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Malaria Control

Clive Shiff, PhD

*“Malaria control depends on the presence of essential public health functions. Health services in tropical malarious countries have not yet developed a public health capacity adequate for the control of malaria. To control malaria under current conditions requires an international response, one that builds national public health capacities capable of fully supporting **local** initiatives.”*

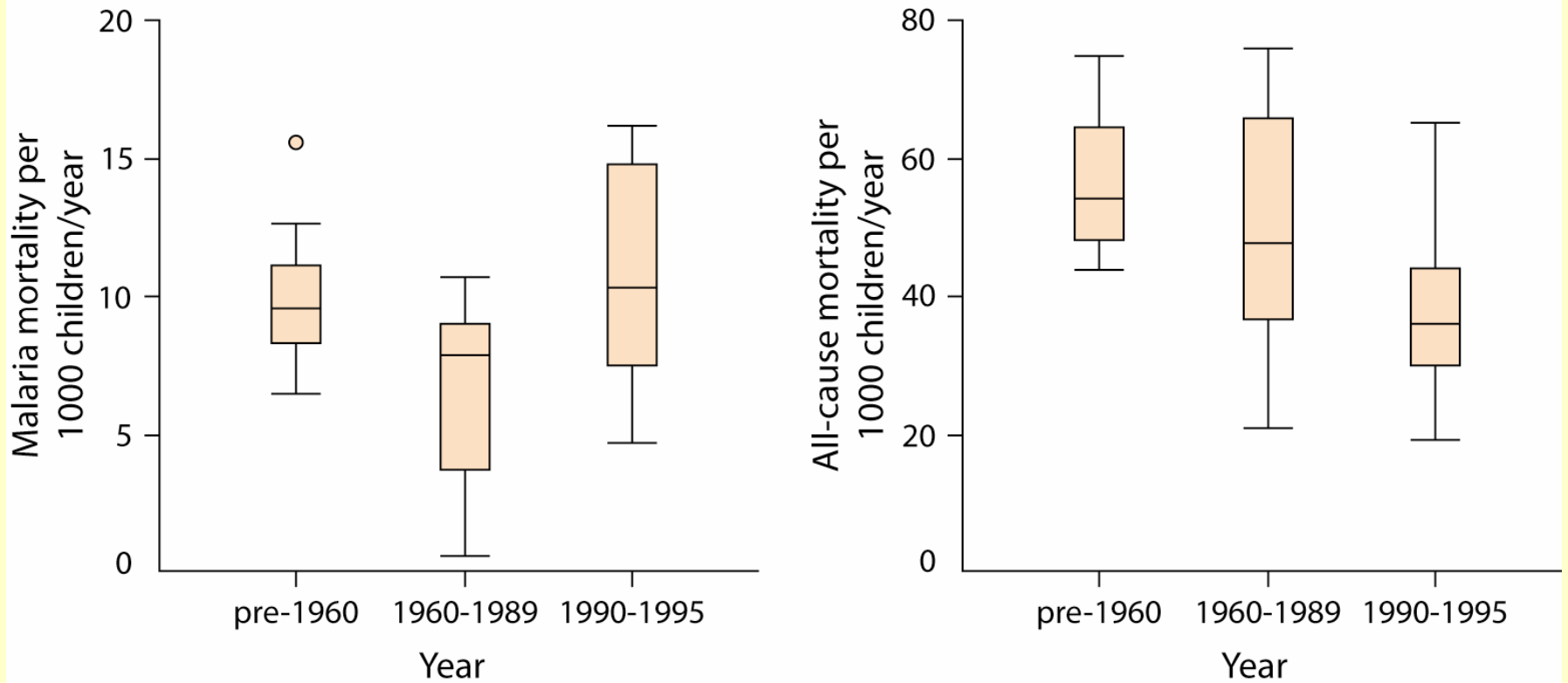
- Socrates Litsios: 2001: WHO. In “Malaria Control and the future of International Public Health”

What is Malaria Control?

