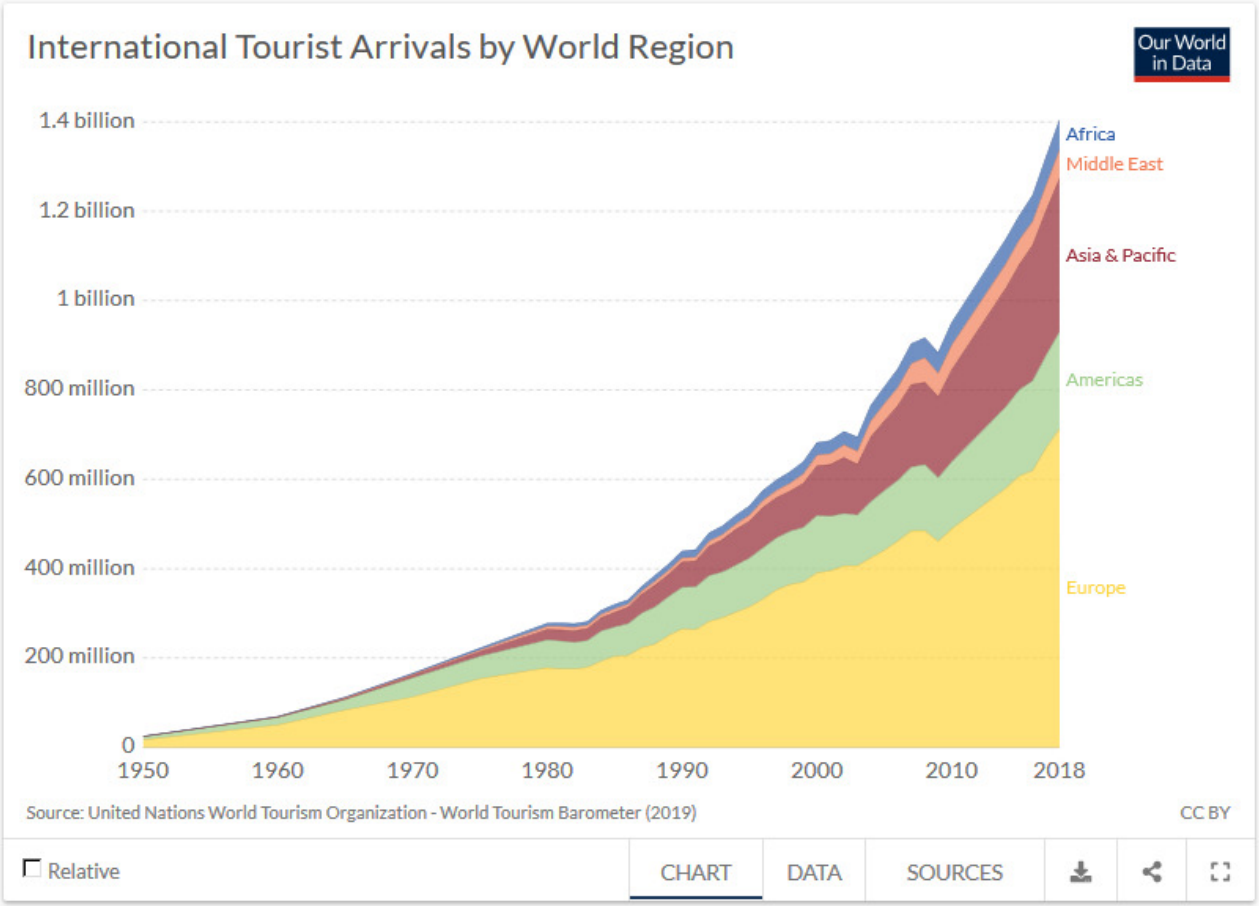
HOT TOPICS from CISTM16
June 5-9th, 2019

Arrivals by world region

The first visualisation shows how tourist arrivals have increased since shortly after the Second World War in 1950.

The United Nations World Tourism Organization (UNWTO) estimates that internationally there were just 25 million tourist arrivals in 1950. 68 years later this number has increased to 1.4 billion international arrivals per year. This is a 56-fold increase.



ourworldindata.org

Climate change

- Voluntary migrations
- Forced displacements
- Tourism & Travel
- Migrants more at risk of communicable and non communicable diseases
- Migration ≠ driver of communicable disease outbreaks

Air pollution

Incorporate consideration of air quality, especially if underlying comorbidity

C. Sanford ‘Every breath you take’

A problem in both low- and high-income nations.

