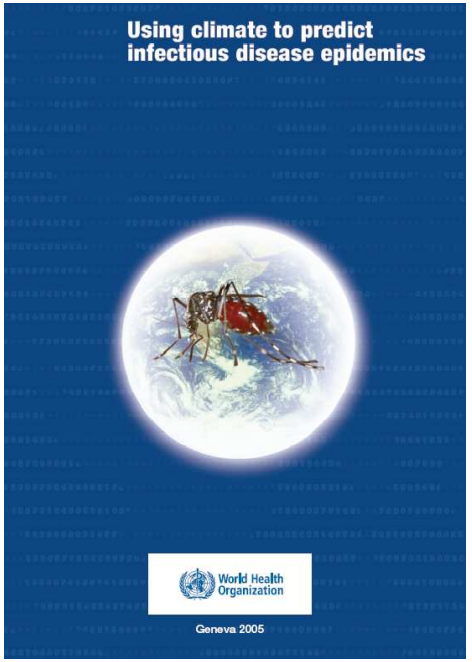
Climate and Health ……

Using Climate to Predict Infectious Disease Epidemics. WHO 2005

Diseases include:	Inter-annual variability:	Sensitivity to climate#:	Climate variables:
Influenza	* * * * *	* *	(<T)
Meningitis	* * * *	* * *	>T,<H (>R)
Leishmaniasis	* *	* * *	(>T,>R)
R.V. Fever	* * *	* * *	>R (<T)
Cholera	* * * * *	* * * * *	(>T)
Malaria	* * * * *	* * * * *	(>R,T,H)
Dengue	* * * *	* * *	(>R,T,H)



.. bacterial, viral and protozoan ..

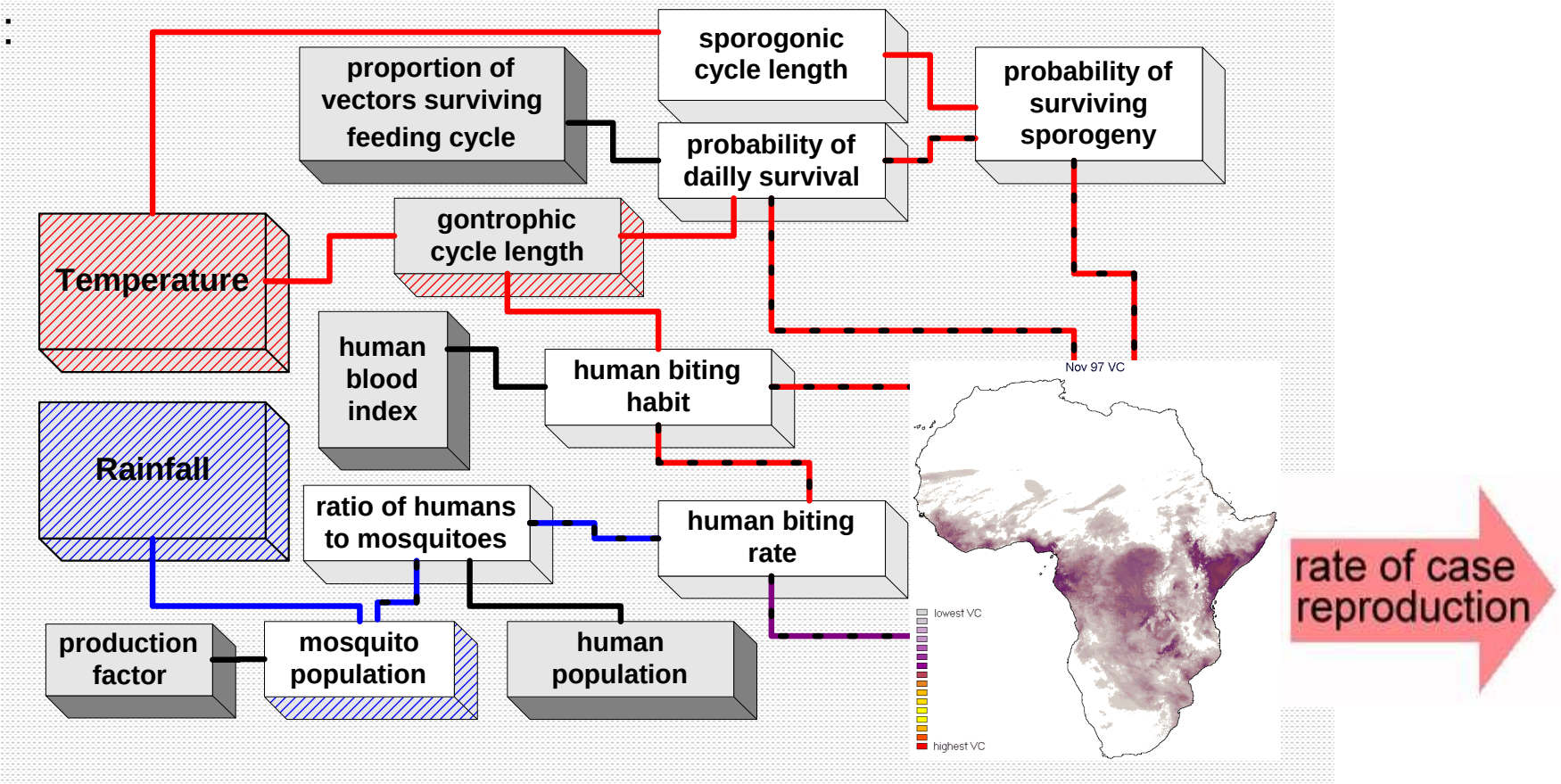
..other candidates, e.g some respiratory and pulmonary diseases, allergies, cancers, etc. not yet included….

