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Worldwide malaria prevention strategies: similarities and differences

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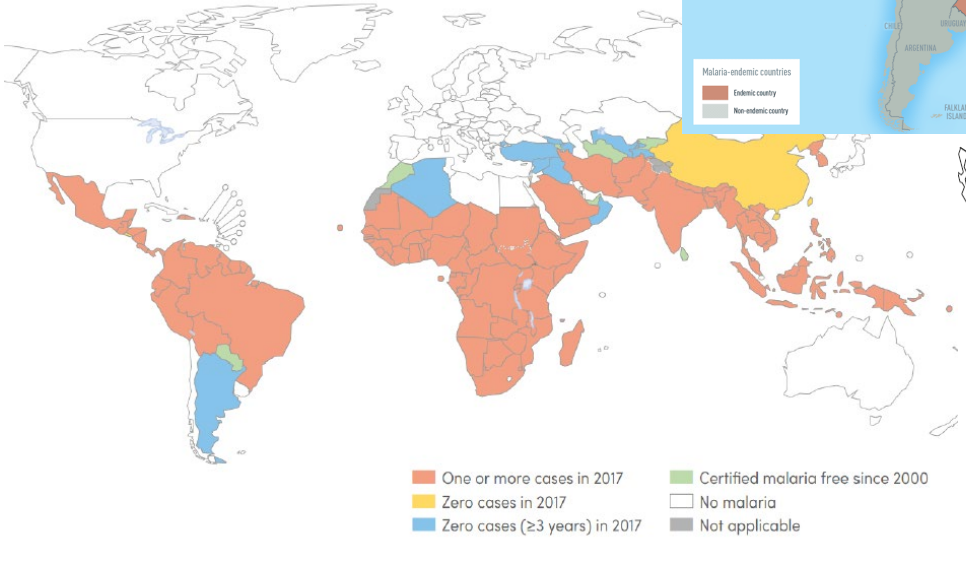
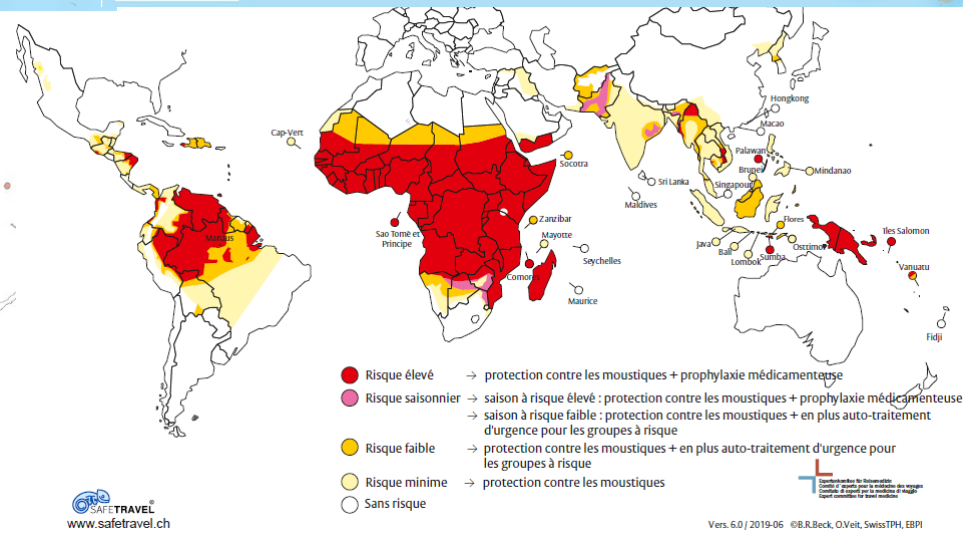
Menu

- How much do we agree and disagree for malaria preventive measures: the example of India
- Reasons for ‘disagreement’ (?)
- Malaria summit
  - Universal malaria risk assessment (mapping)

We all agree

on the malaria risk worldwide





We all agree

on the dynamics of malaria risk

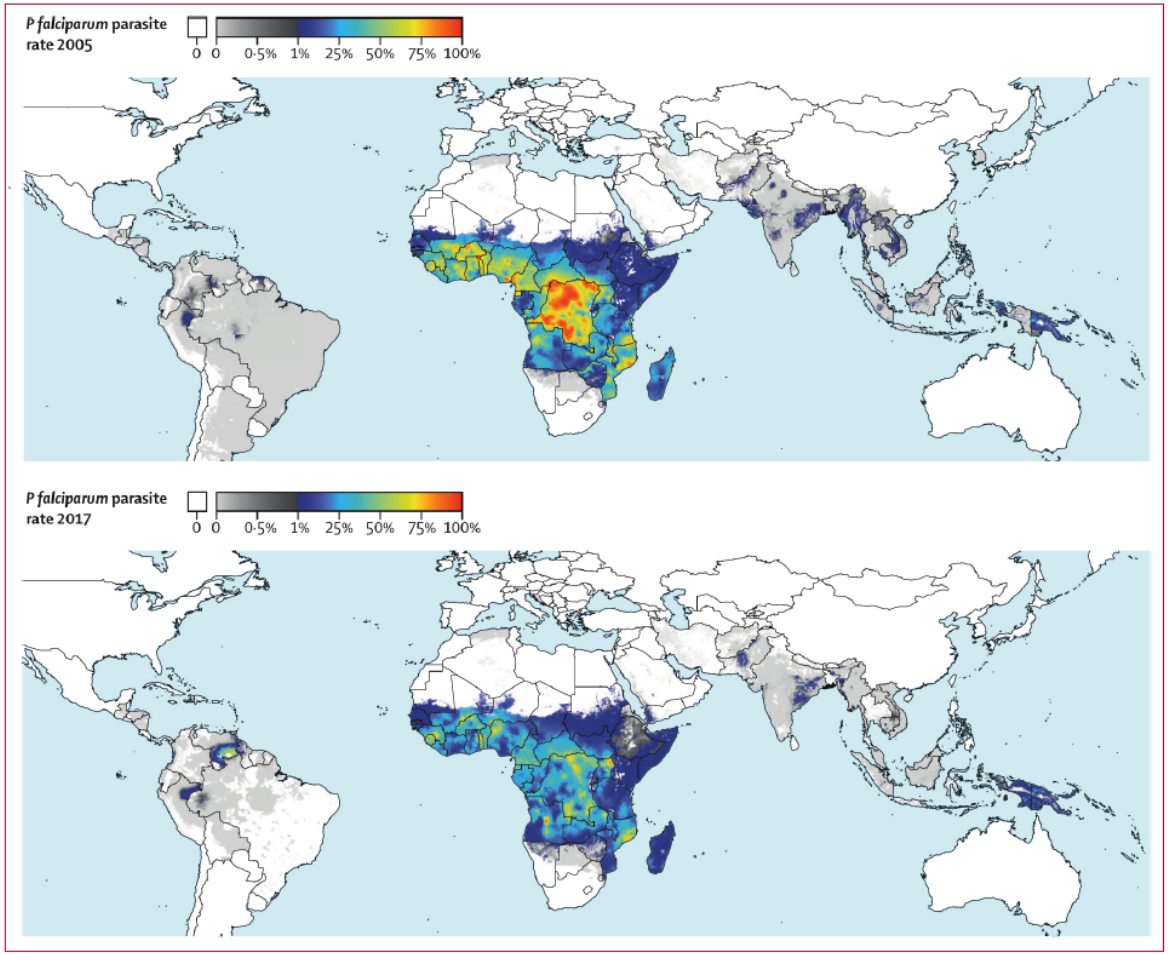
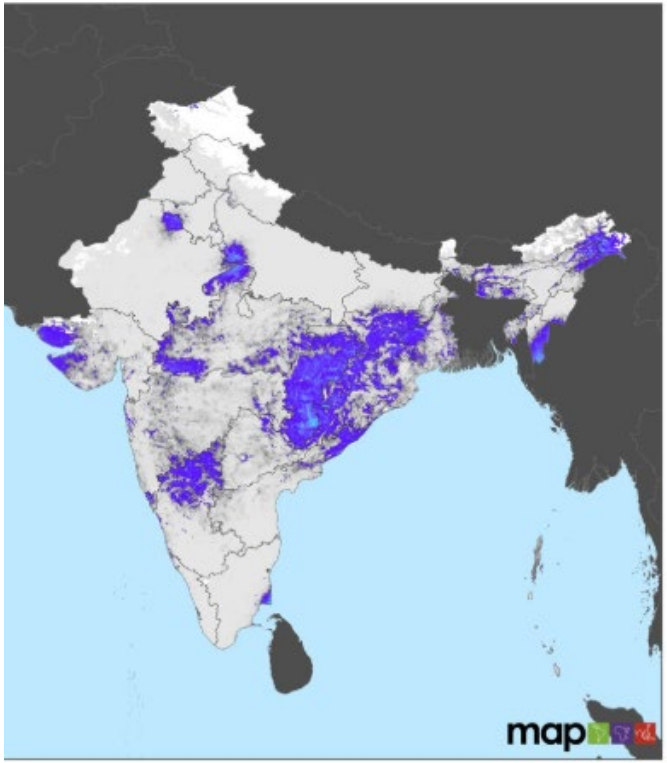


