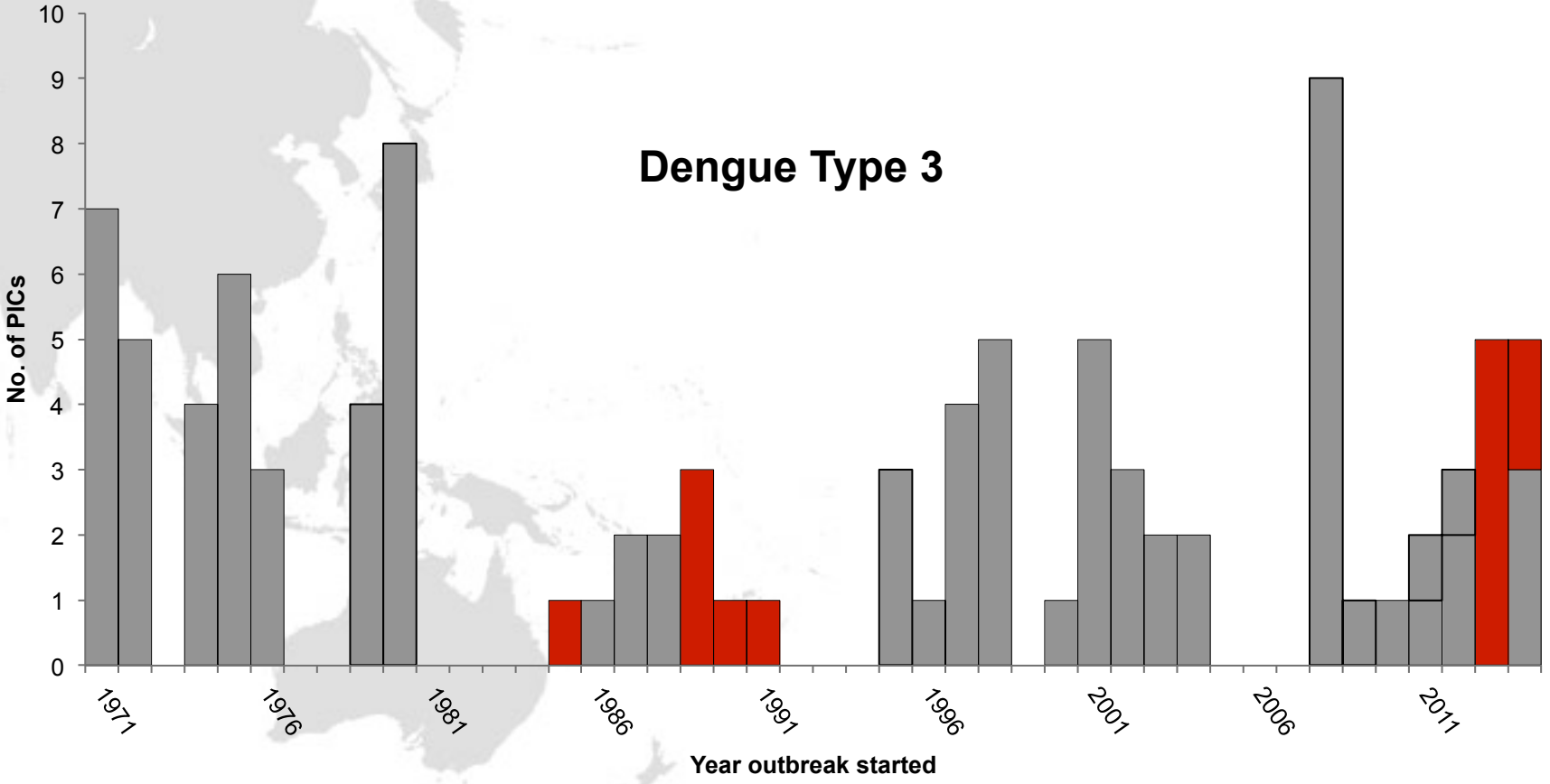
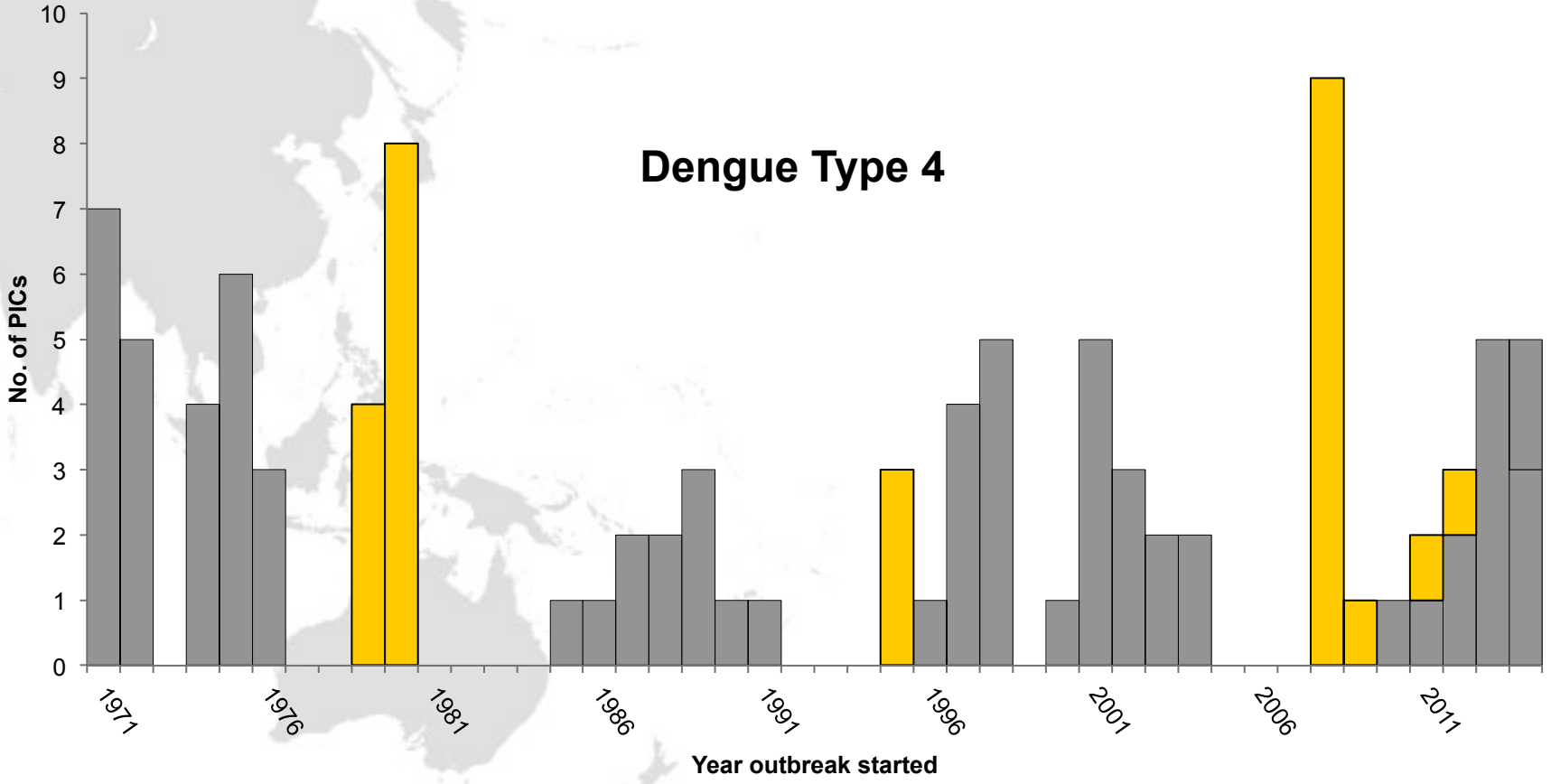


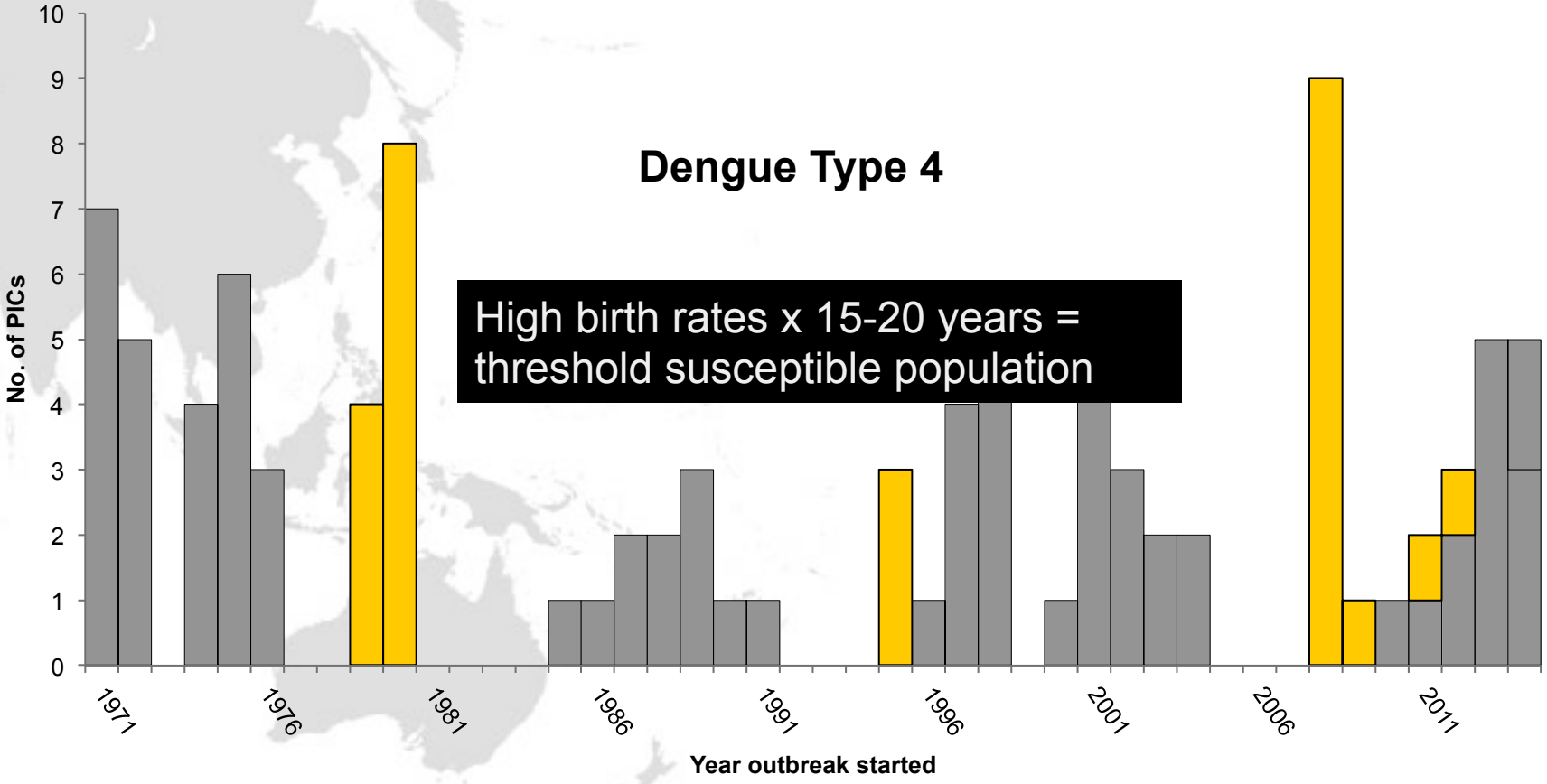
Pacific island dengue outbreaks 1971 to 2014