… must remember socio economic factors very important…

Climate in Disease EWS (malaria examples)…

analogous to the environmental driving force under-pinning the transmission potential in an area

Complex model:



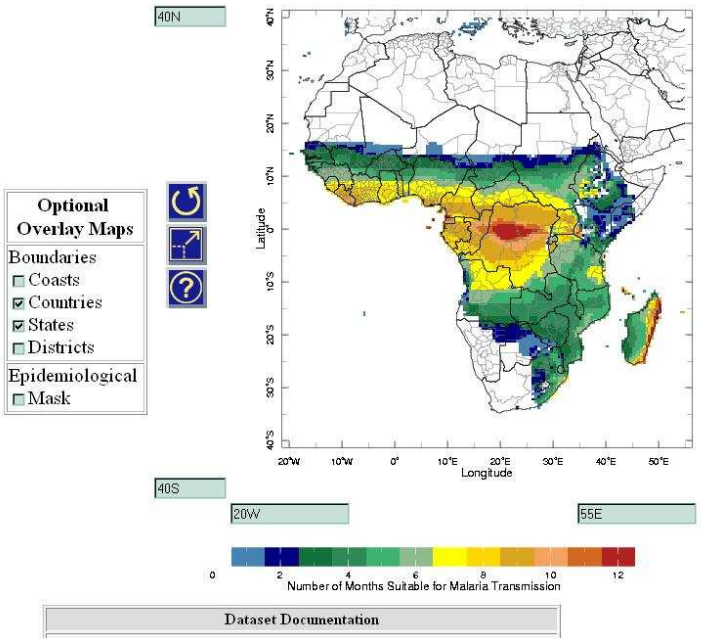
Climate and endemic (stable) malaria….

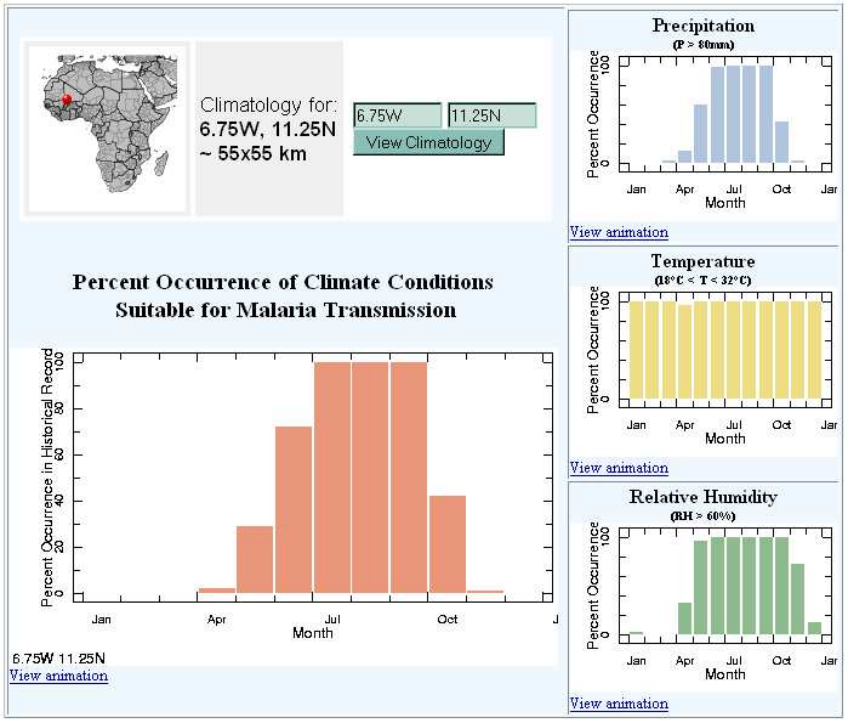
Unfortunately epidemiological data is very poor in sub-Saharan Africa.