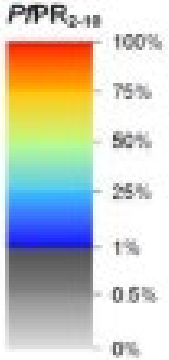
Figure 3: **Spatial distribution of age-standardised *P falciparum* parasite rate$_{2-10}$ in 2005 (top) and 2017 (bottom)**
Note the colour scaling is split to better differentiate within low endemic areas, with one linear scale between zero and 0·01 *P falciparum parasite rate*$_{2-10}$ (grey shades) and a second linear scale between 0·01 and 1 (colours from blue to red). Areas without endemic *P falciparum* are shown in white. *P falciparum* parasite rate$_{2-10}$=*P falciparum* parasite rate for children aged 2–10 years of age.

Weiss et al Lancet 2019

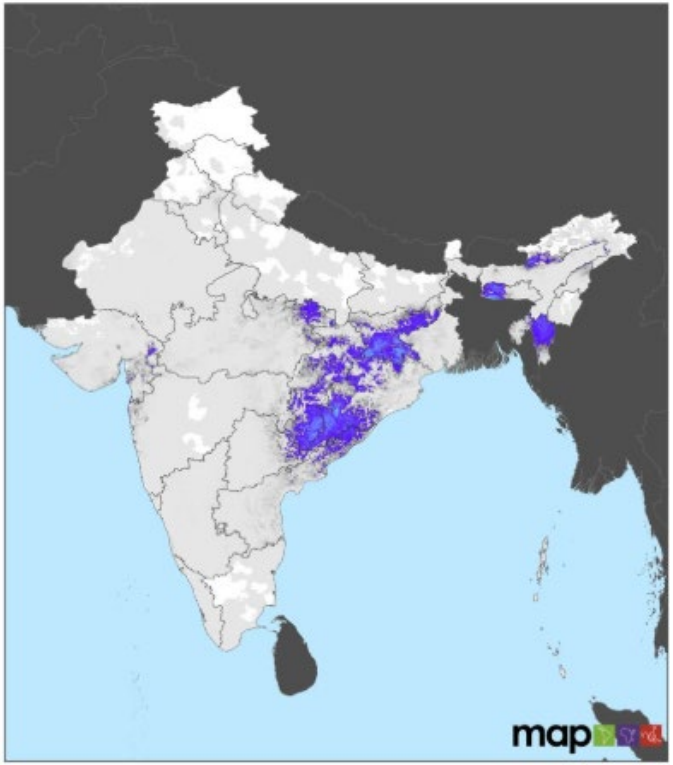
MAP Atlas *Pf* prevalence in India

2000





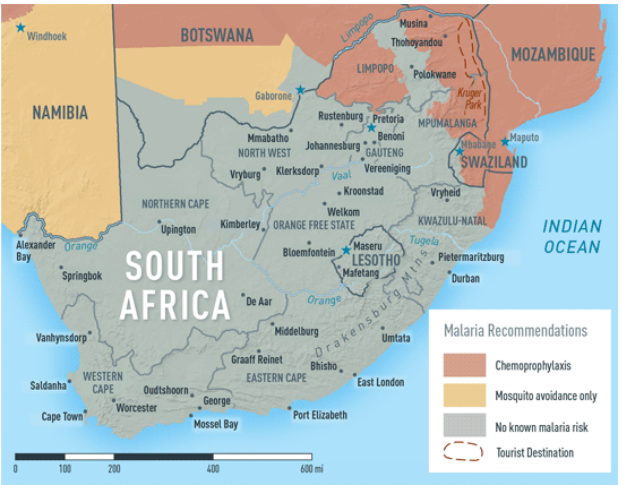
2017

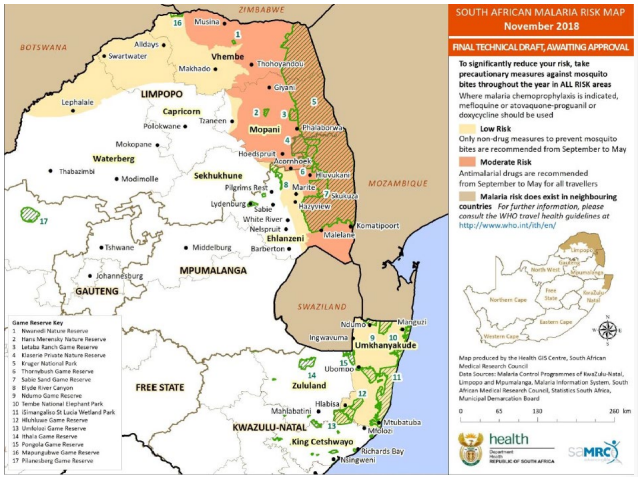


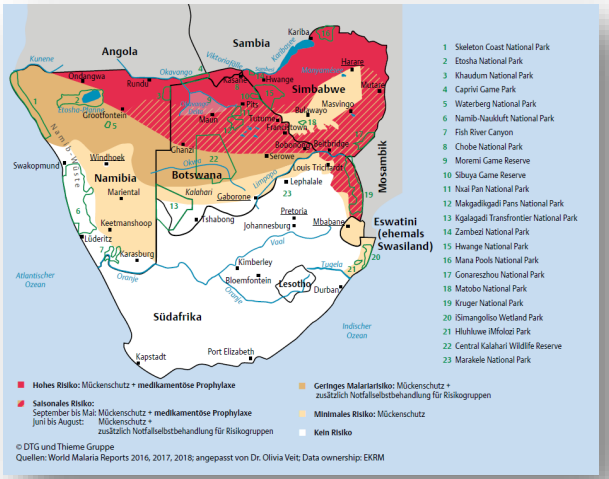
https://map.ox.ac.uk/trends/country/IND

We all agree

on the regional variations ?





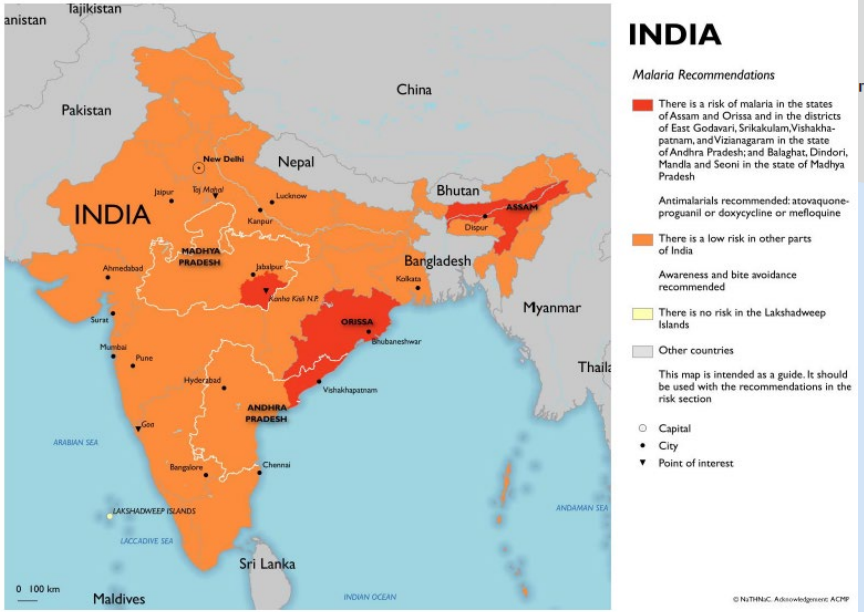


CDC NATHNAC CH-Ger-Aus

Where we start to ‘disagree’