- Over 90% of deaths related to air pollution occur in low-income nations.

India, China

- India and China account for over 50% of deaths due to air pollution.
- Of the 25 cities with the worst air pollution, 20 are in India.

Increasingly, travelers are visiting regions with significant air pollution.

- 2017: 1.32 billion tourist arrivals globally

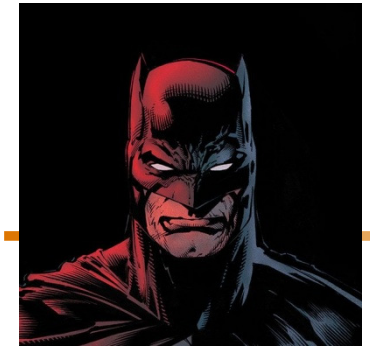
International Tourist Arrivals

	1990	2015
World	435 million	1.186 billion
Advanced economies	299 million	653 million
Emerging economies	136 million (31%)	533 million (45%)

--UNWTO 2016a

Health effects of air pollution

- Stroke
- Sudden death
- Heart disease
- COPD
- Asthma
- Lung cancers and other cancers

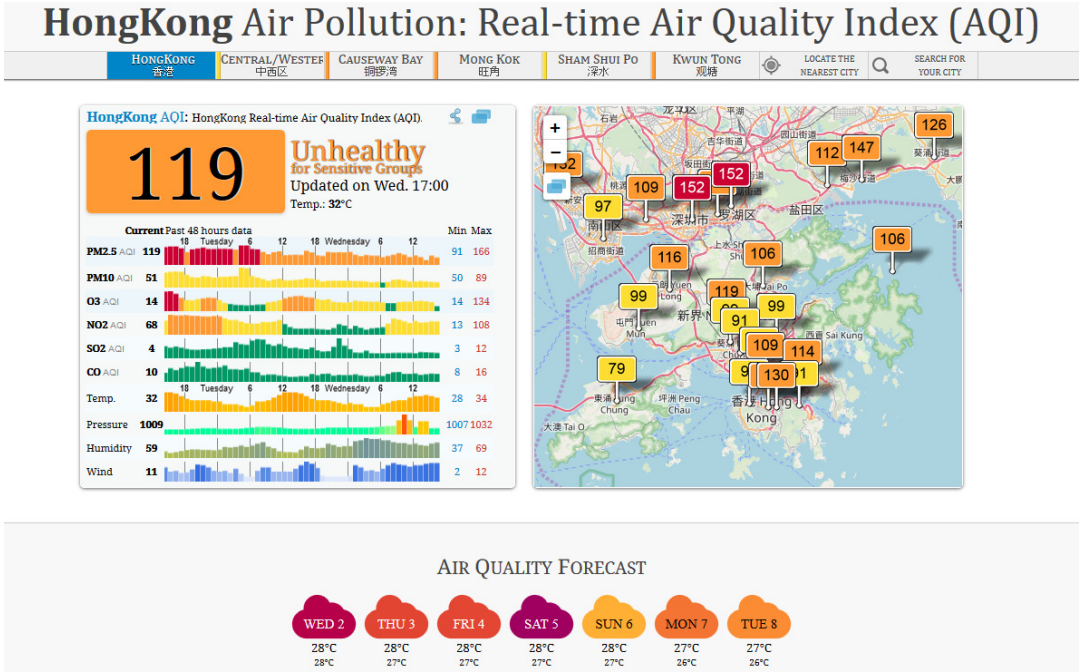


Prevention?