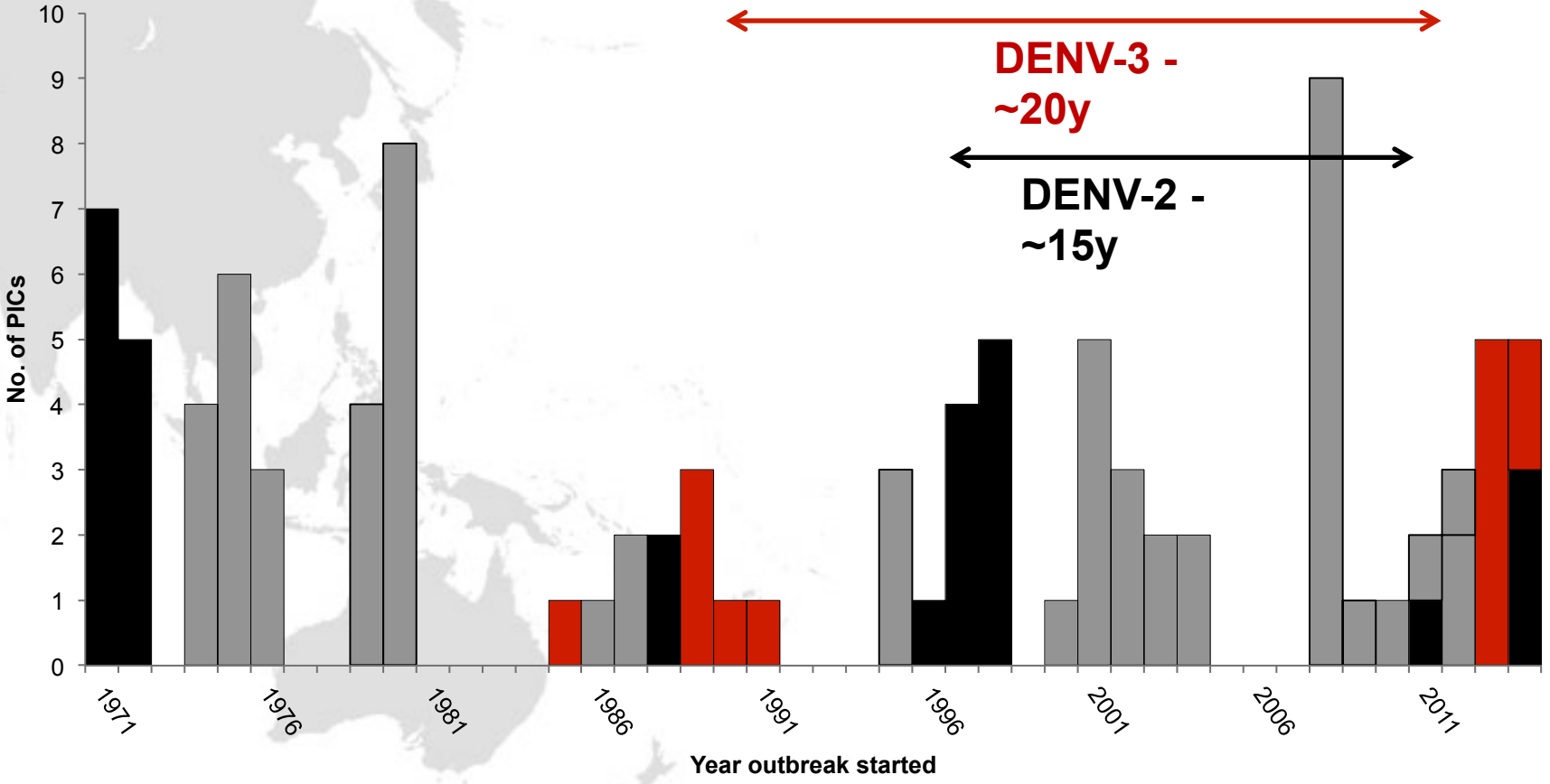
Pacific island dengue outbreaks 1971 to 2014



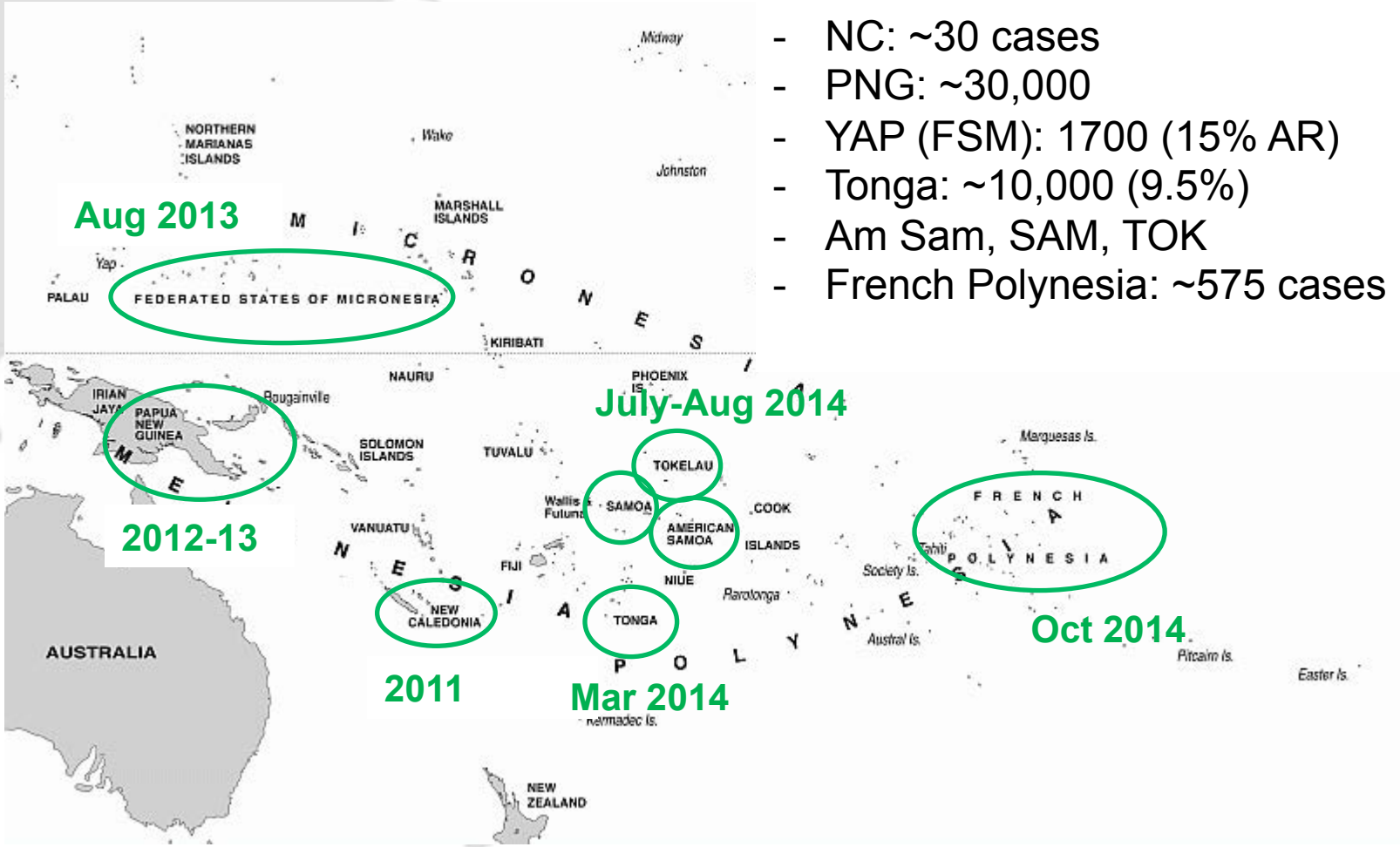
Pacific island dengue outbreaks 1971 to 2014