In the absence of epidemiological data - climate data has been used to help model and map the distribution of climate sensitive disease.

Climate suitability for endemic malaria

= 18-32ºC + 80mm + RH>60%

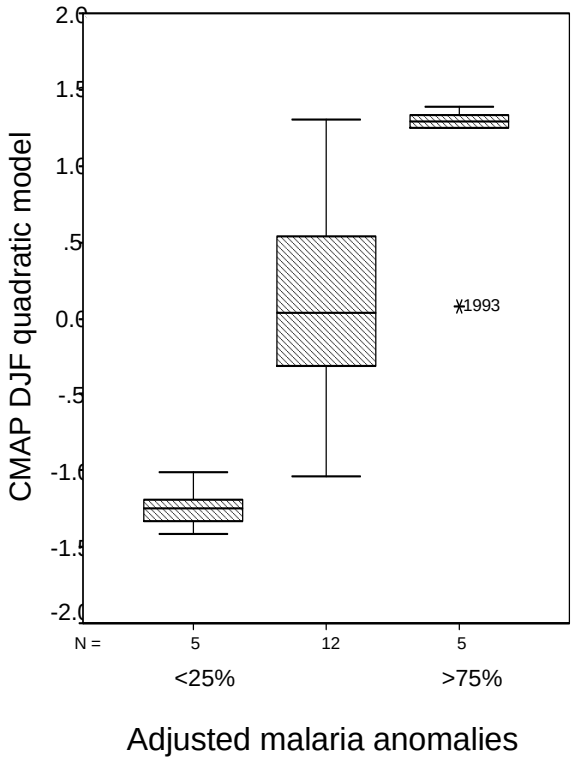




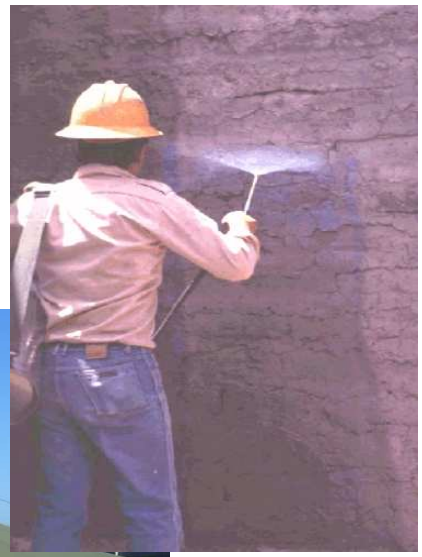
Temporal information useful for developing seasonal disease calendars for control planning purposes