Masks? No recommendation

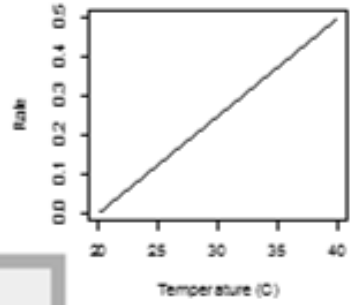
Awareness

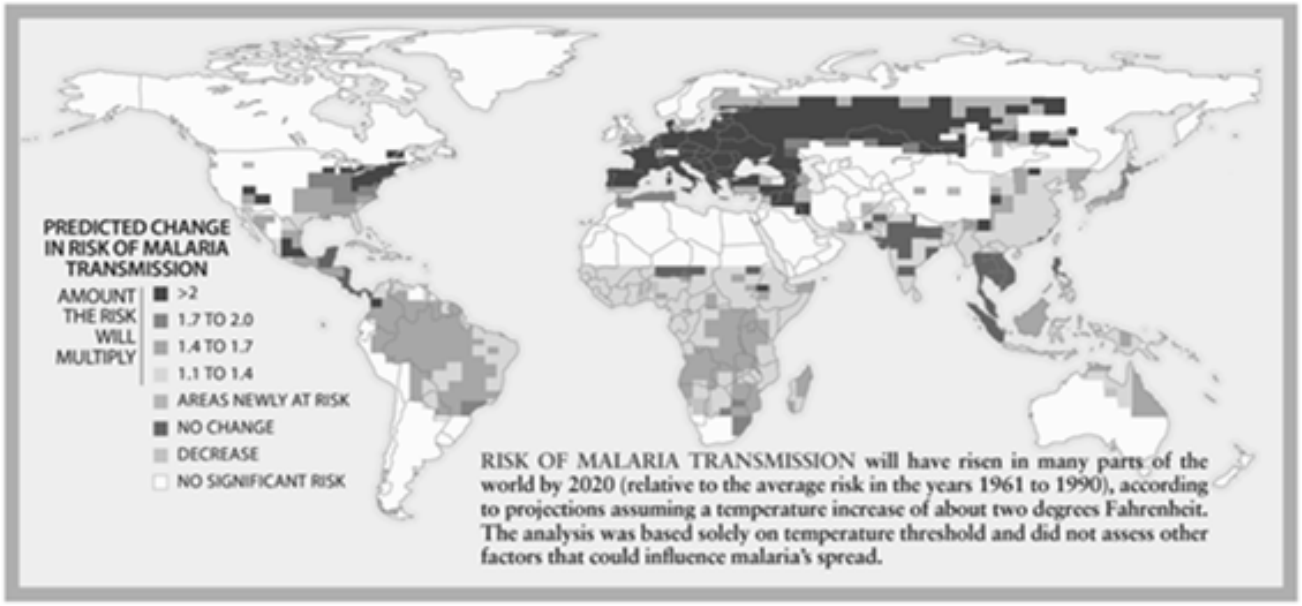
Apps exist to *ajust activities*



D. LaBeaud ‘Climate change and the ecology of vector-borne diseases’

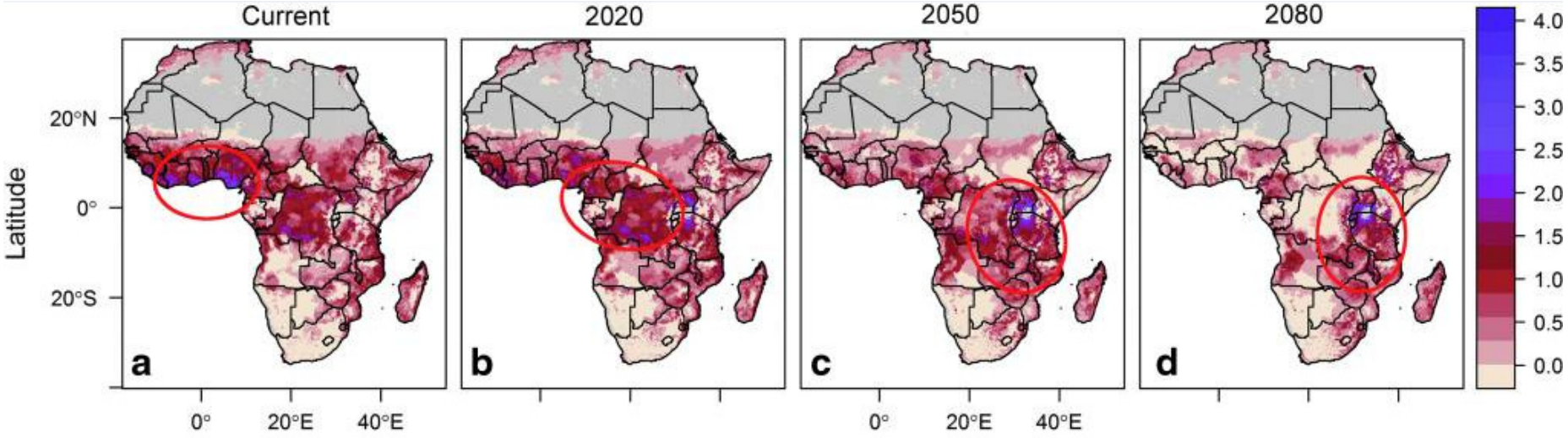
"Warmer is sicker"