Map 2-15. Malaria in India

Figure 19. Map of India showing the areas with appropriate malaria prevention measures recommended



INDIA

Malaria Recommendations

There is a risk of malaria in the states of Assam and Orissa and in the districts of East Godavari, Srikakulam,Vishakhapatnam, and Vizianagaram in the state of Andhra Pradesh; and Balaghat, Dindori, Mandla and Seoni in the state of Madhya Pradesh

Antimalarials recommended: atovaquone-proguanil or doxycycline or mefloquine

There is a low risk in other parts of India

Awareness and bite avoidance recommended

There is no risk in the Lakshadweep Islands

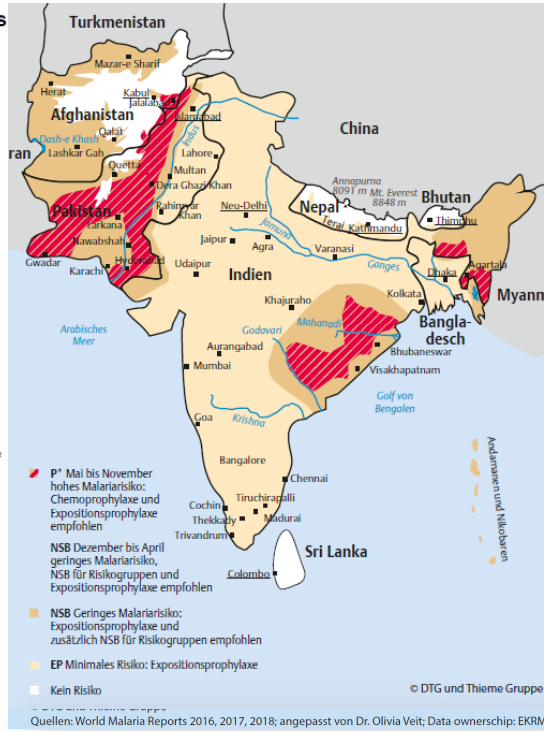
Other countries

This map is intended as a guide. It should be used with the recommendations in the risk section

Capital
City
Point of interest

© NaTHNaC. Acknowledgement: ACMP

Source: http://travelhealthpro.org.uk/country/105/india#Malaria



Quellen: World Malaria Reports 2016, 2017, 2018; angepasst von Dr. Olivia Veit; Data ownerschip: EKRM

CDC NATHNAC CH-Ger-Aus

Different national recommendations: why?

- Different malaria risk assessment?
- Different malaria recommendation development methodology?
- Different preventive measures available (availability of medication - licensure)
- Different ‘culture’

Different national recommendations: why?

- Different malaria risk assessment?
  - Imported malaria data vs local national statistics
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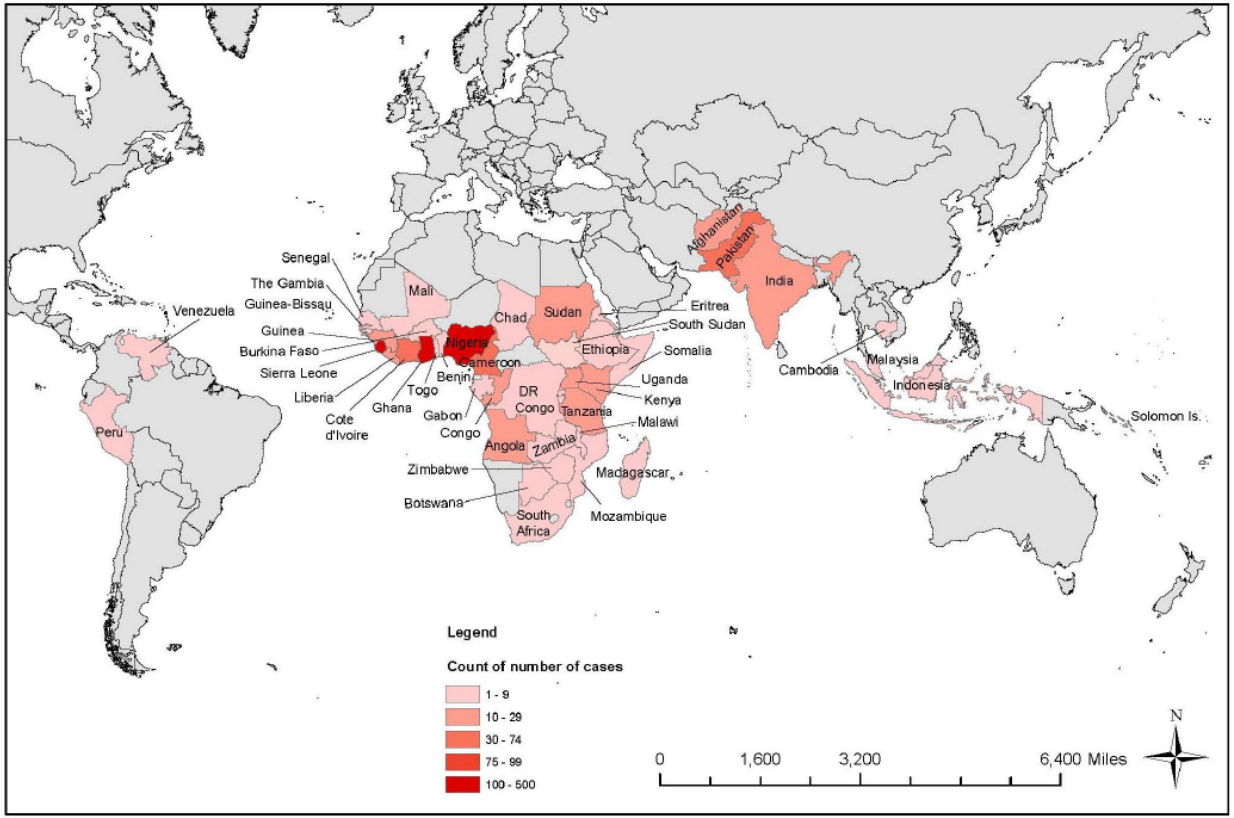
Different national recommendations: why?

- Different malaria risk assessment?
  - Confusion
    - Malaria risk (rate) = number of cases/ 100’000 travelers
    - Malaria cases = absolute number of imported malaria cases from national statistics

Annual number of malaria cases: UK 2018



Malaria imported into the United Kingdom: 2018 Public Health 2019

Different national recommendations: why?