Pacific island dengue outbreaks 1971 to 2014

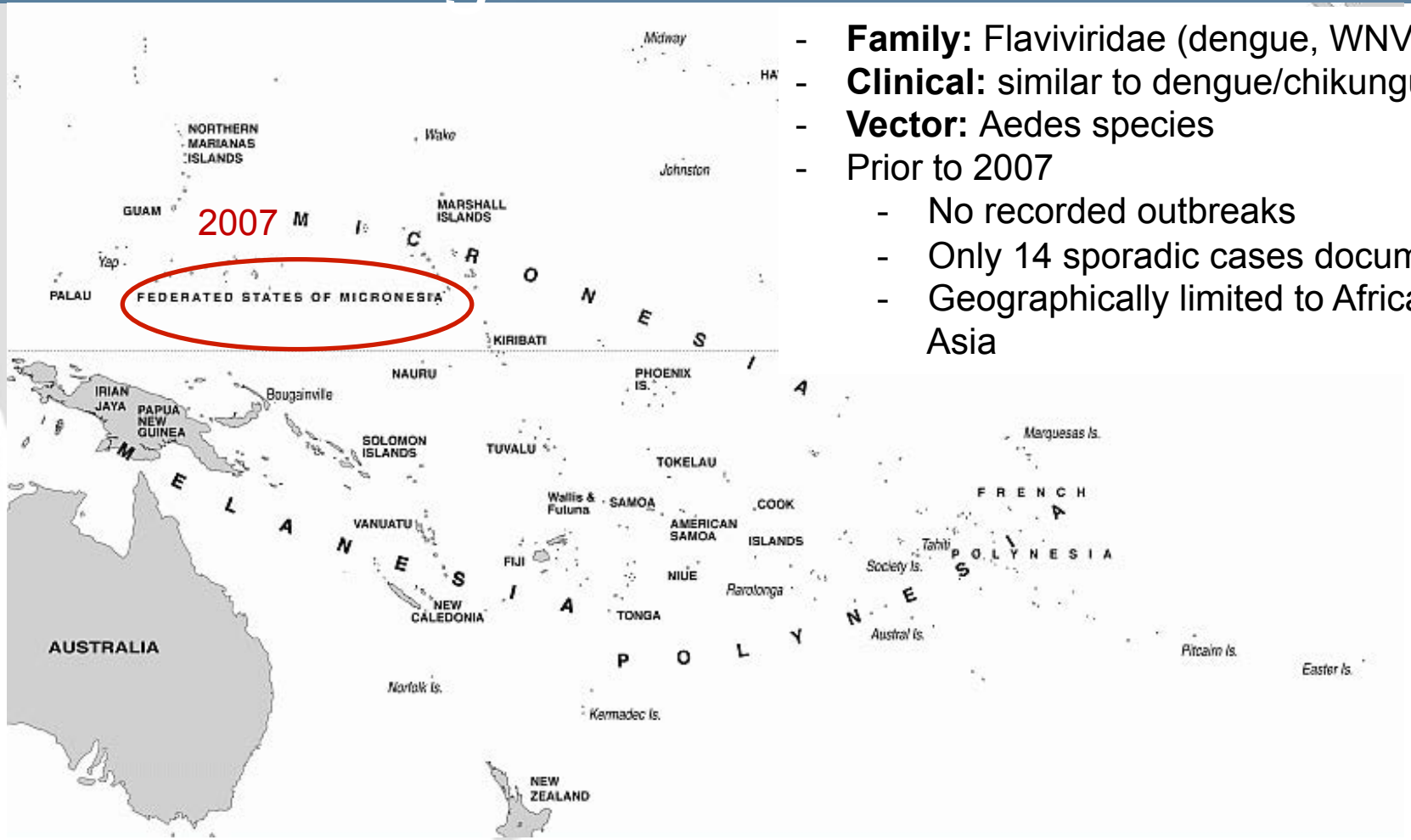


Chikungunya virus: Emergence in the Pacific



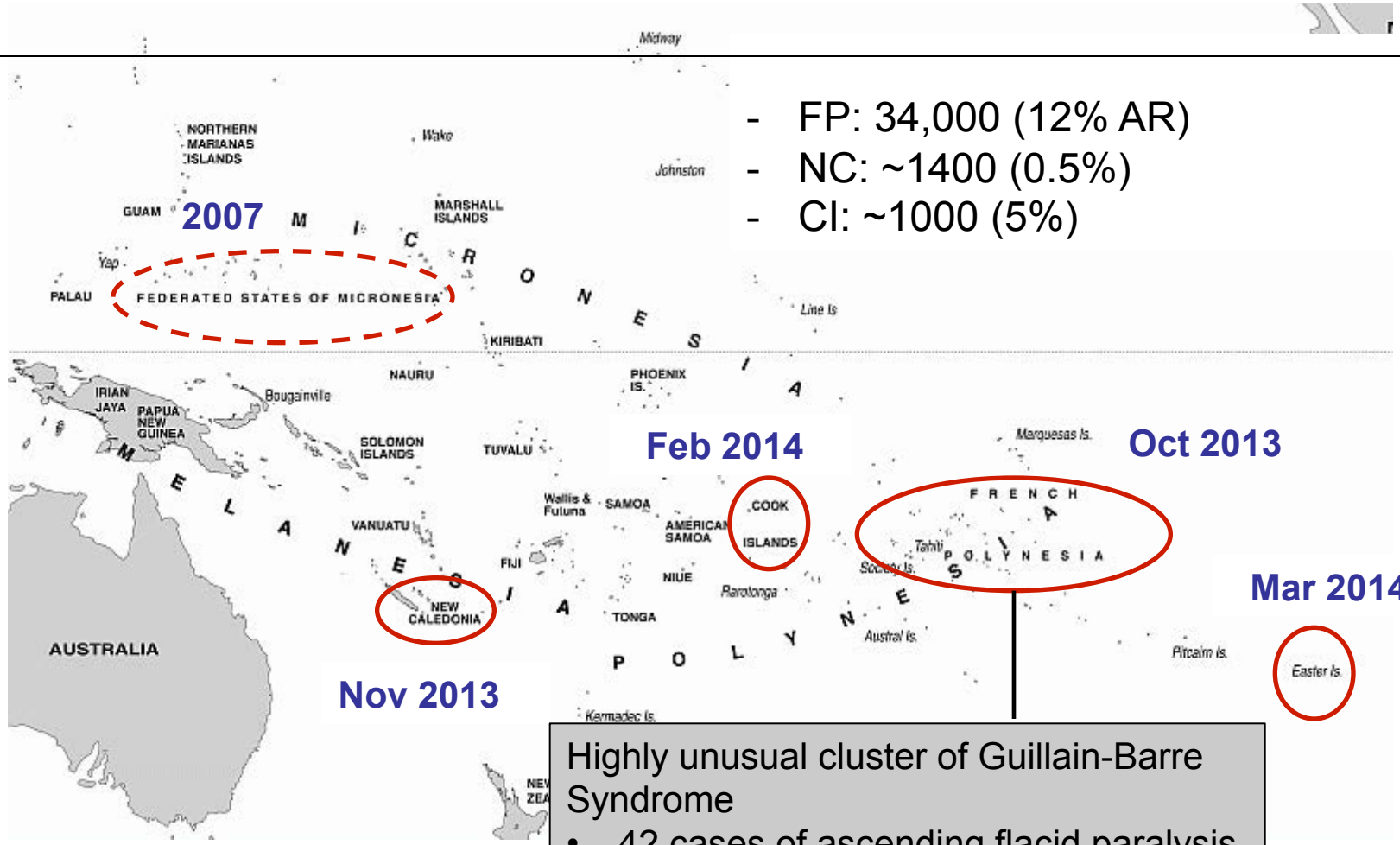
- NC: ~30 cases
- PNG: ~30,000
- YAP (FSM): 1700 (15% AR)
- Tonga: ~10,000 (9.5%)
- Am Sam, SAM, TOK
- French Polynesia: ~575 cases

Zika virus: Emergence in the Pacific



- **Family:** Flaviviridae (dengue, WNV, YF)
- **Clinical:** similar to dengue/chikungunya
- **Vector:** Aedes species
- Prior to 2007
  - No recorded outbreaks
  - Only 14 sporadic cases documented
  - Geographically limited to Africa and Asia

- Mild disease without need for hospitalization
  - Reported or documented fever
  - Maculopapular rash
  - Conjunctivitis
  - Edema of hands/feet
- Attack rate ~90%
- 60-70% asymptomatic
- No complications or deaths identified
- Vector unproven – likely *Aedes hensilli vs Ae aegypti*



- FP: 34,000 (12% AR)
- NC: ~1400 (0.5%)
- CI: ~1000 (5%)

Highly unusual cluster of Guillain-Barre Syndrome

- 42 cases of ascending flacid paralysis
- Temporally associated with ZIKV
- Strained intensive care capacity

Disasters in the Pacific

Natural Disaster Risk - Pacific

WorldRiskIndex

Rank	Country	Risk (%)
1.	Vanuatu	36.31
2.	Tonga	28.62
3.	Philippines	27.98
4.	Guatemala	20.75
5.	Bangladesh	20.22
6.	Solomon Islands	18.15
7.	Costa Rica	17.38
8.	Cambodia	17.17
9.	Timor-Leste	17.13
10.	El Salvador	16.89
11.	Brunei Darussalam	15.92
12.	Papua New Guinea	15.81
13.	Mauritius	15.39
14.	Nicaragua	15.36
15.	Fiji	13.69

- Cyclones, floods, earthquakes, tsunamis
- January 2013 – Sept 2014: 7 major disasters in PICs
- Climate change exacerbates the impact of disasters
- Poorest and most vulnerable populations bear the greatest burden

Post-disaster epidemic risks?

Negligible Risk for Epidemics after Geophysical Disasters

Nathalie Floret,*† Jean-François Viel,*† Frédéric Mauny,*† Bruno Hoen,*† and Renaud Piarroux*†

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 12, No. 4, April 2006

Conflict and Health *Conflict and Health* 2007, 1:2

Research Open Access

Occurrence and overlap of natural disasters, complex emergencies and epidemics during the past decade (1995–2004)

Paul B Spiegel*[1], Phuoc Le[1], Mija-Tesse Ververs[2] and Peter Salama[3]

Epidemics after Natural Disasters

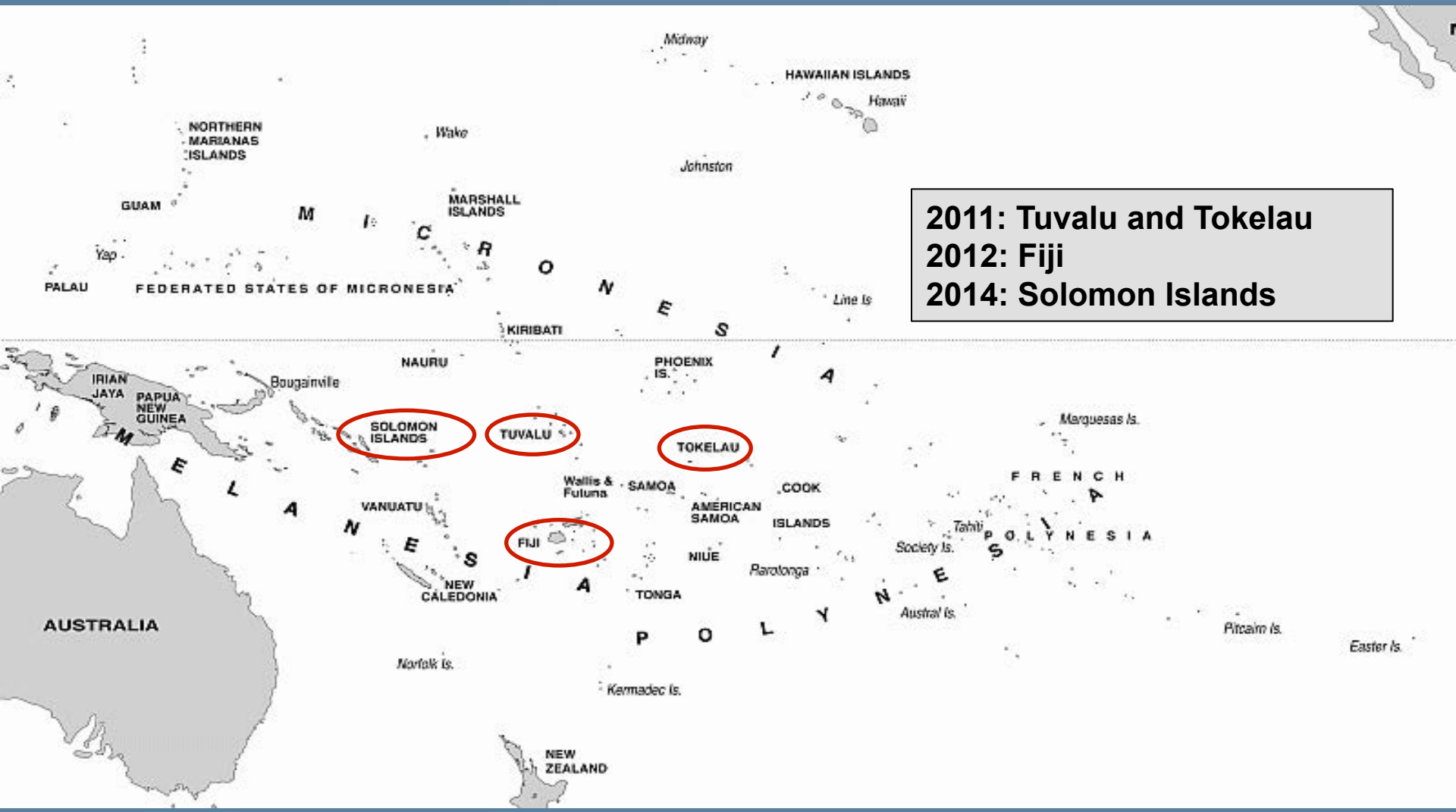
John T. Watson,* Michelle Gayer,* and Maire A. Connolly*