Example in Botswana …

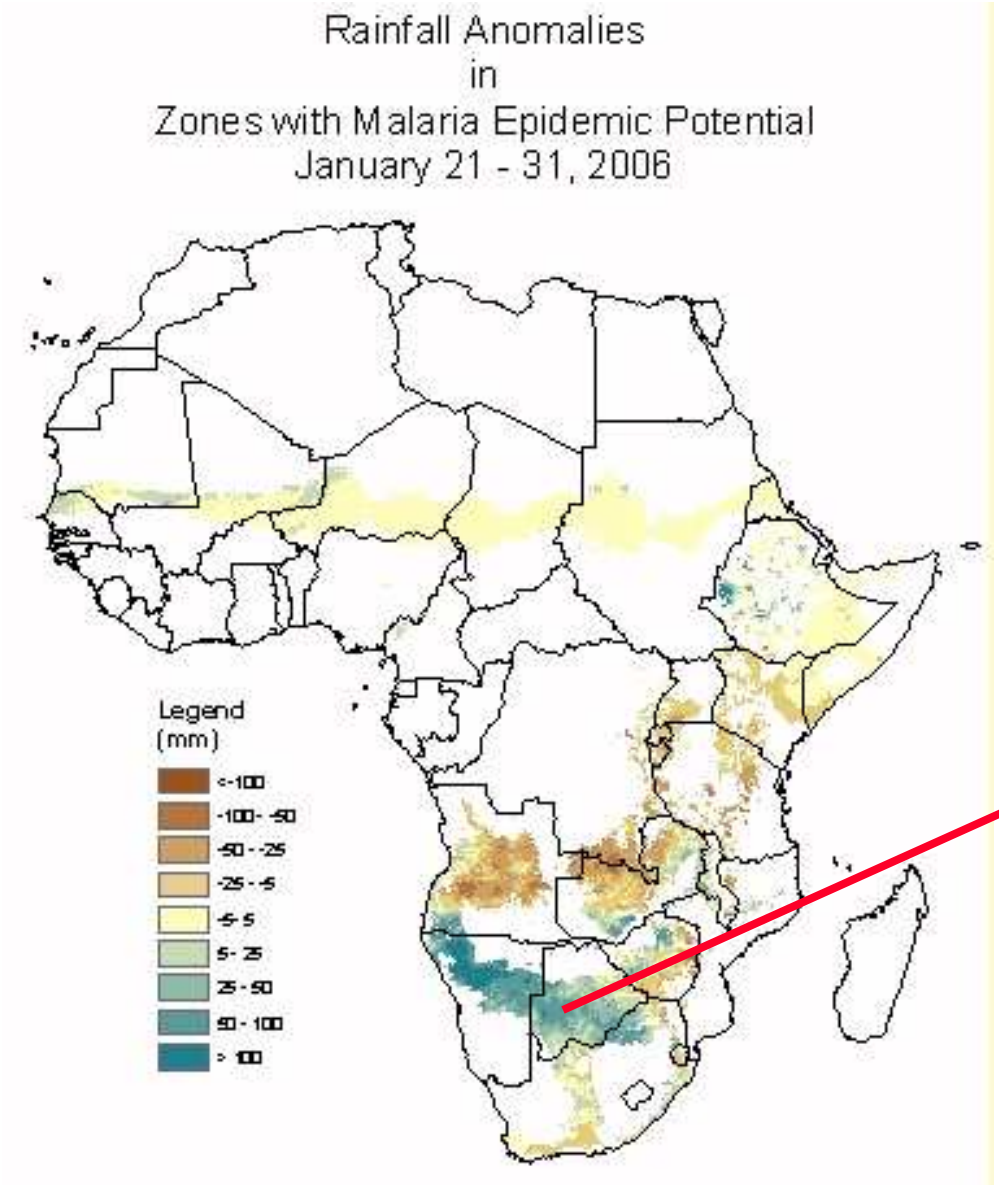
Simple model: increased rainfall and/or temperature = increased malaria



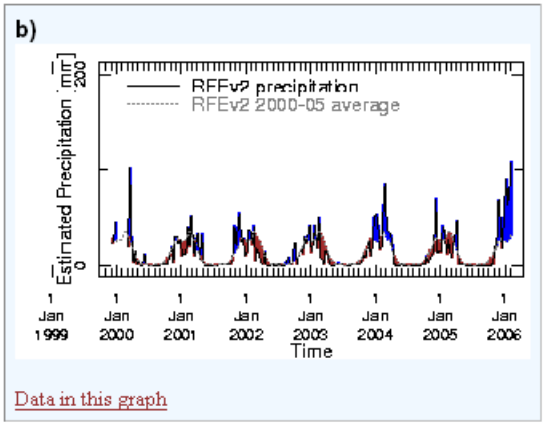
Adjusted malaria anomalies

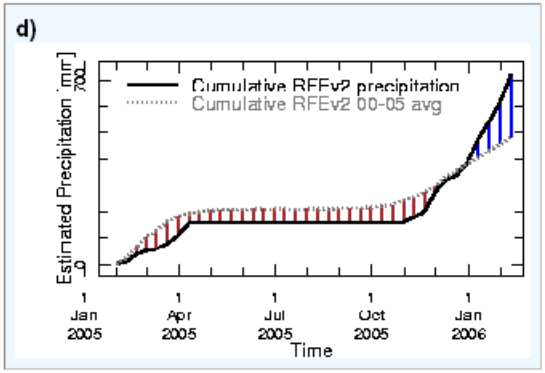


Climate and epidemic malaria ….