- Different malaria risk assessment?
  - Imported malaria data: quality of evidence
  - Local national statistics
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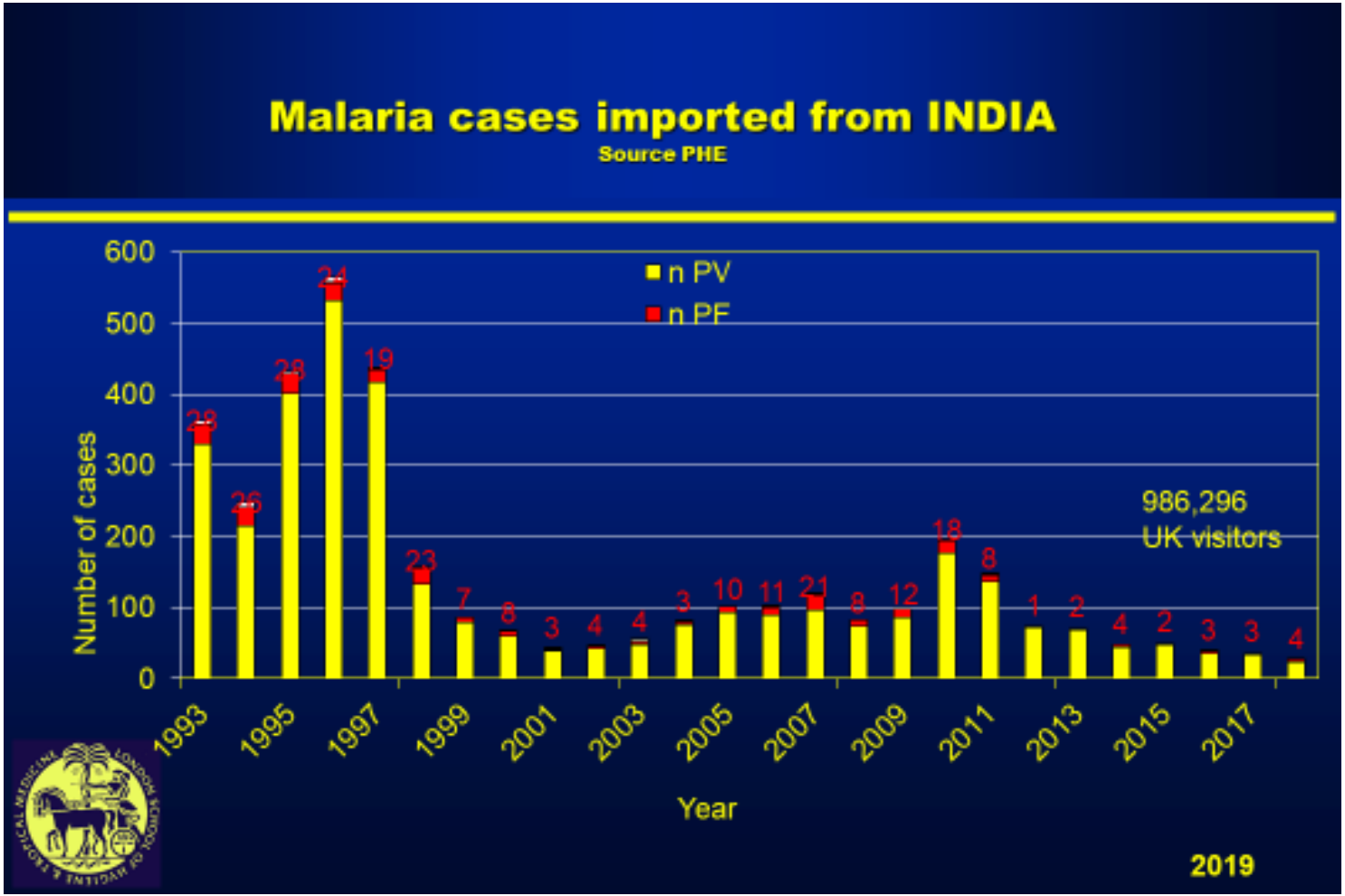
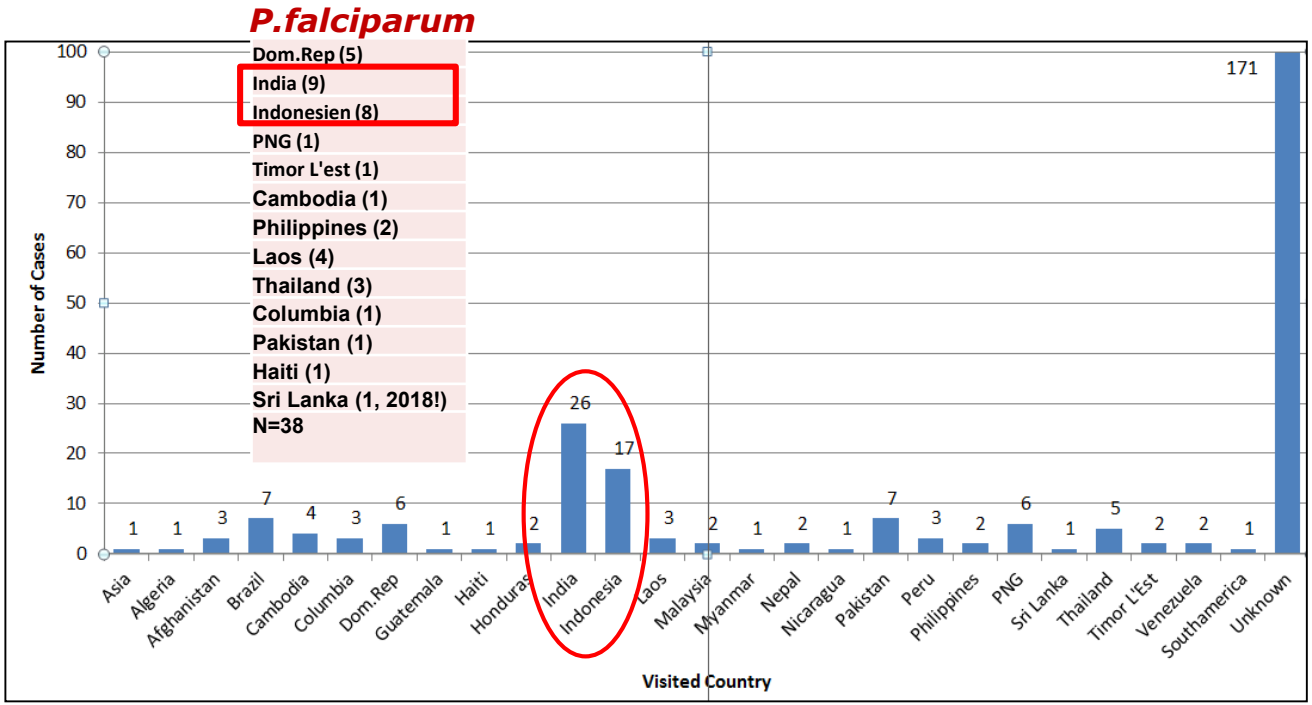


Courtesy from Ron Behrens

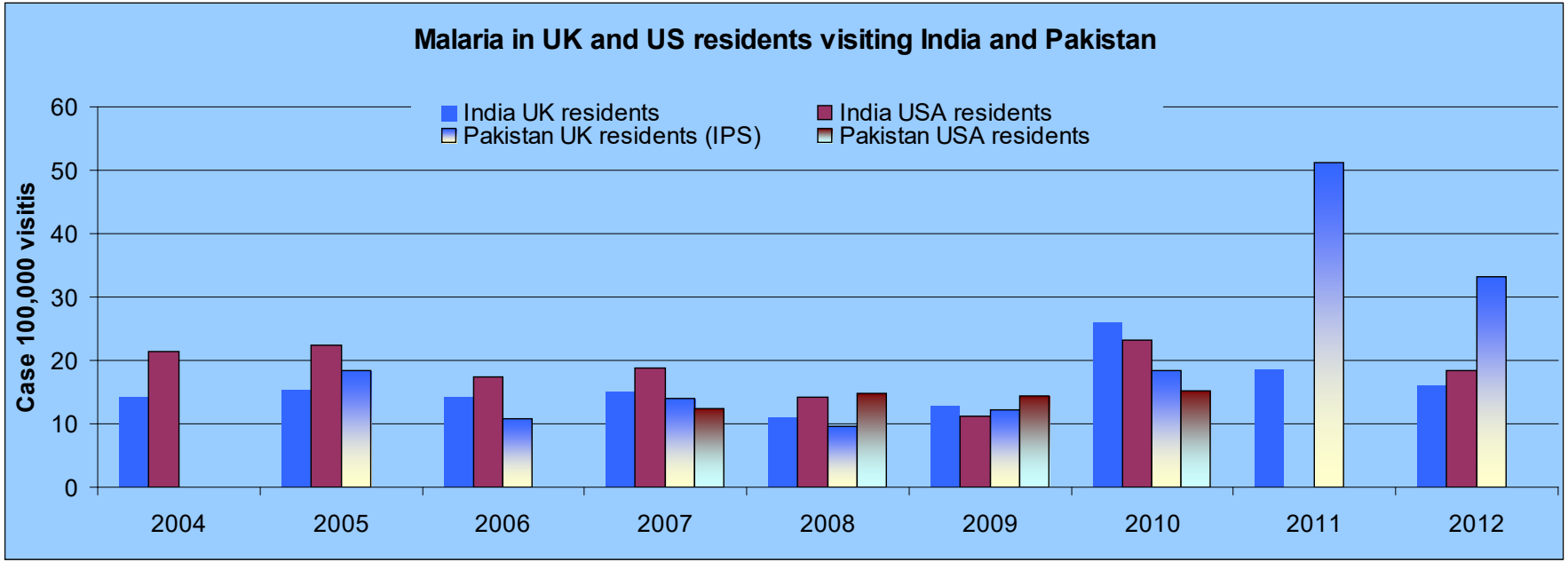
Imported malaria cases to Switzerland from non-African countries, 2009-2018