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 13, No. 1, January 2007

Post-disaster: Factors increasing epidemic risk

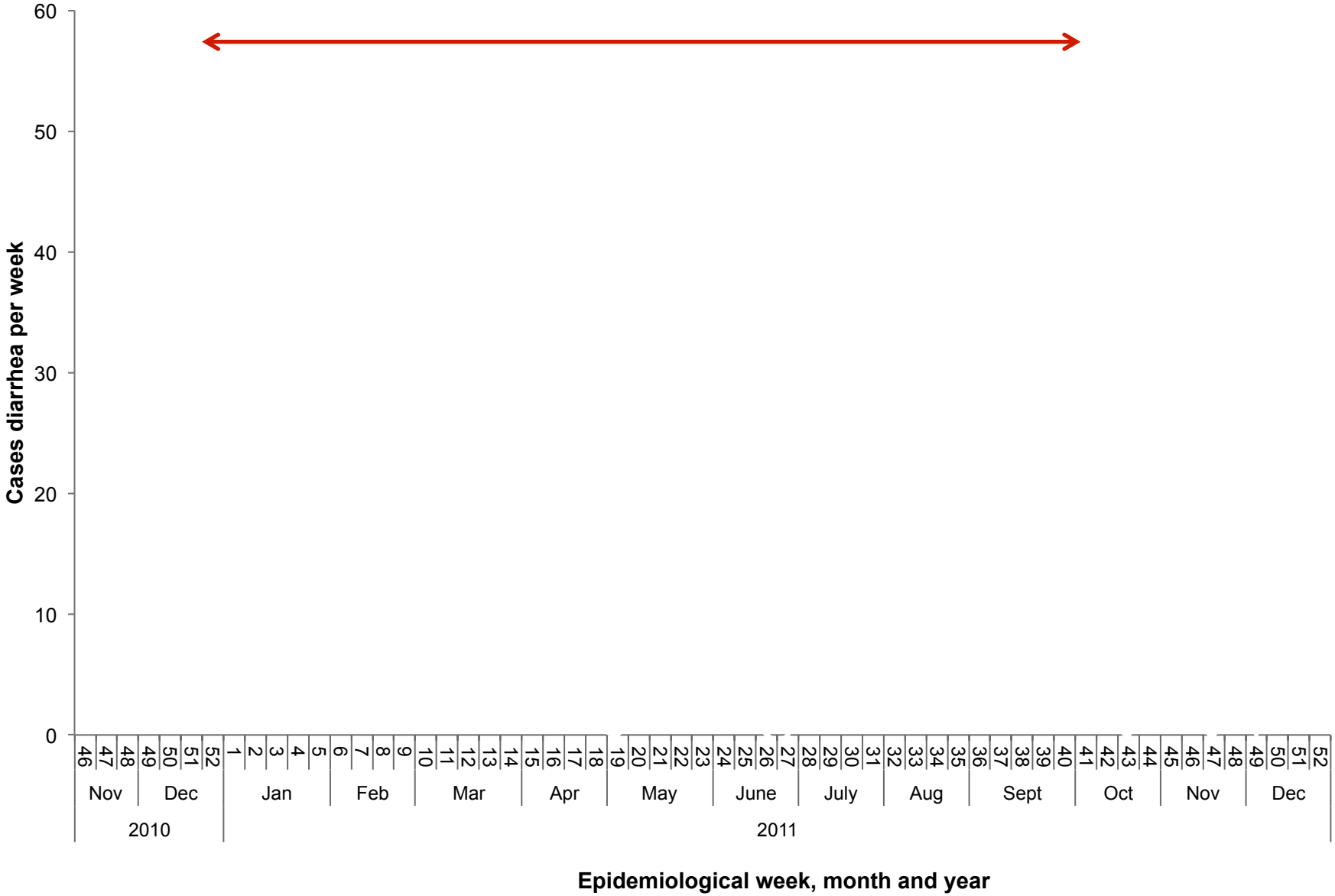
- **Displaced populations**
  - Overcrowding
  - Limited clean water
  - Limited latrines & sanitation
  - Limited access to healthcare
  - Increased exposure to disease vectors
- **Poor baseline population health**

Recent major disaster-related epidemics



2011: Tuvalu and Tokelau
2012: Fiji
2014: Solomon Islands

Tuvalu & Tokelau: Drought emergencies and diarrhoea



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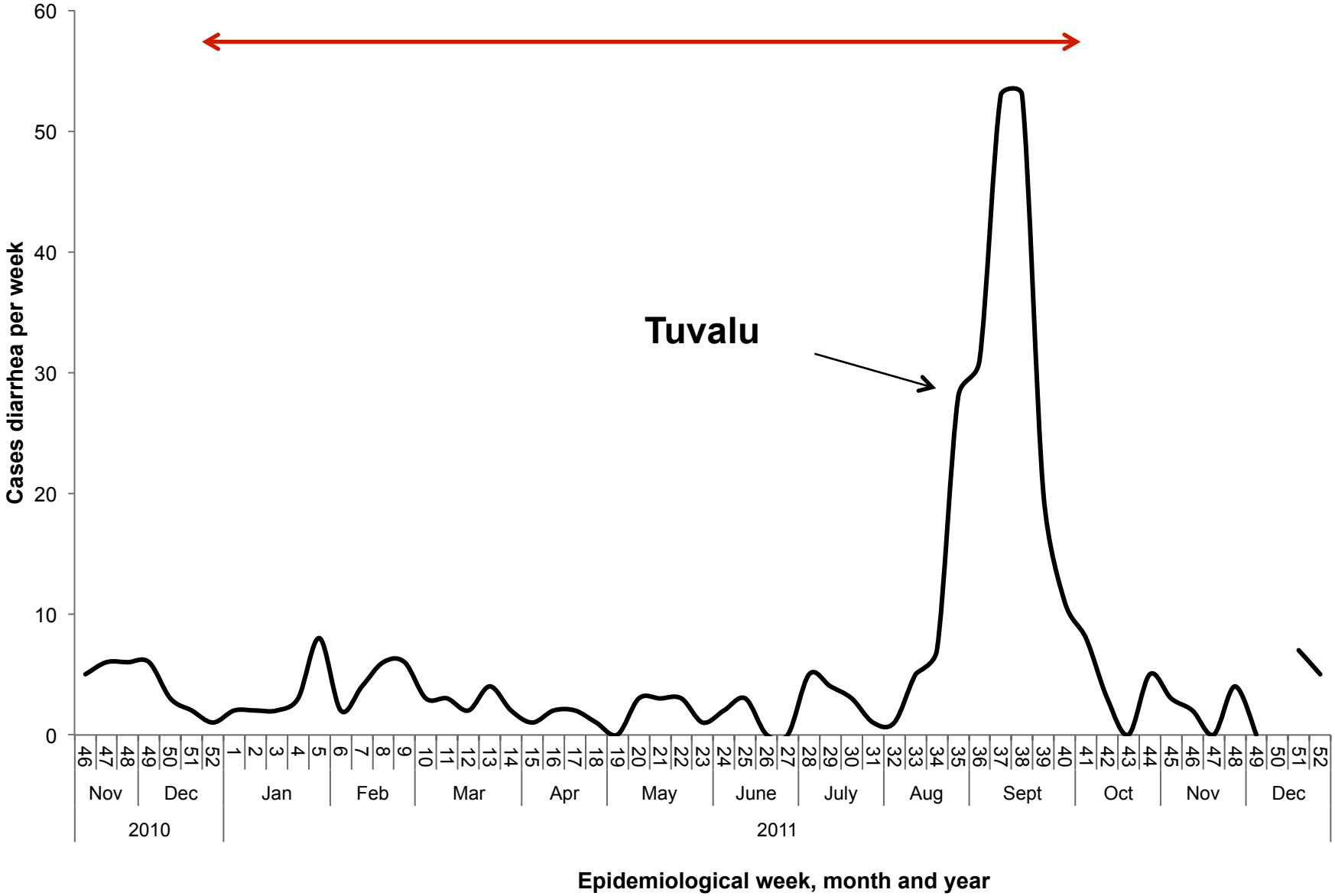

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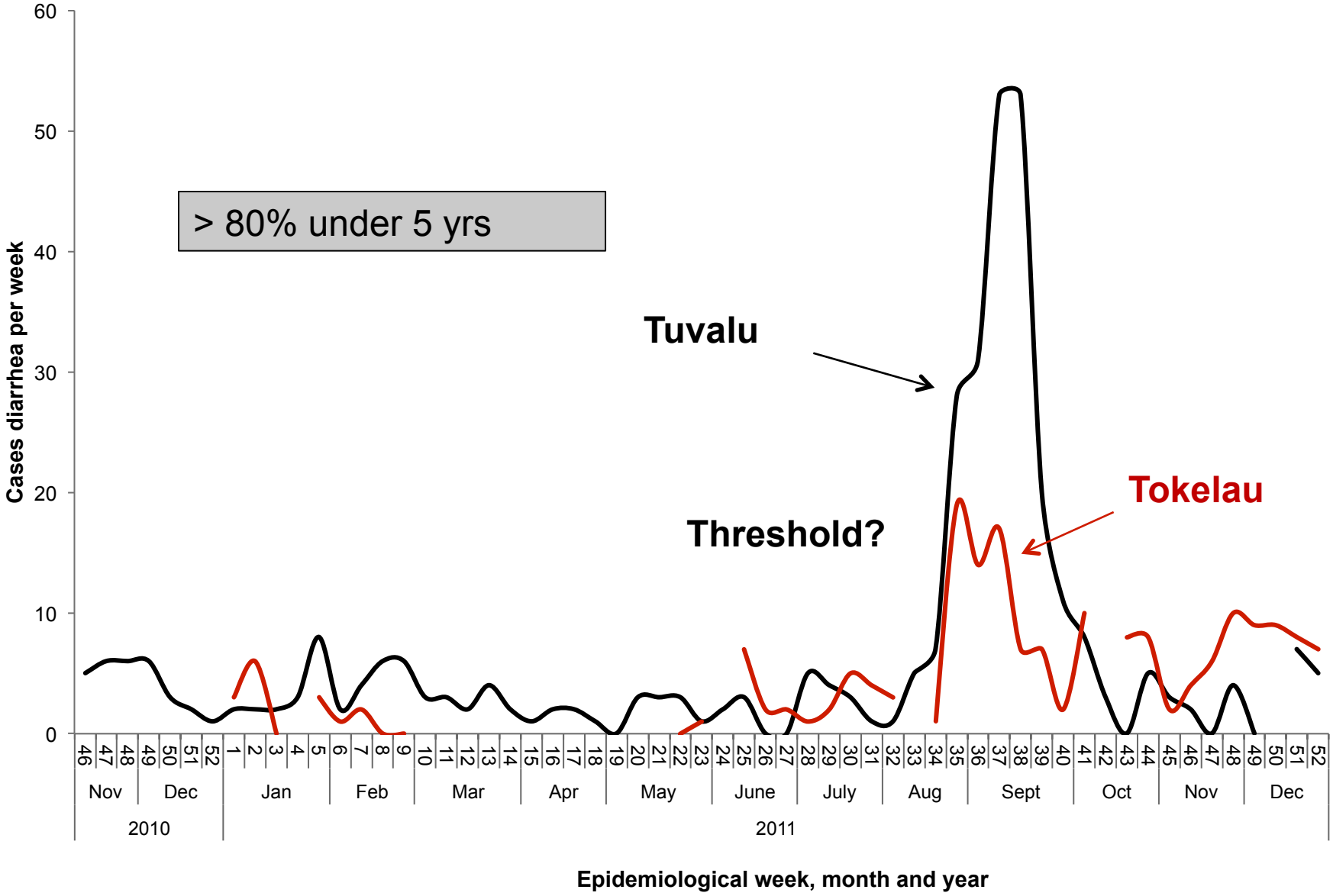