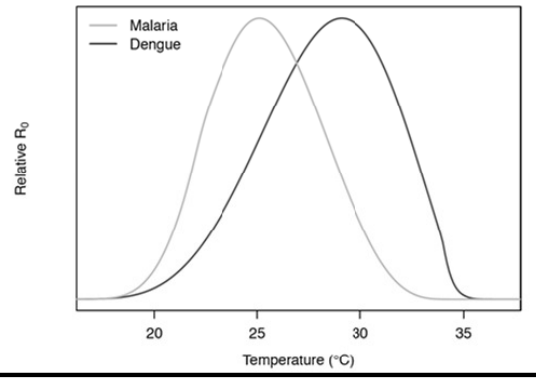


Epstein 200

Vector Borne Zoonotic Dis. 2015 Climate change will shift burden of malaria



Reproductive Number Curves for Malaria and Dengue Virus

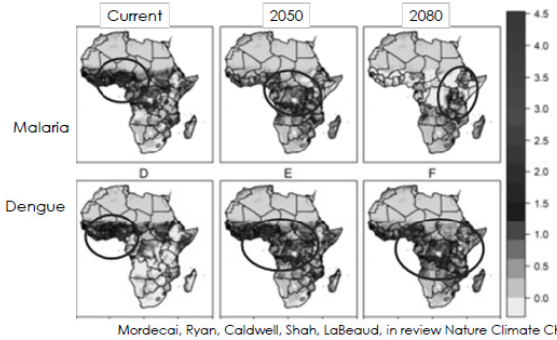


Mordecai EM, Sadie R, Caldwell J, Shah MM, LaBeaud AD. Climate change could shift disease burden from malaria to arboviruses in Africa. Nature Climate Change. Under review.

2

37

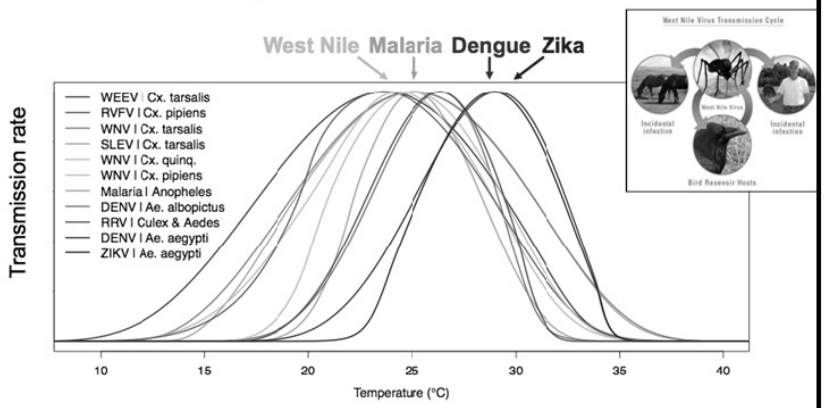
Climate change may drive a shift from **malaria** to **dengue** in Africa



Mordecai, Ryan, Caldwell, Shah, LaBeaud, in review Nature Climate Change

38

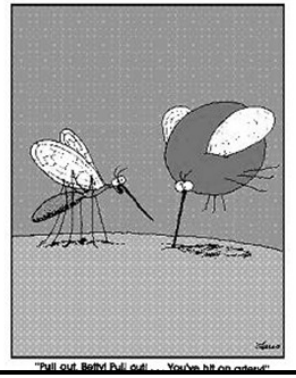
Will climate change **shift** disease burden across the world?