Olivia Veit

Data collected from Bundesamt für Gesundheit, Bern, Switzerland

Rate of all imported malaria in UK & USA residents (2004-11)



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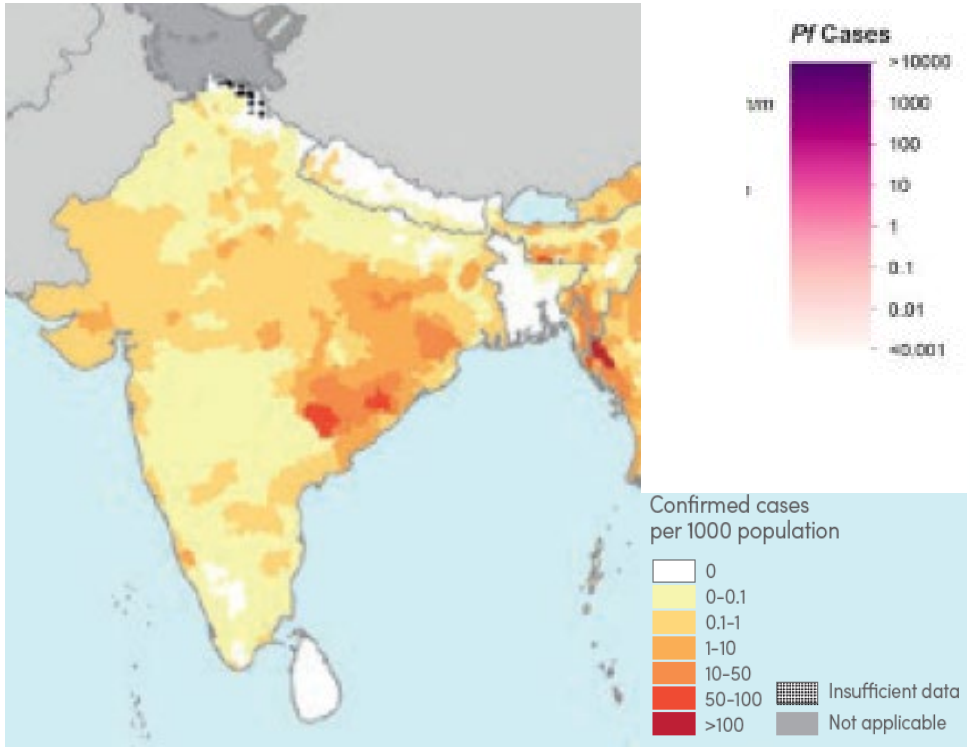
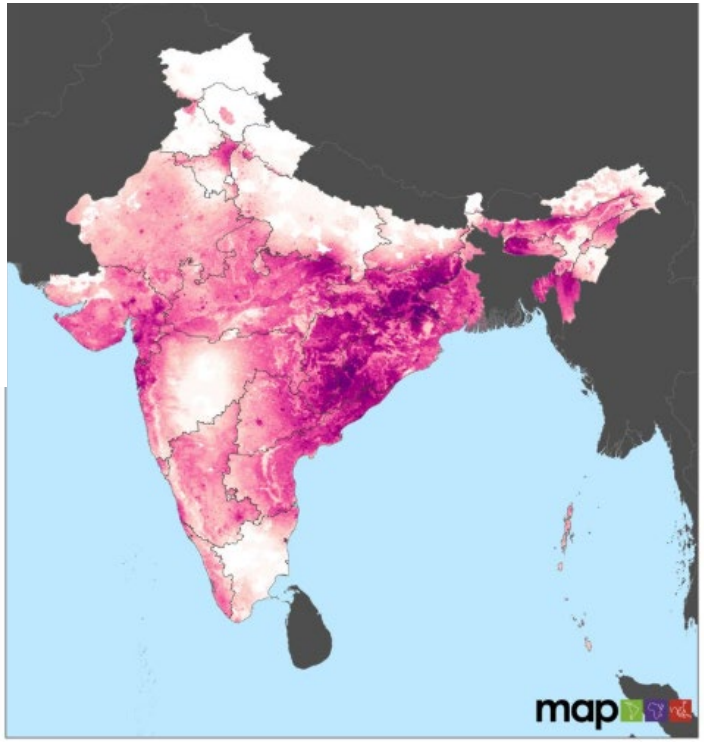
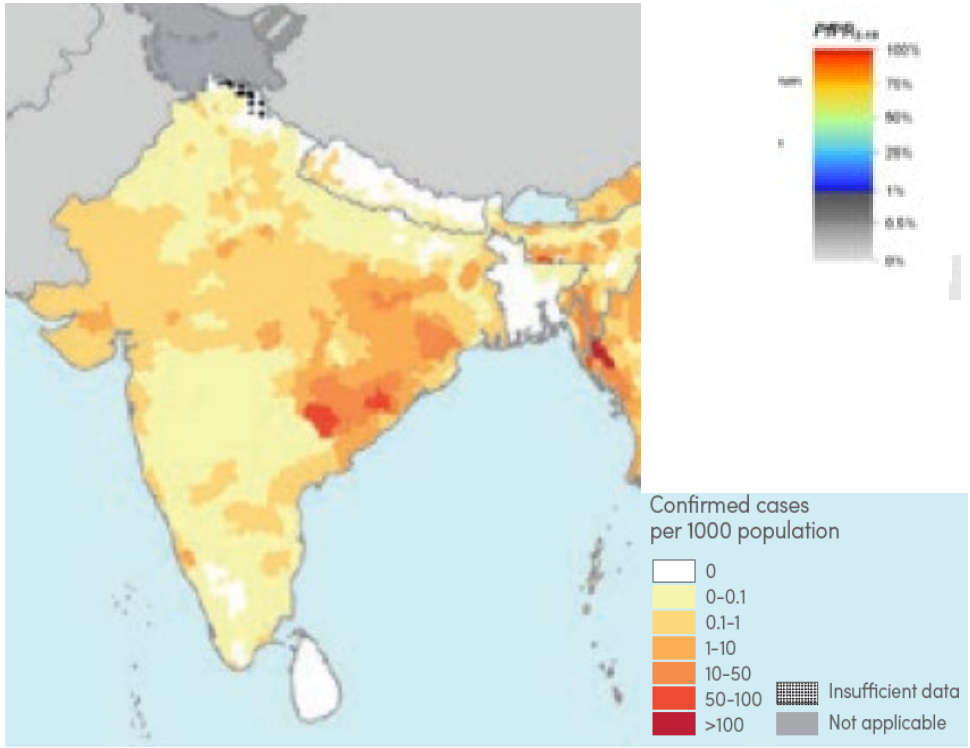
Local data: malaria *Pf* cases numbers