desert fringes … e.g. Botswana



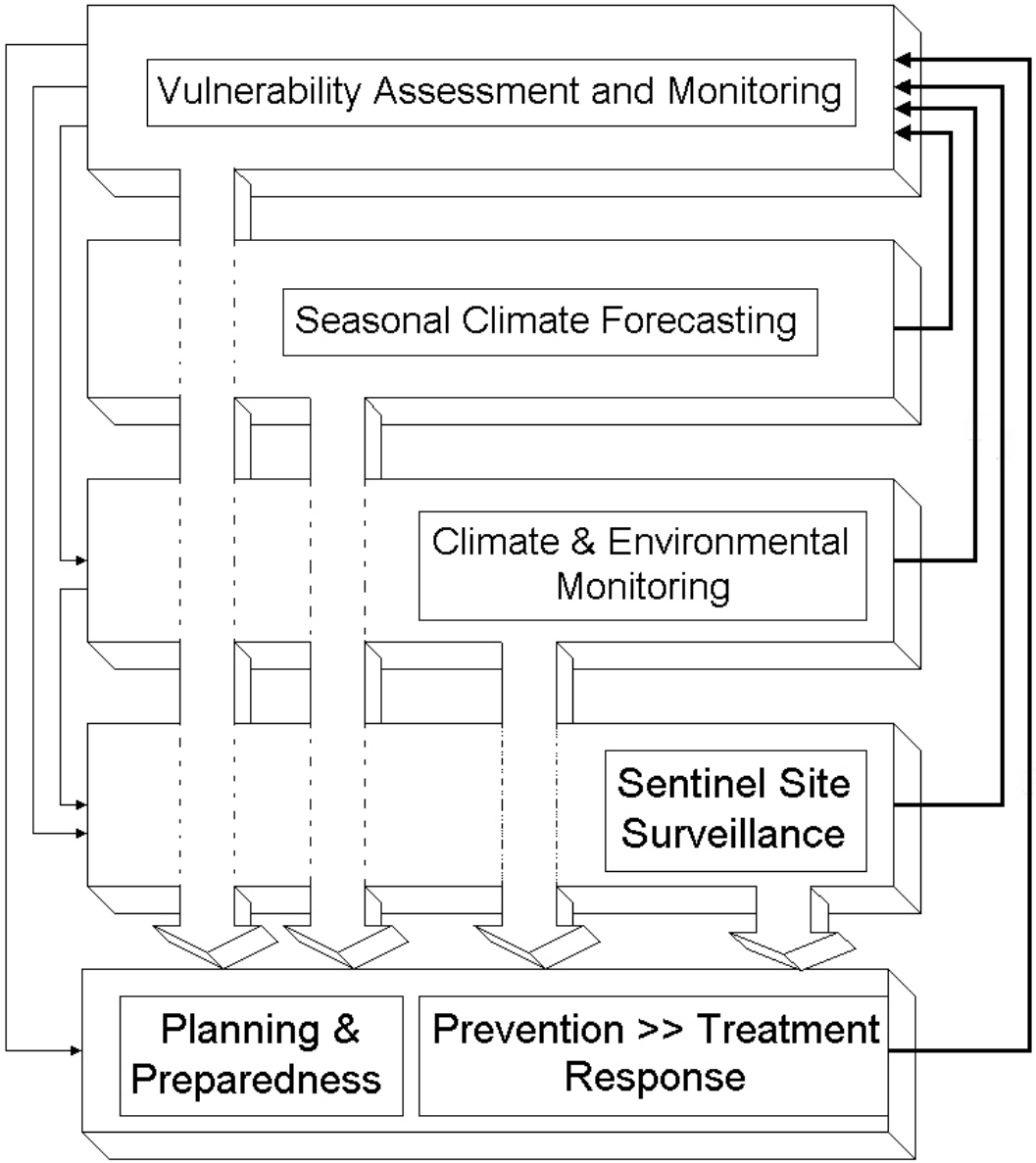


Cost effectiveness of interventions ..