Mordecai et al. 2013, 2017, Johnson et al. 2015, Shocket et al. 2018, in prep, Tesla et al. 2018

Challenges FOR the world

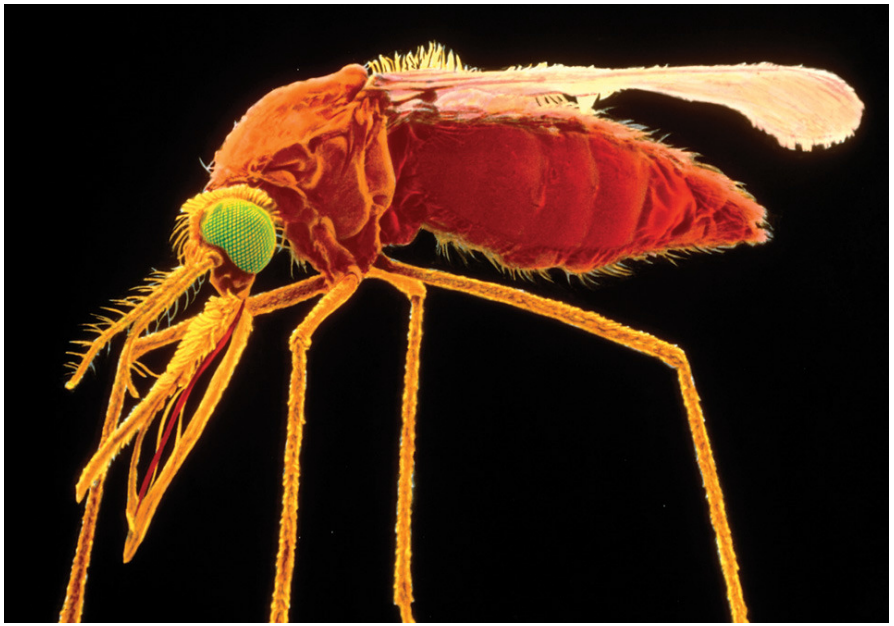
- Non-immune populations
- Widespread competent mosquito vectors
- No rapid local testing currently
- Limited physician knowledge and clinical suspicion
- Poor diagnostics
- No treatments or vaccines



Japanese Encephalitis (JE): to vaccinate or not?

Usual rule in Travel Medicine

General traveler risk = 1/1-10 000 000
Propose vaccine only if travel >30 days in rural areas in at risk-season



Lancet Neurology 2015

Expansion of JE areas

< climate change
< economic development
< agricultural change
< urbanisation of rural areas
< increased migration to cities
leading to …

→ Blurring of boundaries of rural areas where natural enzootic cycle exists
→ Expanding of urban areas

Yellow Book 2020

MAP 4-7. **Distribution of Japanese encephalitis risk**
Boundary representation is not necessarily authoritative.

JE in travelers 1992-2013 (N=14)

JE Can Affect Travelers to Asia and can Have Severe Outcomes

Summary of selected published case studies between 1992–2013

Year	Country of Origin	Travel Destination	Duration/Travel itinerary	Outcome
1992[1]	UK	Malaysia, Thailand	9 weeks, 3 days trekking	Recovered
1994[2]	Sweden	Bali	10 days, one-day trip to the countryside	Recovered
1995[3]	Denmark	Bali	12 days, coastal, few trips inland	Fatal
2001[4]	Sweden	Java and Bali	3 weeks, outings to the countryside	Moderate sequelae
2004[5]	Finland	Thailand	2 weeks (1 week Khao Lak, 1 week Phuket, two-day trips rural area	Initially mild sequelae, after 3 years fully recovered
2004[6]	USA	Thailand	32 days	Recovered
2004[7]	New Zealand	Japan, China, and Hong Kong	5 weeks, urban and rural travel	Severe cognitive and motor sequelae
2005[8]	The Netherlands (two travelers)	Indonesia and Thailand	–	Both travelers recovered after long-lasting cognitive sequelae
2006[9]	Italy	Vietnam	3 weeks, rural travel	Recovered, slight deficit in recent memory
2008[10]	USA	Vietnam and Cambodia	Visiting family and friends, rural travel	Sequelae
2010[11]	Denmark	Cambodia	14 days, urban and rural travel	After initial recovery, died from cardiac arrest following generalized seizure
2010[12]	Canada	Thailand	1 month, urban and rural travel	Sequelae
2013[13]	Spain	Thailand	4 weeks, island, day trips to rural areas, two-day urban stay	Recovered, walk with an ataxic gait, minor memory impairment and emotional lability