BBC NEWS

ASIA

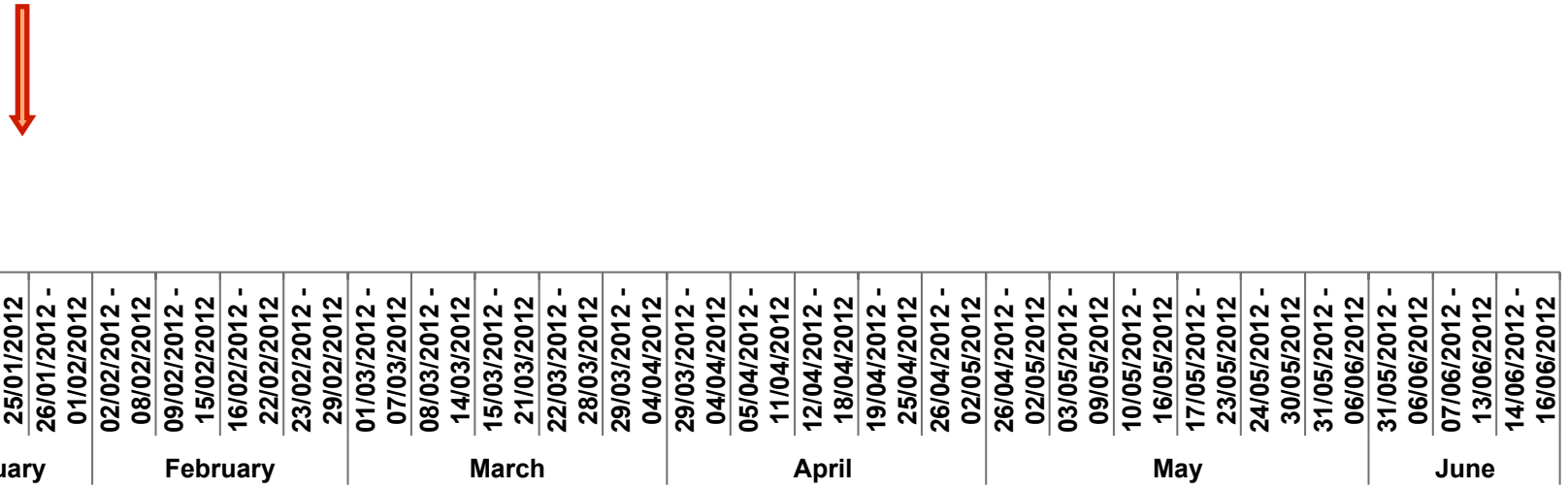
26 January 2012 Last updated at 03:20 GMT

Fiji declares a state of disaster over severe flooding

Flood disaster— Western Division, Fiji, 2012

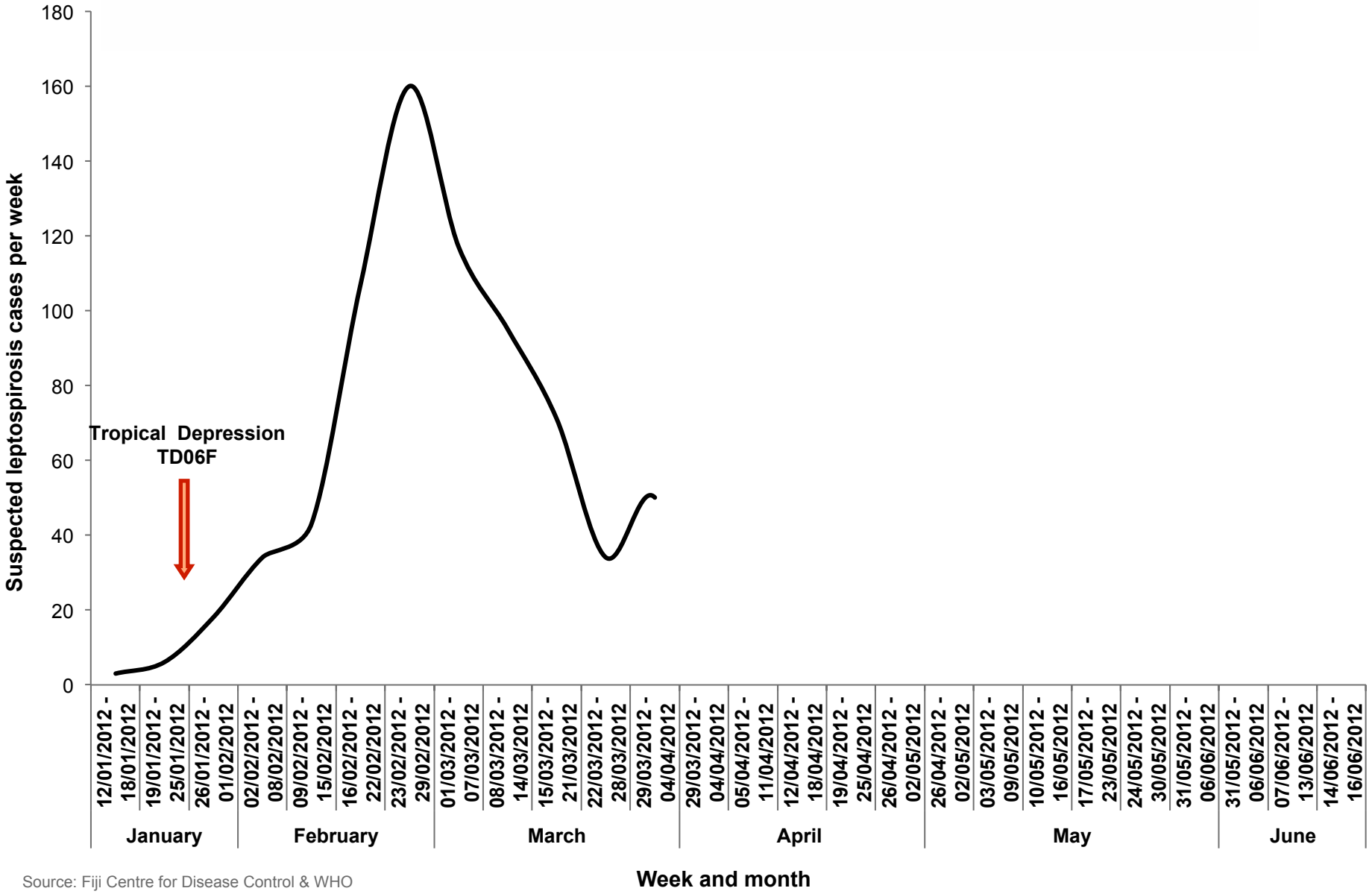
State of emergency declared

Tropical Depression TD06F



Source: Fiji Center for Disease Control & WHO

Leptospirosis outbreak — Western Division, Fiji, 2012



Source: Fiji Centre for Disease Control & WHO

Leptospirosis outbreak — Western Division, Fiji, 2012

Tropical Depression TD06F

Tropical Depression TD17F

Suspected leptospirosis cases per week

0
20
40
60
80
100
120
140
160
180

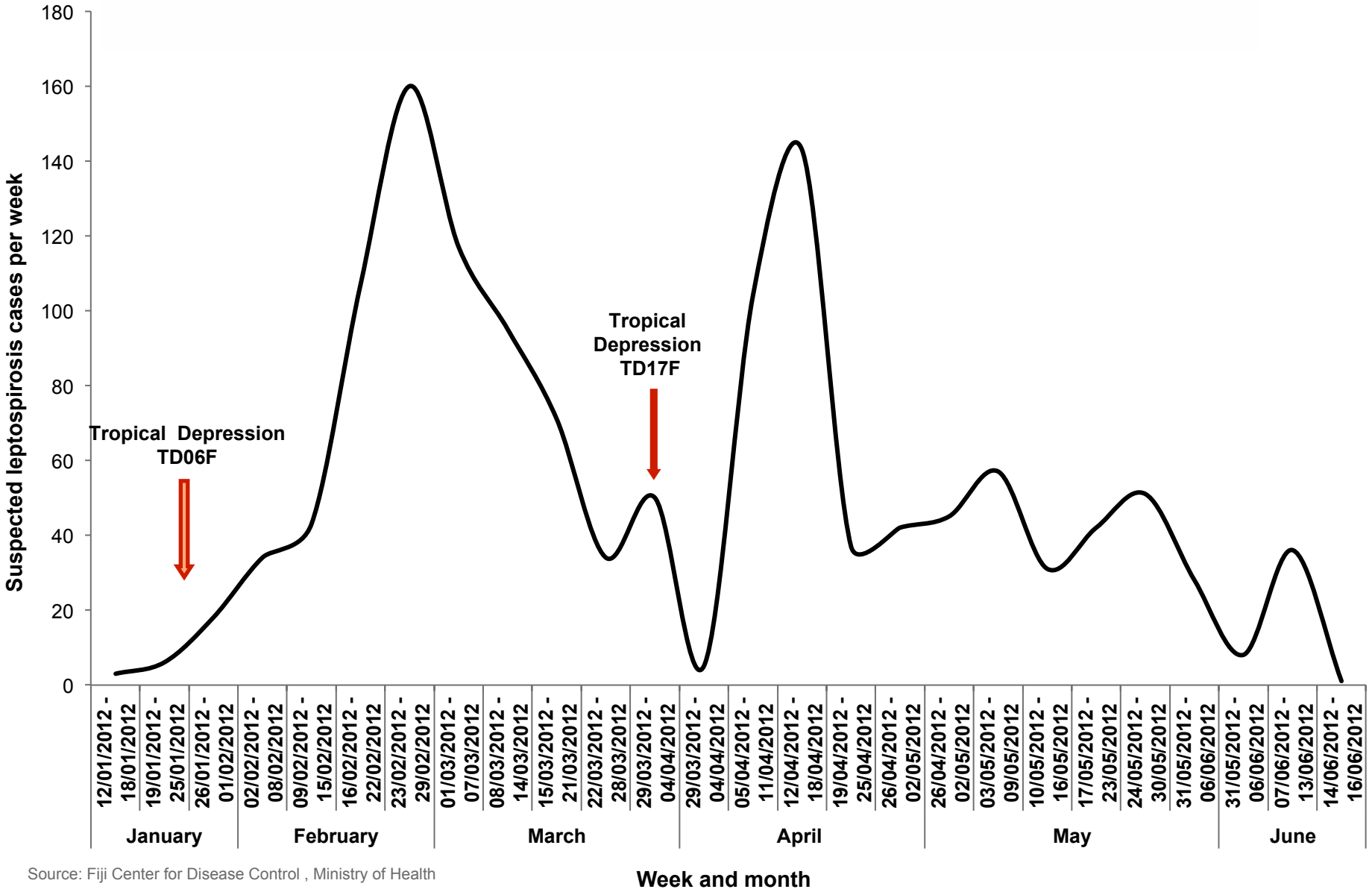
12/01/2012 - 18/01/2012
19/01/2012 - 25/01/2012
26/01/2012 - 01/02/2012
02/02/2012 - 08/02/2012
09/02/2012 - 15/02/2012
16/02/2012 - 22/02/2012
23/02/2012 - 29/02/2012
01/03/2012 - 07/03/2012
08/03/2012 - 14/03/2012
15/03/2012 - 21/03/2012
22/03/2012 - 28/03/2012
29/03/2012 - 04/04/2012
29/03/2012 - 04/04/2012
05/04/2012 - 11/04/2012
12/04/2012 - 18/04/2012
19/04/2012 - 25/04/2012
26/04/2012 - 02/05/2012
26/04/2012 - 02/05/2012
03/05/2012 - 09/05/2012
10/05/2012 - 16/05/2012
17/05/2012 - 23/05/2012
24/05/2012 - 30/05/2012
31/05/2012 - 06/06/2012
31/05/2012 - 06/06/2012
07/06/2012 - 13/06/2012
14/06/2012 - 16/06/2012