In areas of epidemic or highly seasonal malaria transmission, the cost-effectiveness of certain interventions vary according to intensity of transmission, the timing of the intervention and level of coverage achieved.

Malaria control intervention - Hwange, Zimbabwe (Worrall et al 2003)	Cost per case prevented (US$)	Cost per case treated (US$)
Average year	1.07	4.93
Low transmission year (1993) spray round effective from January	108.04	4.93
High transmission year (1996) spray round effective from January	0.42	4.93
High transmission year (1996) spray round effective from October	0.19	4.93

MEWS development …. issues



Integration essential

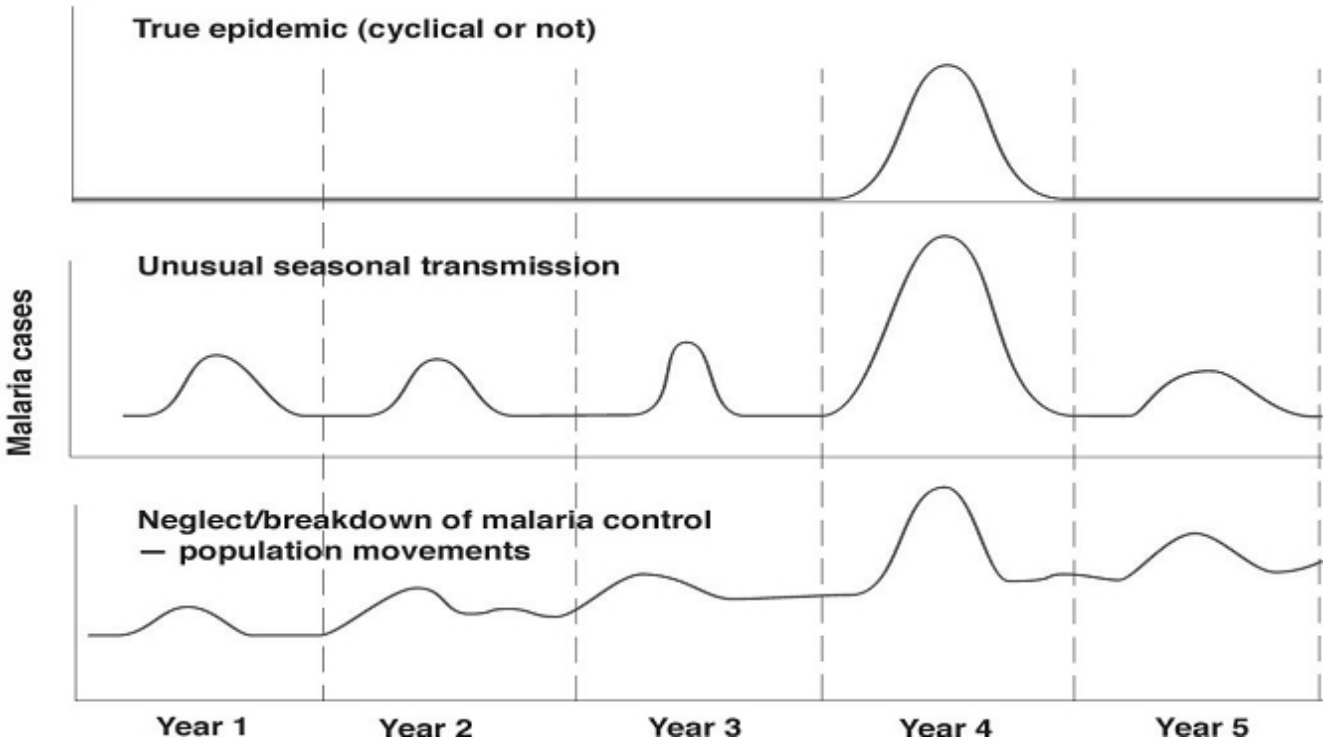
- Planning
- Early warning
- and Response

Feedback and refinement loops

Opportunities for inter-sectoral partnership and capacity building ..

What is an epidemic?

Classification and definition of major malaria epidemic types (WHO 2002).