1. Burdon et al 1994; 2. Wittesjoet al 1995; 3. Buhl et al 1996; 4. Ostlund et al 2004; 5. Lehtinen et al 2006; 6. Centers for Disease Control and Prevention 2005; 7. Cutfield et al 2005; 8. Delsing et al 2005; 9. Caramello et al 2007; 10. Centers for Disease Control and Prevention 2009; 11. Werlinrud et al 2011; 12. Langevin et al 2012; 13. Doti et al 2013

JE among visitors to Bali

Patient		Stay	Type	Outcome	Ref.
y/o	Resident of	Chronology			
10 F	Australia	14d / 1988	Beach hotel*	died	1
60 F	Swedish	10d / 1994	Beach hotel*	recovered	2
51 M	Danish	12d / 1994	Beach hotel*	died	3
80 M	Swedish	3 wk /	Bali (+ Java)	sequelae	4

* one / few single day excursions

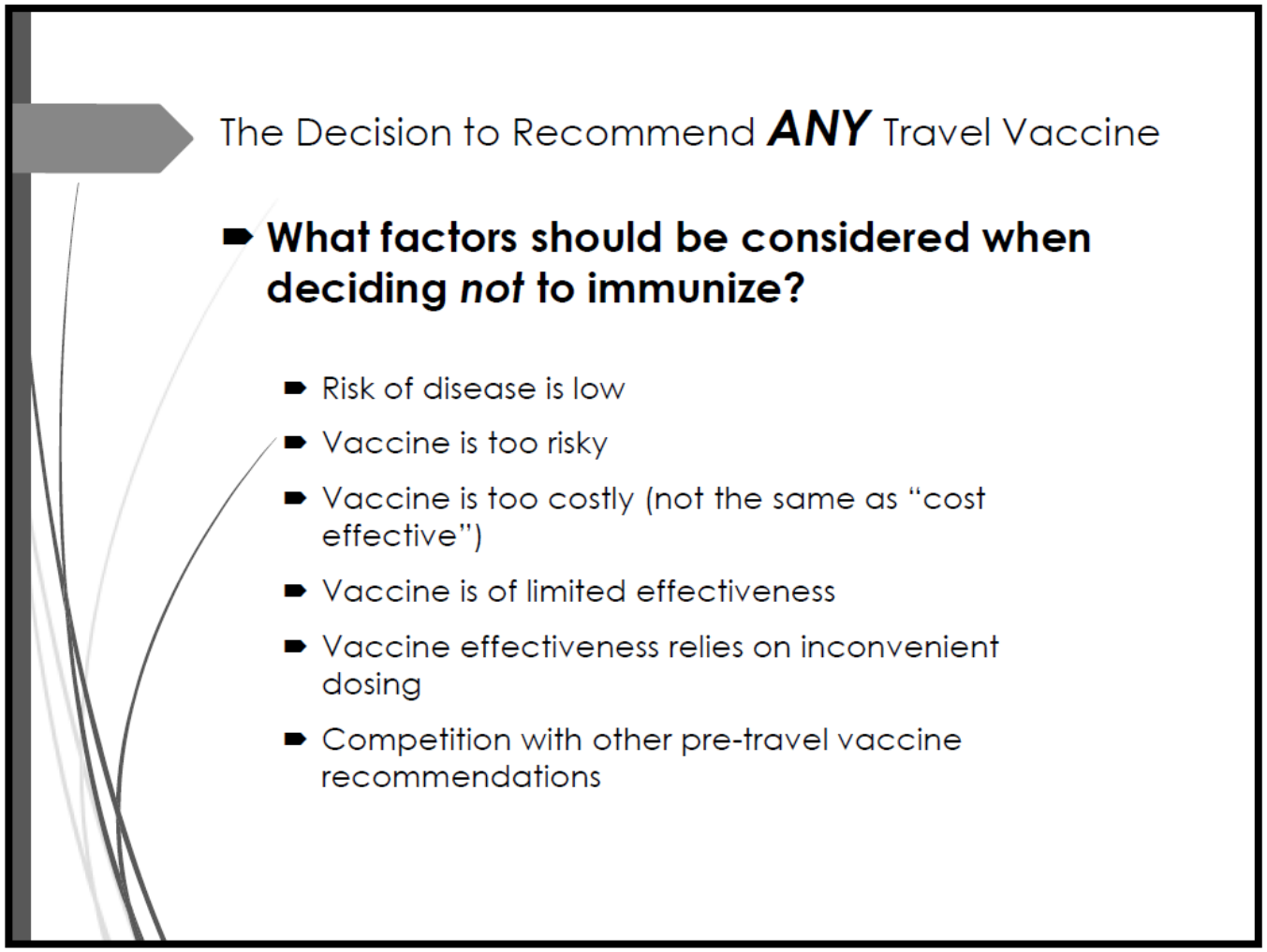
1. Macdonald WBG et al. Med J Aust 1989;150:334-9
2. Wittesjö B et al. Lancet 1995;345:856
3. Buhl M et al. Scand J Infect Dis 1996;28:189
4. Ostlund MR et al. Scand J Infect Dis 2004;36:512-3