January | February | March | April | May | June

Week and month

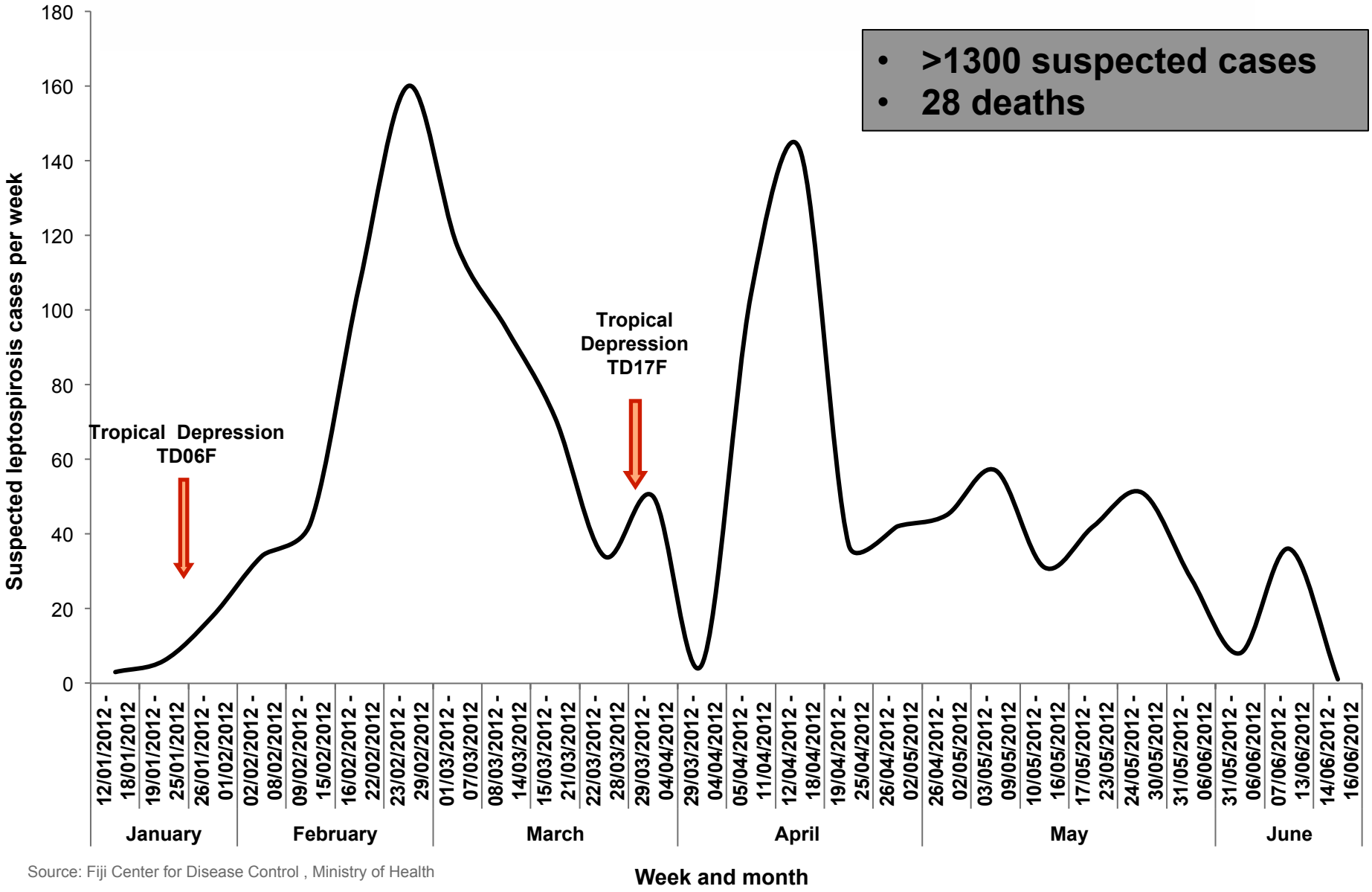
Source: Fiji Center for Disease Control & WHO