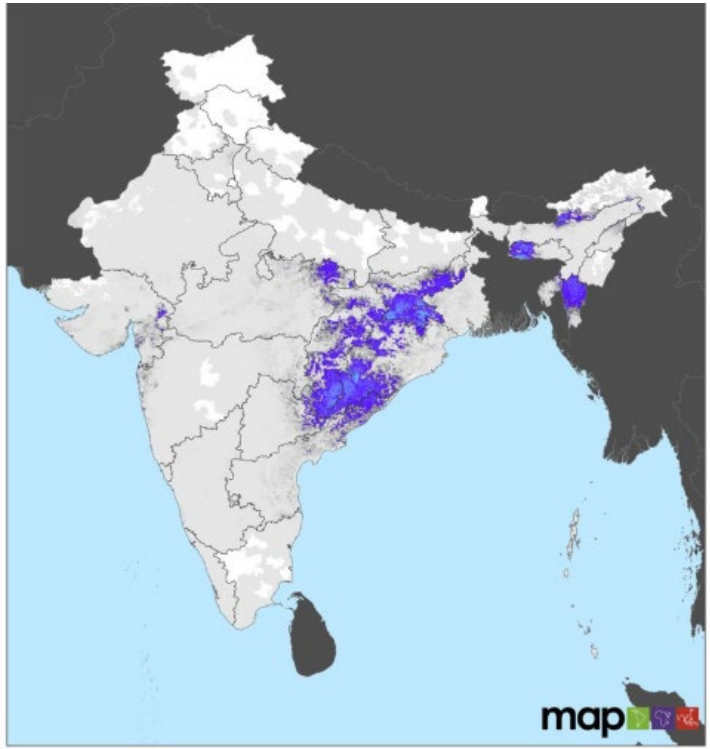




WHO World Malaria report 2018

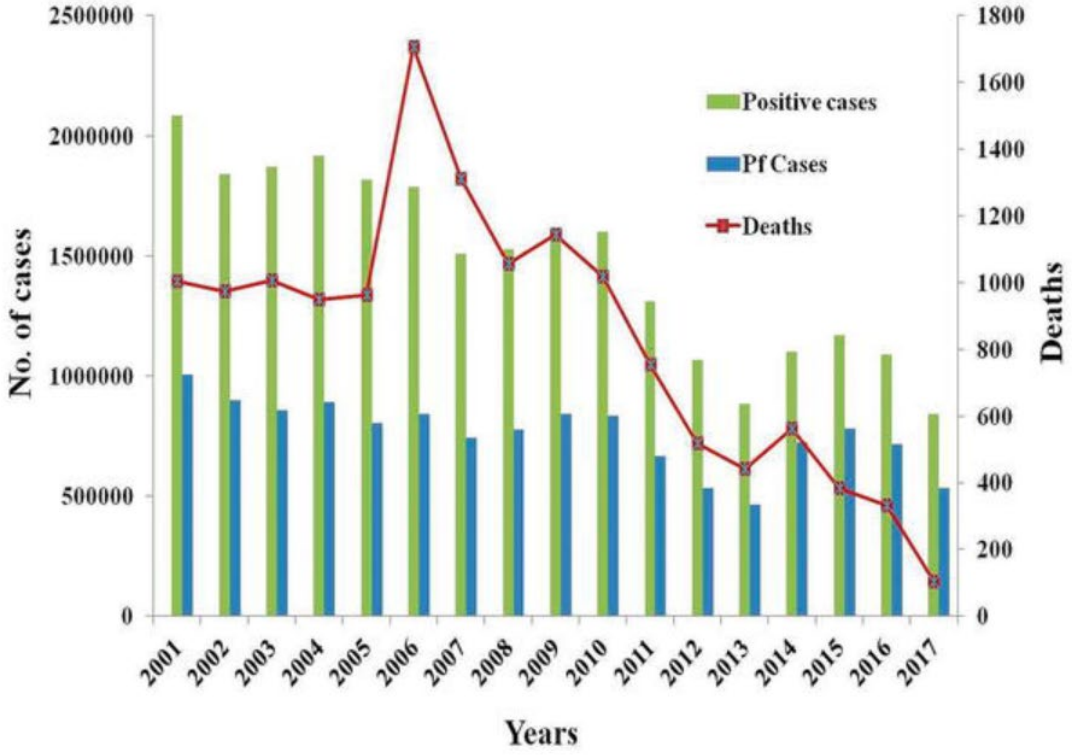
Local data: malaria *Pf* prevalence





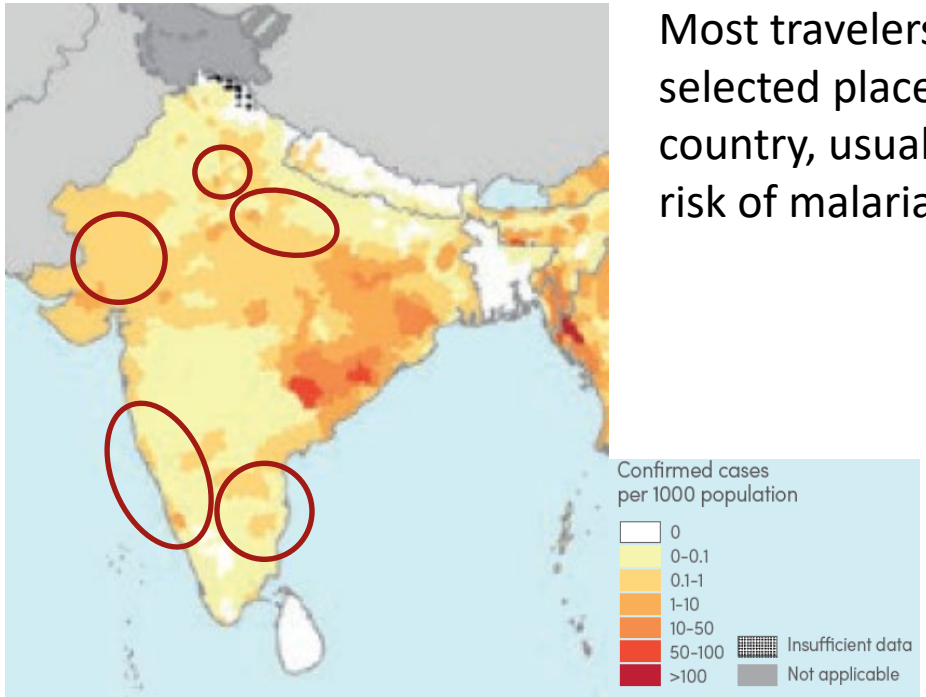
WHO World Malaria report 2018

Reliance on local data: what's the problem?



Dhiman et al, IntechOpen 2018

Reliance on local data: what's the problem?



Most travelers go in selected places in the country, usually less at risk of malaria

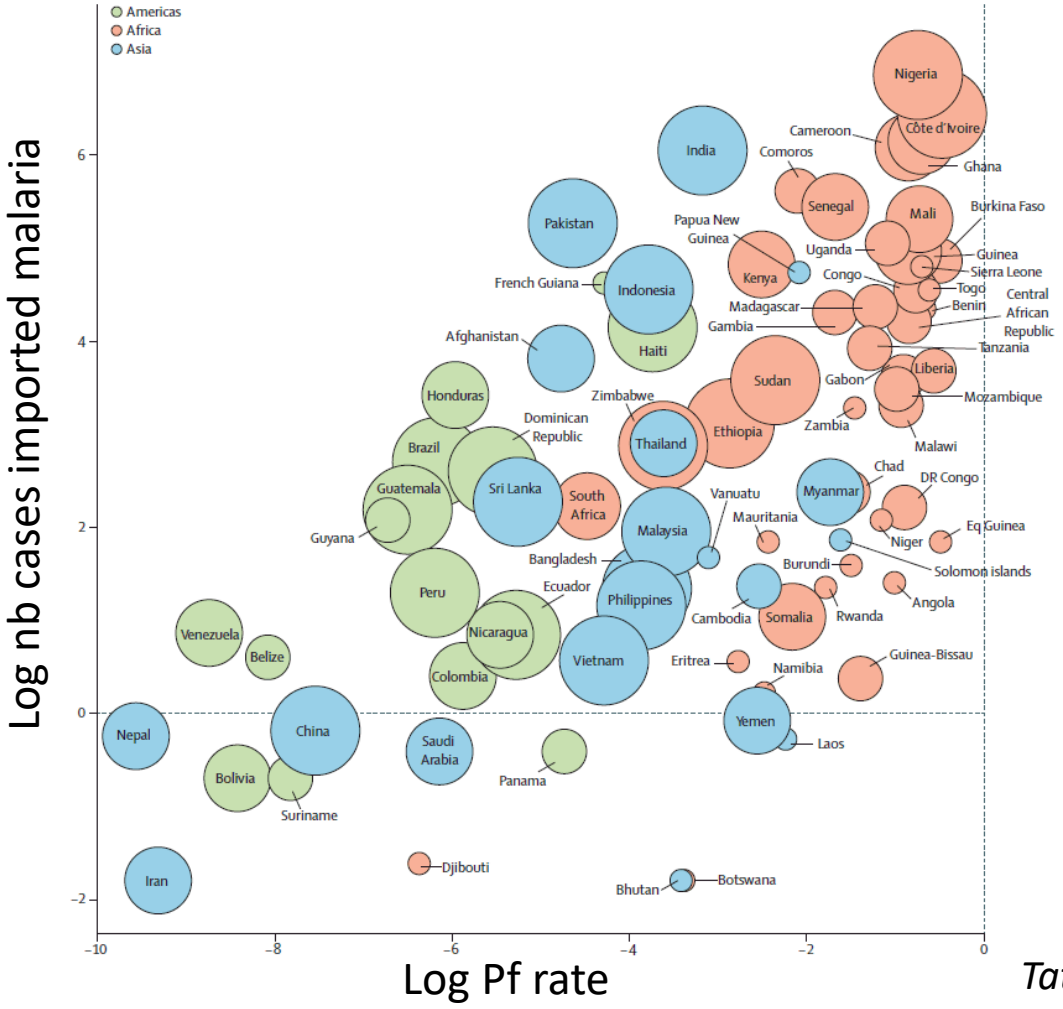
Schmid et al, J Trav Med 2009, WHO World Malaria report 2018