JE vaccine
Pros and Cons

- Tolerance and safety
- Convenience
- Efficacy, effectiveness
- No accurate data about risk for travelers
- Risk for death/sequelae
- Most effective way of prevention

- No accurate data about risk for travelers
- Lots of asymptomatic forms
- Price

Why *not* immunize?



World Health Organization

World Health Organization (WHO) states:

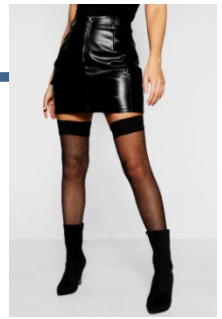
- Even if the number of JE-confirmed cases is low, vaccination should be considered when the environment is suitable for JE virus transmission, and that there is little evidence to support JE reduction disease burden from interventions other than human vaccination.

World Health Organization

World Health Organization (WHO) states:

At least inform the traveler and propose vaccination!

Examination of the evidence



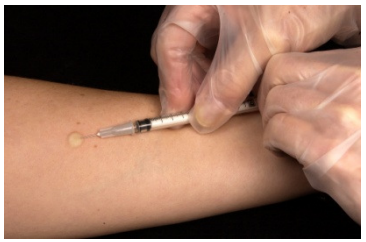
Use of compression socks to prevent DVT : NO

Doxy wkly for prevention of leptospirosis : YES

Hygiene to reduce TD occurrence: NO

Use of insect repellents to reduce the risk of malaria: YES

Screening for latent TB in traveler: NO



Older travelers

- 5-30% travelers >60 years old
- Different profiles of vaccine response and vaccine AE
- Risk of health pb during travel:
  - ↓if higher education, travelling with partner
  - ↑if longer duration, travel experience
- Documented increased risk for Influenza, pneumonia, Zoster

Reduced antibody responses to all antigens

Young cells die and memory cells survive → difficulty to respond to a new vaccine

< decreased response to Ag
< decreased neutros function
< increased damage
< increased time to recover

Lack of studies especially for travel vaccines in the elderly

- Hep A vaccine : response vaccine delayed and decreased in older adults (65%-97%) → 2 doses before travel
- YFever, Imojev® and rabies : excellent immunogenicity
- Ixiaro ® : >65 y → 65% efficacy
- Hepatitis B 65% > 65y after 3 doses (98% à 20 ans)
- Measles: benefit of age but lose Ab quicker if immunized later
- Typhoid: CRF 36%- no data >55 y

- Think *S. pneumoniae* vaccine if RF, mass gathering
- Think Pertussis if>10 years

M Walberg 'To vaccinate or not elderly'

Can we improve response to vaccines?

- Quality of antigen
  - Improvements are possible (conjugate versus pure polysaccharides), but some antigens are just better than others.
- Quantity of antigen
  - Larger doses of antigen, but not more frequent administration, may be beneficial
- Uptake of antigen
  - Adjuvants appear to increase immune response and may be beneficial

Thank you for your attention!