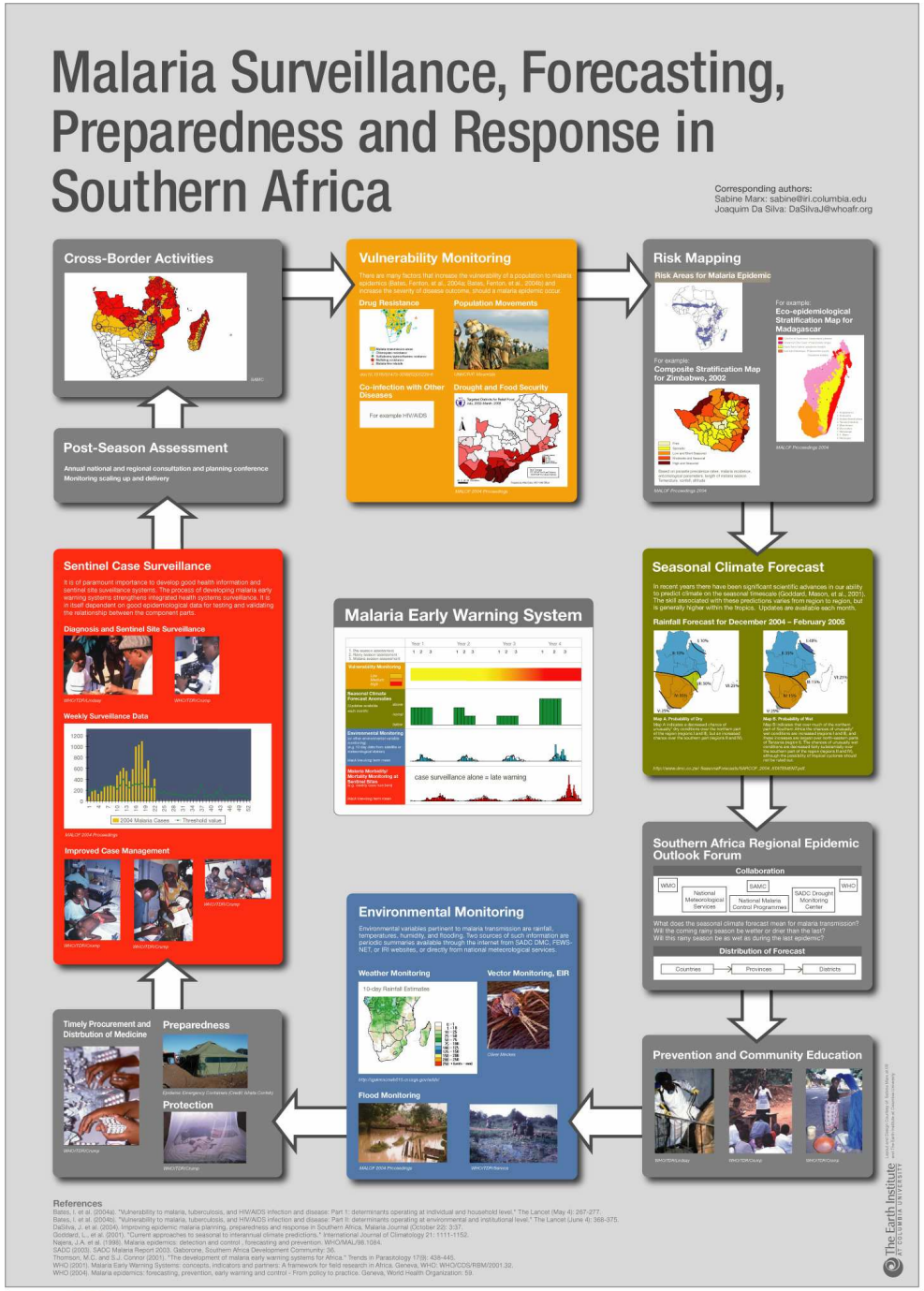


•The first (top) situation represents a “true epidemic,” i.e. an infrequent event occurring in areas where the disease does not normally occur. This type of epidemic is often associated with warm arid and semi-arid regions. This type of epidemic may be cyclical in nature.
•The second (middle) situation represents an unusually high peak in transmission in areas where malaria normally presents seasonally. This type of epidemic is often associated with hypoendemic or mesoendemic settings such as the highland fringes. These epidemics may also be cyclical in nature.
•The third (bottom) situation represents a “resurgent out-break” where neglect or breakdown in control allows malaria to attempt to return to its higher ‘pre-control’ level of endemicity. This third type of epidemic may be associated with more complex emergency situations involving political instability and displaced populations