Data sources vary in quantity and quality by country

- Mexico:
  - Weekly surveillance data of case counts by state published online
  - Cases by district available upon request via CDC-Mexico liaison
  - U.S. National Malaria Surveillance System (NMSS) data
  - Result: More detailed guidelines
- India:
  - World Malaria Report
  - Published literature
  - U.S. National Malaria Surveillance System (NMSS) data
  - Result: Less detailed guidelines, but align with WHO

Courtesly from K Tan, CDC

Travelers data vs local data



Tatem et al, Lancet 2017

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CDC development and update of prophylaxis guidelines

Reassess

Gather

- Surveillance data (sub-national, U.S., other USG)
- Unpublished and confidential info
- Seminal papers and systematic reviews
- Entomology data
- World Malaria Report
- WHO and other national guidelines
- Personal communications (WHO, in-country contacts, etc.)

Assess

- Geographic spread of cases
- Trends
- Data quality
- Data quantity

Write

- Red pages
- Yellow Book
- Malaria notices

Adapted from K Tan, CDC

Imported Malaria Cases to Switzerland and Germany per 100 000 Travellers per Year

Example INDIA

COUNTRY	2009-2018 ARRIVALS (TOTAL)	2009-2018 ARRIVALS (average per year)
INDIA	0	
CH	463'926	46'39
D	2'463'159	246'31
A	338'232	33'82
TOTAL for CH/D/A	3'265'317	326'53

Arrivals in destination countries, based on UNWTO statistics of arrivals to countries by nationality

2009-2013 versus 2014-2018

2009-2013 ARRIVALS (average per year)	Imported malaria cases (TOTAL) Total	Pf/k/u	Pv/o/m	Average per year of imported malaria cases (per 100 000 Travellers per year) Total	Pf/k/u	Pv/o/m	2014-2018 ARRIVALS (average per year)	Imported malaria cases (TOTAL) Total	Pf/k/u	Pv/o/m	Average per year of imported malaria cases (per 100 000 Travellers per year) Total	Pf/k/u	Pv/o/m
0							0						
44'993	22	7	15	9.78	3.11	6.67	47'792	6	2	4	2.51	0.84	1.67
233'271	67	11	58	5.74	0.94	4.97	259'360	22	1	21	1.70	0.08	1.62
34'417	14	1	13	8.14	0.58	7.55	33'230	4	1	3	2.41	0.60	1.81
312'681	103	19	86	6.59	1.22	5.50	340'382	32	4	28	1.88	0.24	1.65

Pf/u= *Plasmodium falciparum/knowlesi, unknown*

Pv/o/m= *Plasmodium vivax/ovale/malariae*

Olivia Veit, Data on reported malaria cases data were collated from FOPH

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Availability of antimalarials for chemoprophylaxis

Product	Dosage	Schedule	Availability
Mefloquine	1 cp 250mg	1x/week	Everywhere
Atovaquone +proguanil	1cp 250/100mg	1x/d	
Doxycycline	1 cp 100mg	1x/d	
Primaquine	1 cp 15mg	2/d	US + endemic
Tafenoquine	1 cp 100mg	2/d x 3 days & 2/week	US, Brazil

Different national recommendations: why?

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Different ‘culture’ between Europeans and Americans ?

- Risk perception?
  - Real fear of malaria, but why not of drugs…?
- Industry pressure?
- Legal consequences?
- Other?

Different ‘culture’ between Europeans and Americans ?

- Risk perception?
  - No systematic difference
- Attitudes towards risk?
  - Precaution principle in EU vs evidence of harm in US

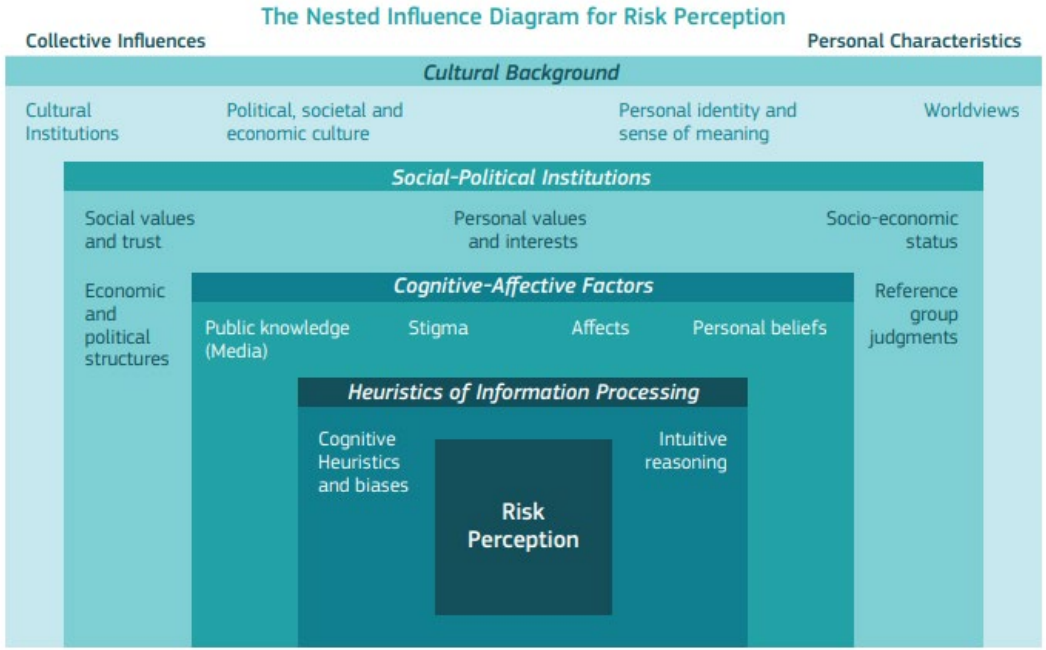

Figure 2. The multiple influences that interact to form risk perception (modified from Renn & Rohrmann, 2000b).

http://ec.europa.eu/science-environment-policy 2014

Different ‘culture’ between Europeans and Americans ?

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Different ‘culture’ between Europeans and Americans ?

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Chemoproprophylaxis or SBET or nothing for travellers to India: a small calculation…

- In 2017: 17 millions foreign tourists arrivals in India
- 17 million x 50$ = 850 millions $
- Attack rate of *Pf* in 2017 (UK): 4/1'000'000
- 64 cases (4x17)
- 13.3 millions $ per case of Pf malaria averted (850 milions/64)
- 1.8% CFR => ~1 death/year
- 850 millions $ per *Pf* malaria death averted

Where do we go from there?