Leptospirosis outbreak — Western Division, Fiji, 2012



Source: Fiji Center for Disease Control , Ministry of Health

Leptospirosis outbreak — Western Division, Fiji, 2012

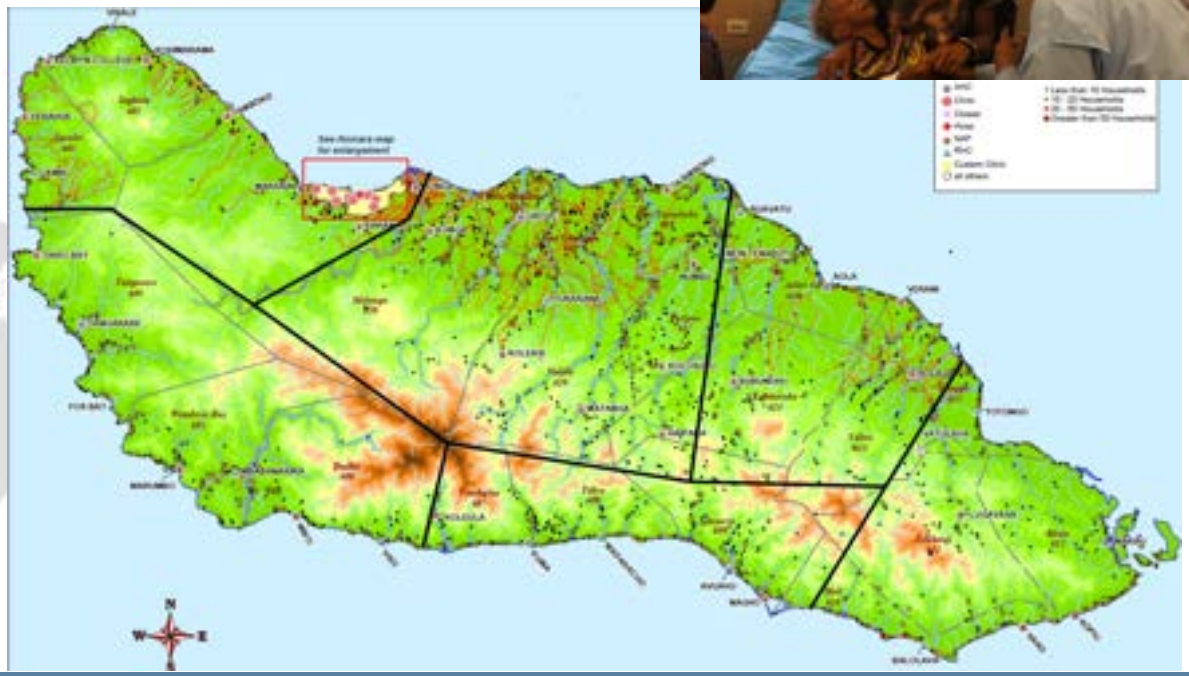


Source: Fiji Center for Disease Control , Ministry of Health

Solomon Islands 2014 – Flash floods

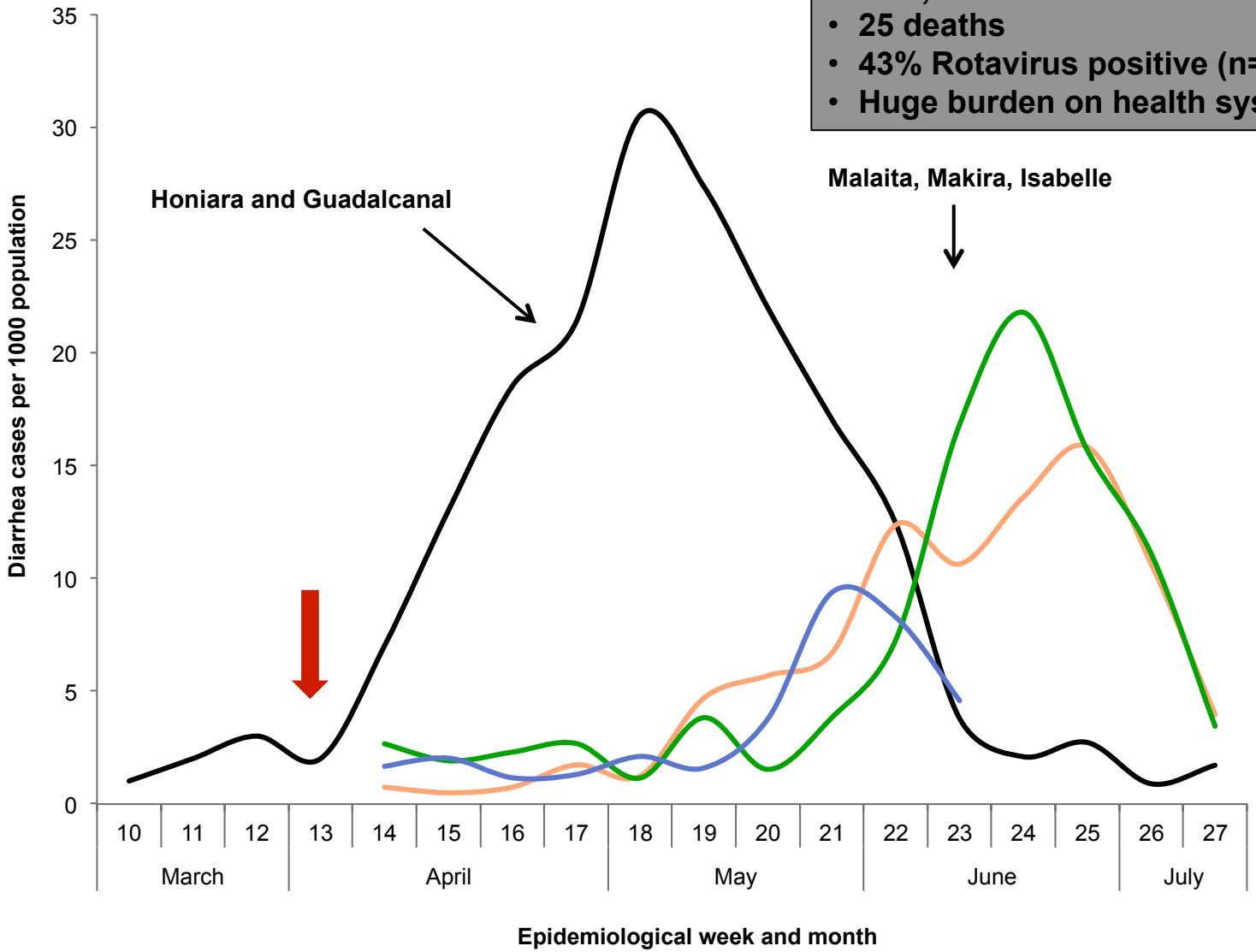
Solomon Islands – Flash Flood Disaster

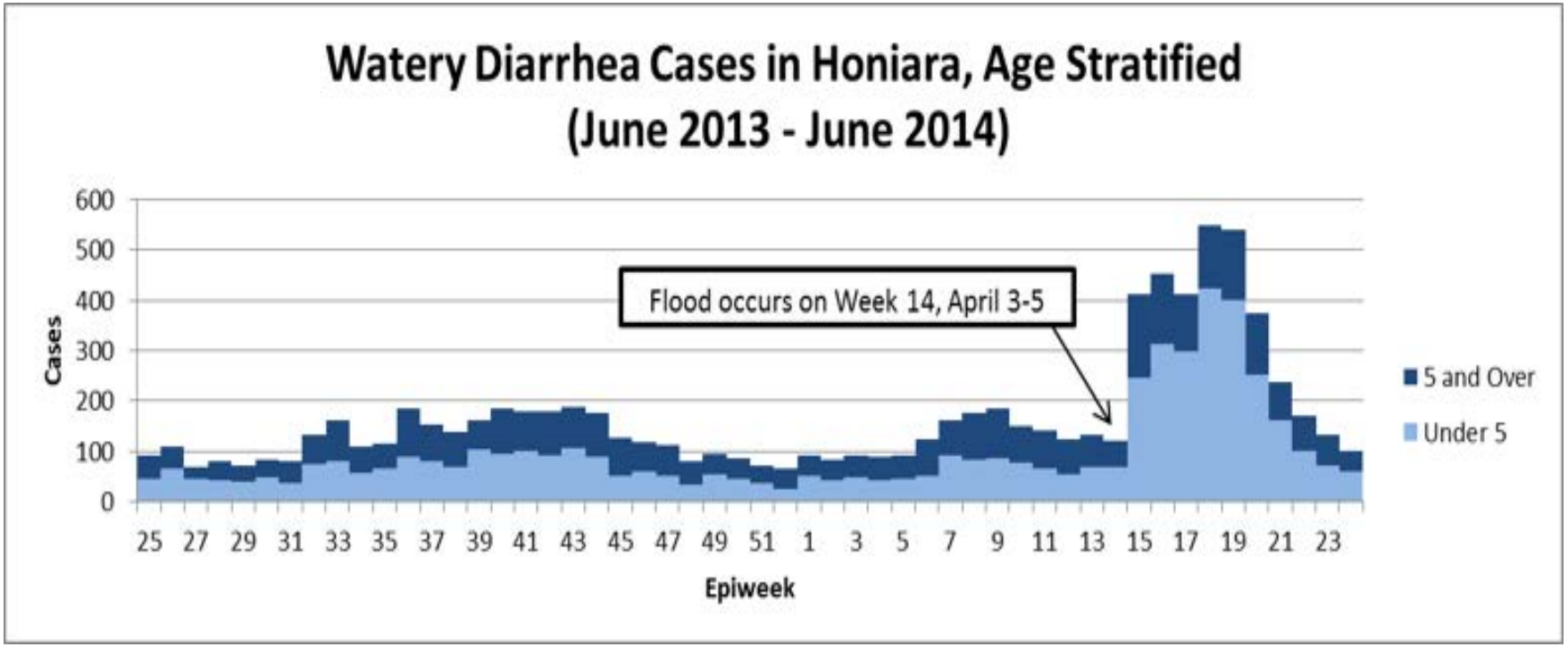
- Torential rains 3-5 April
- 52,000 affected (10,000 displaced in Hona
- Large international response



Post flash-flood emergency diarrhoea outbreak

- > 10,000 cases
- 25 deaths
- 43% Rotavirus positive (n=49)
- Huge burden on health system





*Forrest Jones, Yale SPH MPH Student

WHO post-disaster response

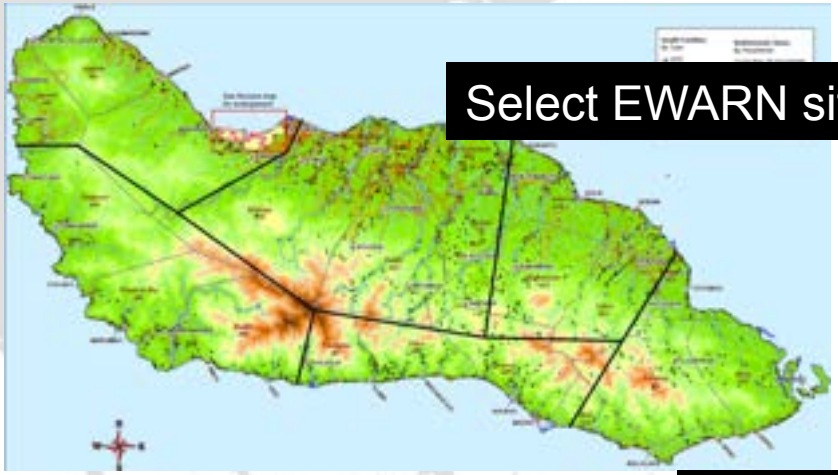
Rapid epidemic risk assessment – critical initial step

- Assess local epidemic prone diseases
- Population displacement? Overcrowding?
- Clean water, sanitation, healthcare?
- Pre-existing surveillance? Functional?
- Outbreak response capacity
- Available resources

Disease	Likelihood of substantial outbreak (A)	Impact of substantial outbreak (B)	Combined public health risk (A + B)/2
Shigella/dysentery	Moderate	High	Moderate-High
Leptospirosis	Mod-High	Mod-High	Moderate-High
Malaria	Moderate	Moderate	Moderate
Dengue*	Low-Mod	Mod-high	Moderate
Cholera	Low	High	Moderate
Typhoid Fever	Low	Moderate	Low-Moderate
Measles	Low-Mod	Mod	Low-Moderate
Hepatitis A	Low	Low	Low

WHO post-disaster response

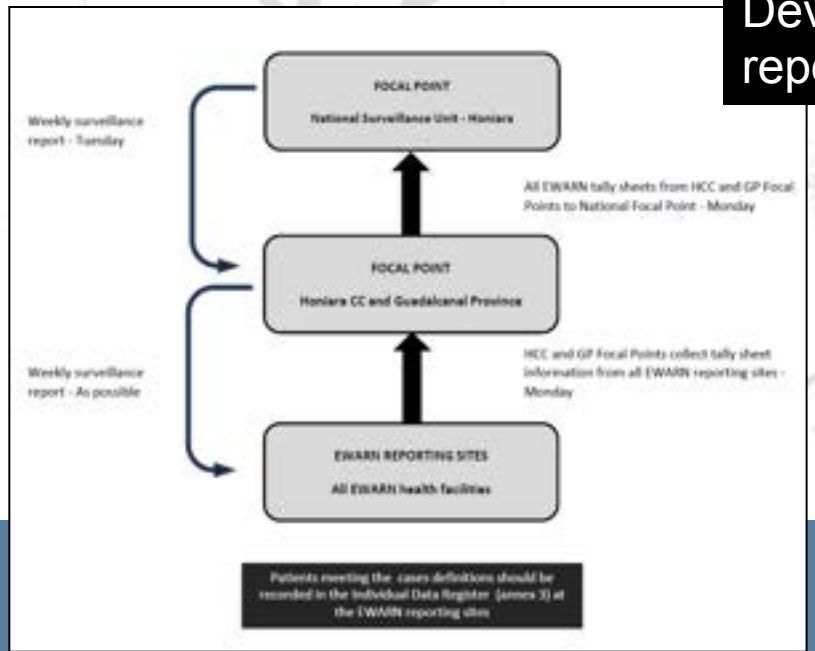
Early warning alert & response networks (EWARN)



Select EWARN sites

Early Warning Epidemic Surveillance Reporting Form – Flash Flood Emergency

Develop forms and reporting protocols



Implement

Establishing an early warning alert and response network following the 2013 Solomon Islands tsunami

Augustine Bilve,[a] Francisco Nogareda,[b] Cynthia Joshua,[c] Lester Ross,[c] Christopher Betcha,[c] Kara Durski,[d] Juliet Fleischl[d] & Eric Nilles[b]

Problem On 6 February 2013, an 8.0 magnitude earthquake generated a tsunami that struck the Santa Cruz Islands, Solomon Islands, killing 10 people and displacing over 4700.

Approach A post-disaster assessment of the risk of epidemic disease transmission recommended the implementation of an early warning alert and response network (EWARN) to rapidly detect, assess and respond to potential outbreaks in the aftermath of the tsunami.

Local setting Almost 40% of the Santa Cruz Islands population were displaced by the disaster, and living in cramped temporary camps with poor or absent sanitation facilities and insufficient access to clean water. There was no early warning disease surveillance system.

Relevant changes By 25 February, an EWARN was operational in five health facilities that served 90% of the displaced population. Eight priority diseases or syndromes were reported weekly; unexpected health events were reported immediately. Between 25 February and 19 May, 1177 target diseases or syndrome cases were reported. Seven alerts were investigated. No sustained transmission or epidemics were identified. Reporting compliance was 85%. The EWARN was then transitioned to the routine four-syndrome early warning disease surveillance system.

Lesson learnt It was necessary to conduct a detailed assessment to evaluate the risk and potential impact of serious infectious disease outbreaks, to assess whether and how enhanced early warning disease surveillance should be implemented. Local capacities and available resources should be considered in planning EWARN implementation. An EWARN can be an opportunity to establish or strengthen early warning disease surveillance capabilities.

Abstracts in عربي, 中文, Français, Русский and Español at the end of each article.