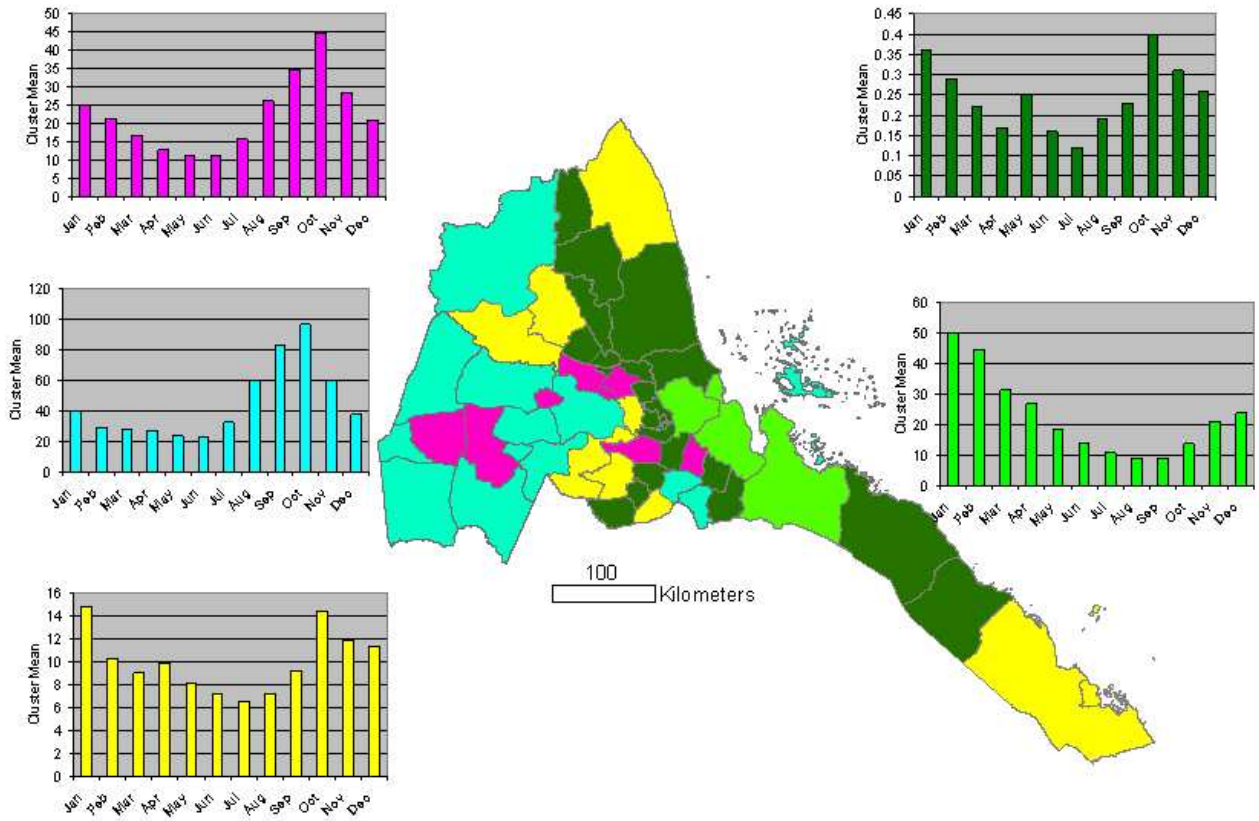
On rare occasions epidemics may be caused by accidental introduction of an exotic vector species

Southern African Regional Pre-Season Epidemic Malaria Outlook Forum, Harare, 2004 and 2005

Evidence for practical application within a decision making framework (DaSilva, et al. 2004)



Malaria early warning in Eritrea: a new methodology for stratification using health surveillance data.



The methodology permits subzobas to be grouped according to the intensity and seasonality of clinically confirmed malaria. Stratification is essential to the demarcation of epidemic prone districts and the development of malaria early warning systems.

Partners: Ministry of Health, Eritrea, Environmental Health Program, USAID