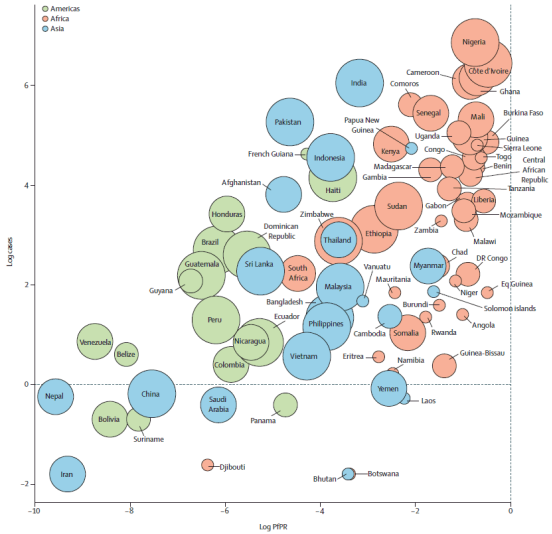
- Malaria summit organised by ISTM
  (US, Canada, UK, CH, Holland, SA, Japan, Indonesia, Thailand, Brazil)
  - Compare recommendations
  - Compare guidelines development methodology
  - Share experience
  - Way forward

Malaria summit: main conclusions

- Everybody is doing pretty much the same in his/her own corner…
- Different level of granulation for risk assessment (~detailed local information)
- Need to combine work forces to get more accurate travelers data across countries
- Need to develop an accurate and dynamic malaria risk map using travelers data from several countries

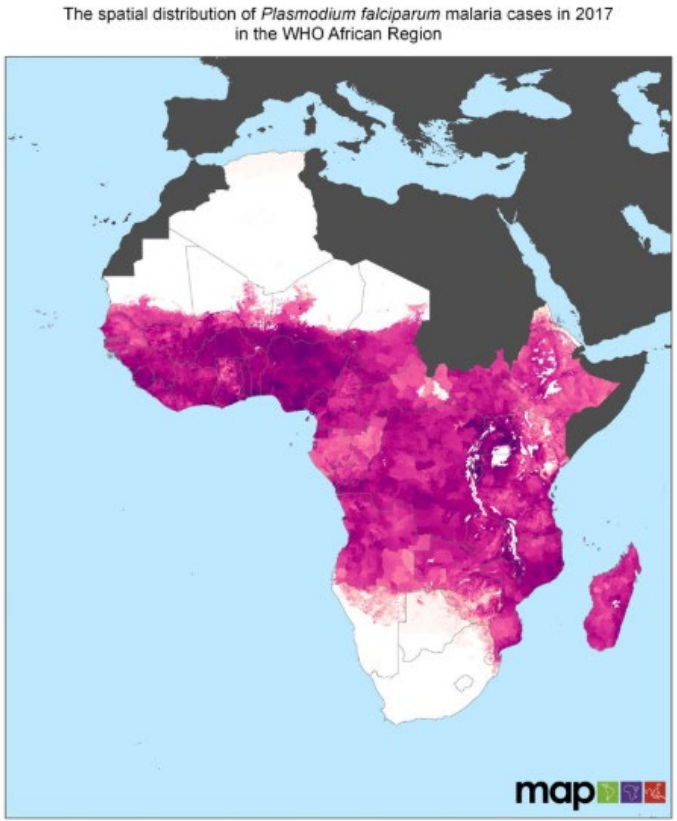
Malaria summit: main conclusions

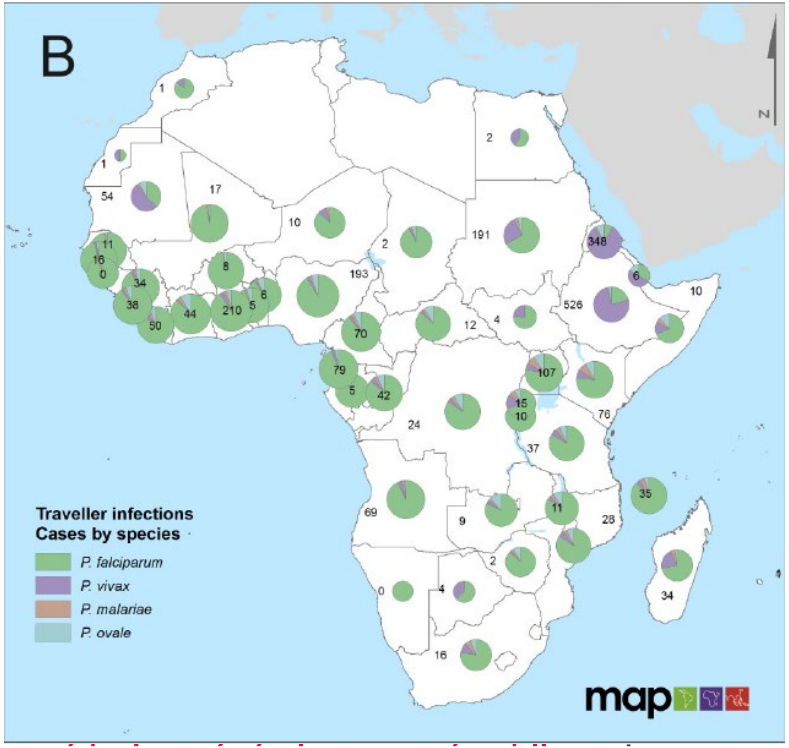
- Collaborate with the MAP Atlas Project to develop a malaria risk map that takes into account travelers and local data



map
malaria atlas project

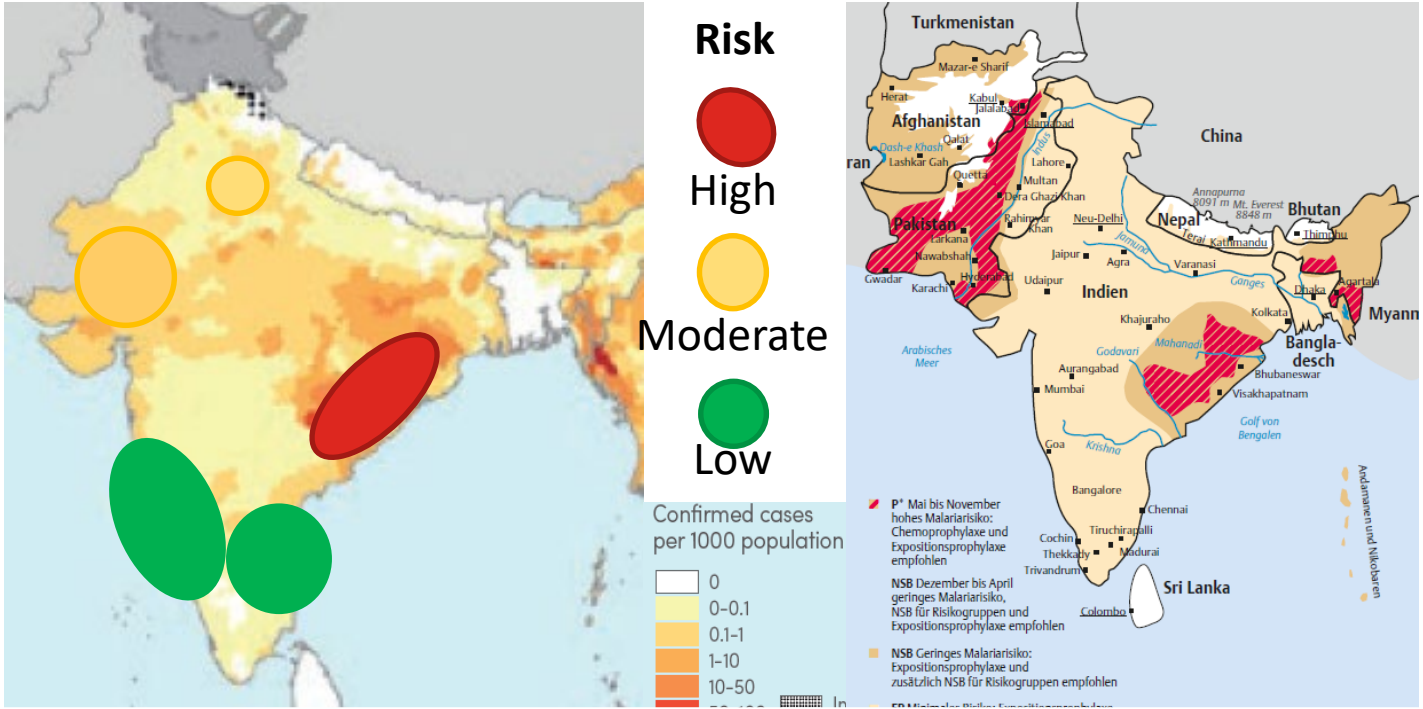
Malaria summit: main conclusions





Twohig et al, PLoS Negl trop Dis 2019

Malaria risk: integration of local and travellers data in a dynamic combined model that can be constantly updated



Way forward

- MAP researchers ready to embark
- National imported malaria data need to be collected on a standardised form
- Need to aggregate them, analyze and transfer them into a risk MAP
- Grading of risk => national recommendations
  + decision sharing with the traveler

Malaria: at risk groups

Increased risk of exposure

- Long-term travel
- VFR

+RDT

Increased risk of complications

- Pregnancy
- Aged person
- Co-morbidity (diabetis, C-V dis or immunosuppression)
- Young children

Consider prophylaxis or SBET (+RDT) or targetted preventive measures (decision sharing)