Bulletin of the World Health Organization

Pacific Syndromic Surveillance System

- Reporting of clinical signs and symptoms only
- No lab
- Fast and simple
- Early detection provides the opportunity to intervene early and limit the impact of outbreak spread

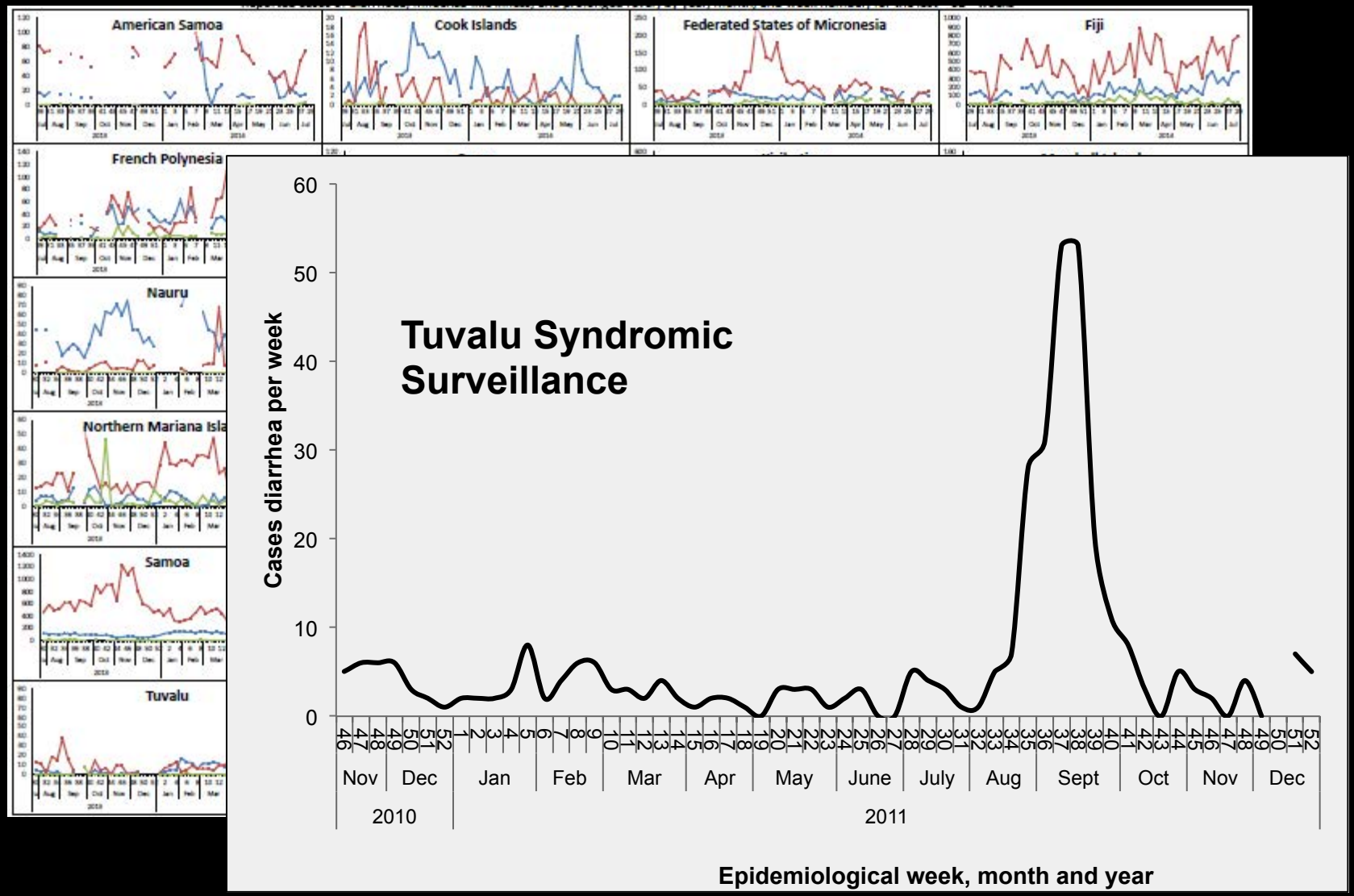
Standardized Pacific syndromic surveillance: Core case definitions

SYNDROME	CASE DEFINITION	IMPORTANT DISEASES TO CONSIDER
1. Acute fever and rash	Sudden onset of fever **AND** acute non-blistering rash	Measles, dengue, rubella, meningitis, leptospirosis
2. Diarrhoea	3 or more loose or watery stools in 24-hours	Viral or bacterial gastroenteritis (cholera, food poisoning, ciguateria fish poisoning)
3. Influenza-like illness	Sudden onset of fever **AND** cough or sore throat	Influenza, other vial or bacterial respiratory infection
4. Prolonged fever	Any fever lasting 3 or more days	Typhoid fever, dengue, leptospirosis, malaria
5. Unusual event (that raised concern)		Unusual pattern of disease; high number of cases with common symptoms; potential outbreak situation; environmental disaster ; animal die-off…

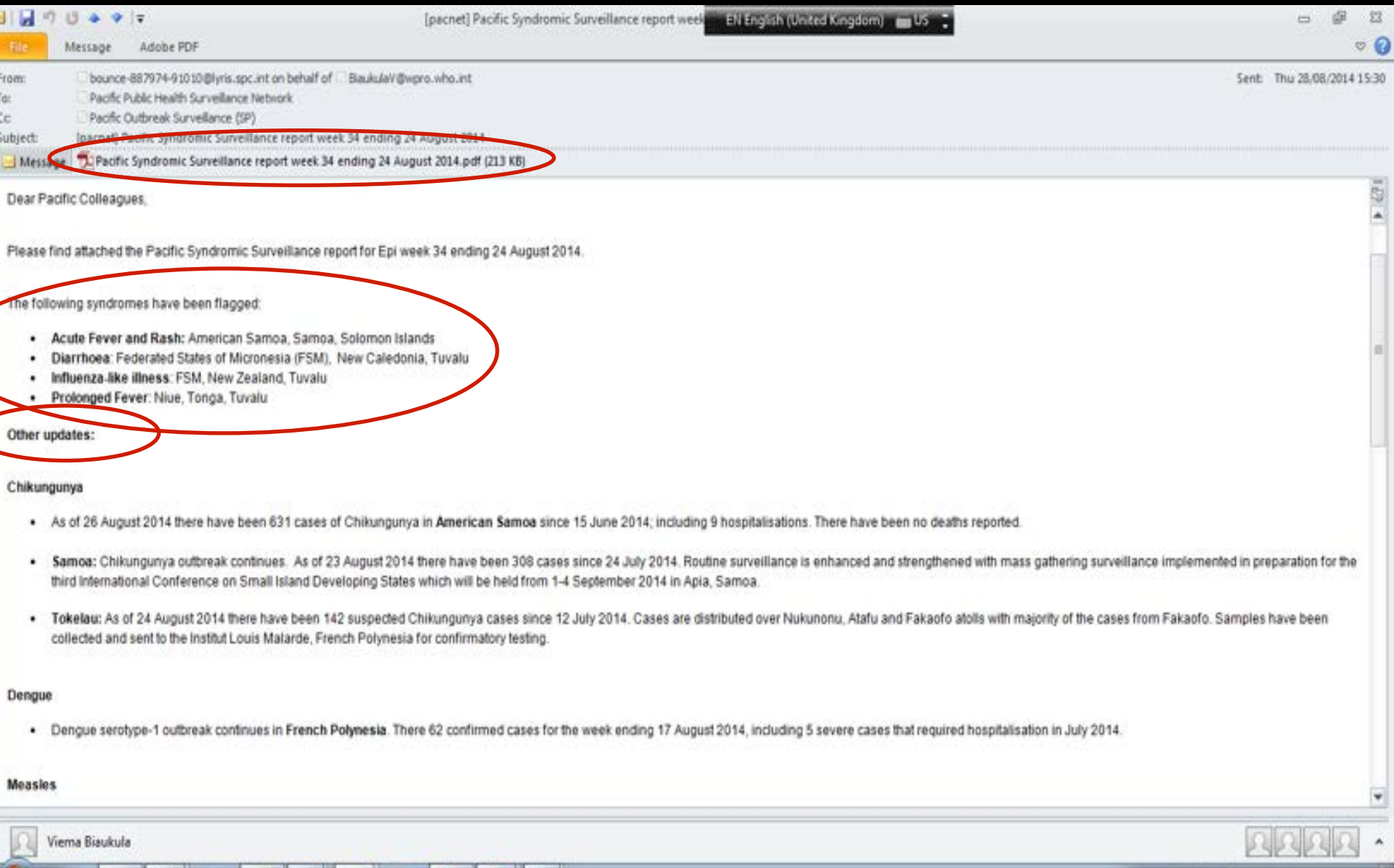
WHO Regional support

- Data collation, analysis & reporting
- Weekly Pacific surveillance and outbreak reports through email
- Regular country missions to support system
- Assistance available when increase in cases detected

Preparation: Strengthen routine surveillance & response



Pacific Syndromic Surveillance System



[pacnet] Pacific Syndromic Surveillance report week

EN English (United Kingdom) US

File Message Adobe PDF

From: bounce-887974-91010@lyris.spc.int on behalf of BiaukulaV@wpro.who.int

To: Pacific Public Health Surveillance Network

Cc: Pacific Outbreak Surveillance (SP)

Subject: [pacnet] Pacific Syndromic Surveillance report week 34 ending 24 August 2014

Sent: Thu 28/08/2014 15:30

Message Pacific Syndromic Surveillance report week 34 ending 24 August 2014.pdf (213 KB)

Dear Pacific Colleagues,

Please find attached the Pacific Syndromic Surveillance report for Epi week 34 ending 24 August 2014.

The following syndromes have been flagged:

- **Acute Fever and Rash:** American Samoa, Samoa, Solomon Islands
- **Diarrhoea**: Federated States of Micronesia (FSM), New Caledonia, Tuvalu
- **Influenza-like illness**: FSM, New Zealand, Tuvalu
- **Prolonged Fever**: Niue, Tonga, Tuvalu

Other updates:

Chikungunya

- As of 26 August 2014 there have been 631 cases of Chikungunya in **American Samoa** since 15 June 2014; including 9 hospitalisations. There have been no deaths reported.
- **Samoa:** Chikungunya outbreak continues. As of 23 August 2014 there have been 308 cases since 24 July 2014. Routine surveillance is enhanced and strengthened with mass gathering surveillance implemented in preparation for the third International Conference on Small Island Developing States which will be held from 1-4 September 2014 in Apia, Samoa.
- **Tokelau:** As of 24 August 2014 there have been 142 suspected Chikungunya cases since 12 July 2014. Cases are distributed over Nukunonu, Atafu and Fakaofo atolls with majority of the cases from Fakaofo. Samples have been collected and sent to the Institut Louis Malarde, French Polynesia for confirmatory testing.

Dengue

- Dengue serotype-1 outbreak continues in **French Polynesia**. There 62 confirmed cases for the week ending 17 August 2014, including 5 severe cases that required hospitalisation in July 2014.

Measles

Viema Biaukula

WHO support to PICs

- Support IHR implementation and monitoring in countries
- Coordination and management of the PSSS among the 23 PICs
- Provide Post disaster surveillance (EWARN)
- Outbreak response support in countries.


Thank you