Mortality Control....? If this is the emphasis then it will be based on treatment: Pros and Cons.....!

- What infrastructure is needed?
- Diagnostic Services? Are these necessary?
- Where will services be offered? Home? Clinic? Hospital?
- What strategy? Drug?

Malaria Specific and All-Cause Mortality Estimates per 1000 Children Aged 0-4 Years



Adapted by CTLT from *TRENDS in Parasitology*

Malaria Morbidity Control

- Accepts that mortality is not the only problem
- Serious economic and social burden is associated with malaria
- Strategies: Indoor spraying, insecticide-treated bed nets, larviciding, environmental management, prophylaxis, treatment during pregnancy, and improved housing and screening,
- Transmission Control?

Vector Control Objectives

- Reduce vector mosquito population
- Repel the vector mosquitoes
- Form a barrier between vector and potential host (personal protection)
- Reduce the lifespan of vector mosquitoes
- Reduce the lifespan of *potentially infected* vector mosquitoes

Eradication Strategy

- Geographical reconnaissance
- *Attack Phase*: Vector control until parasite rate is low.
- *Surveillance Phase*: Active case detection programs continue until parasites undetectable. ? Antigametocyte drugs
- *Maintenance Phase*: Passive case detection and effective treatment.

Malaria Control Strategy

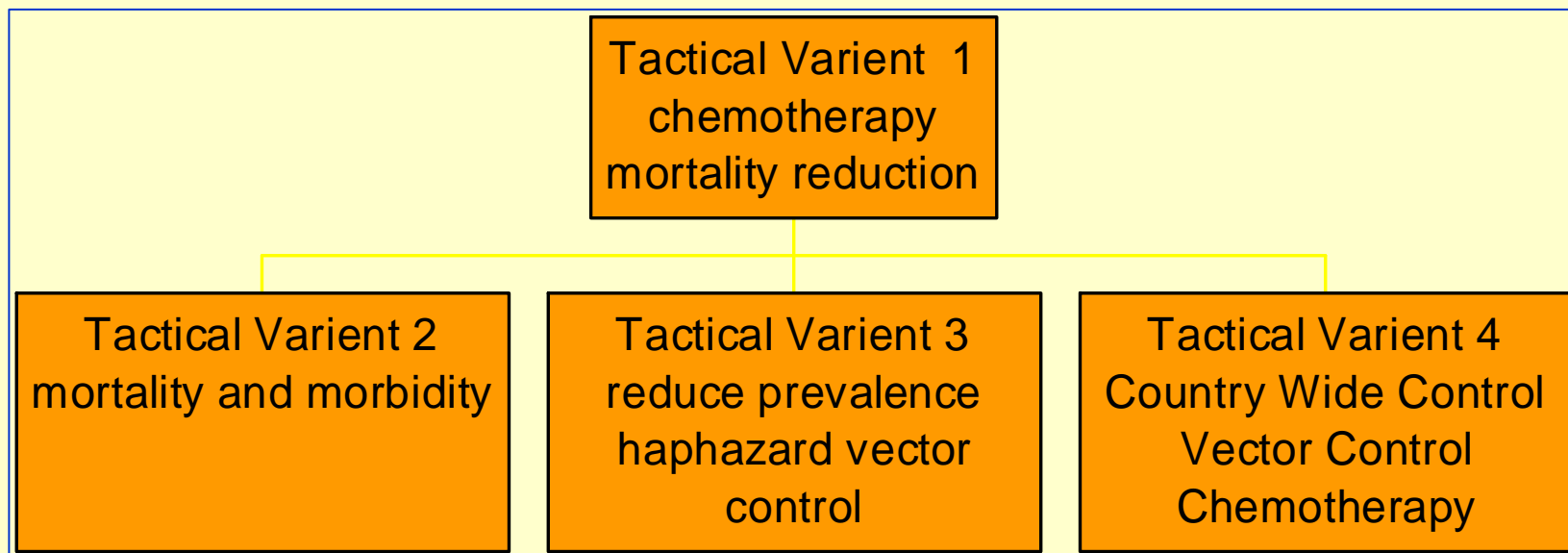
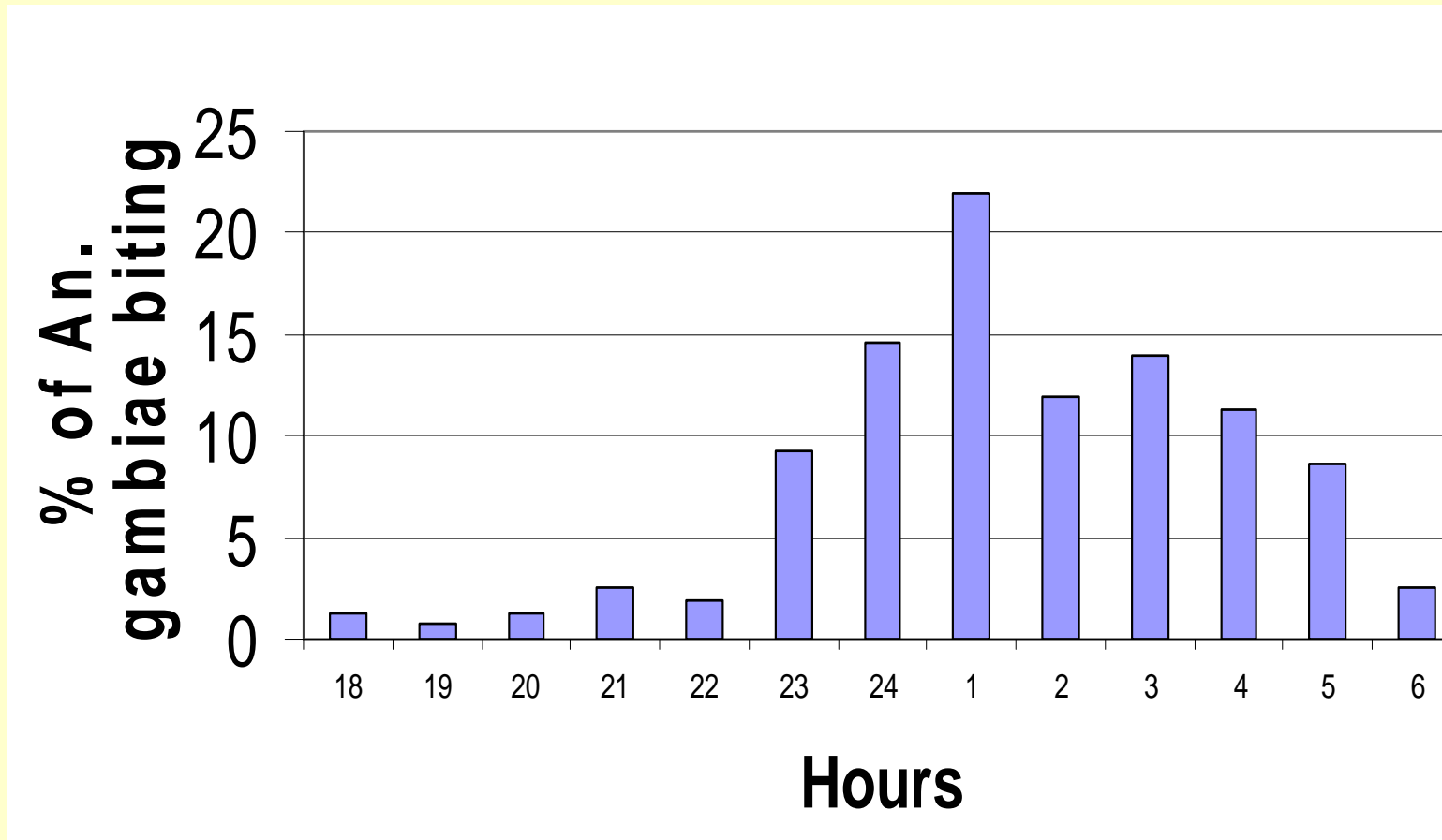




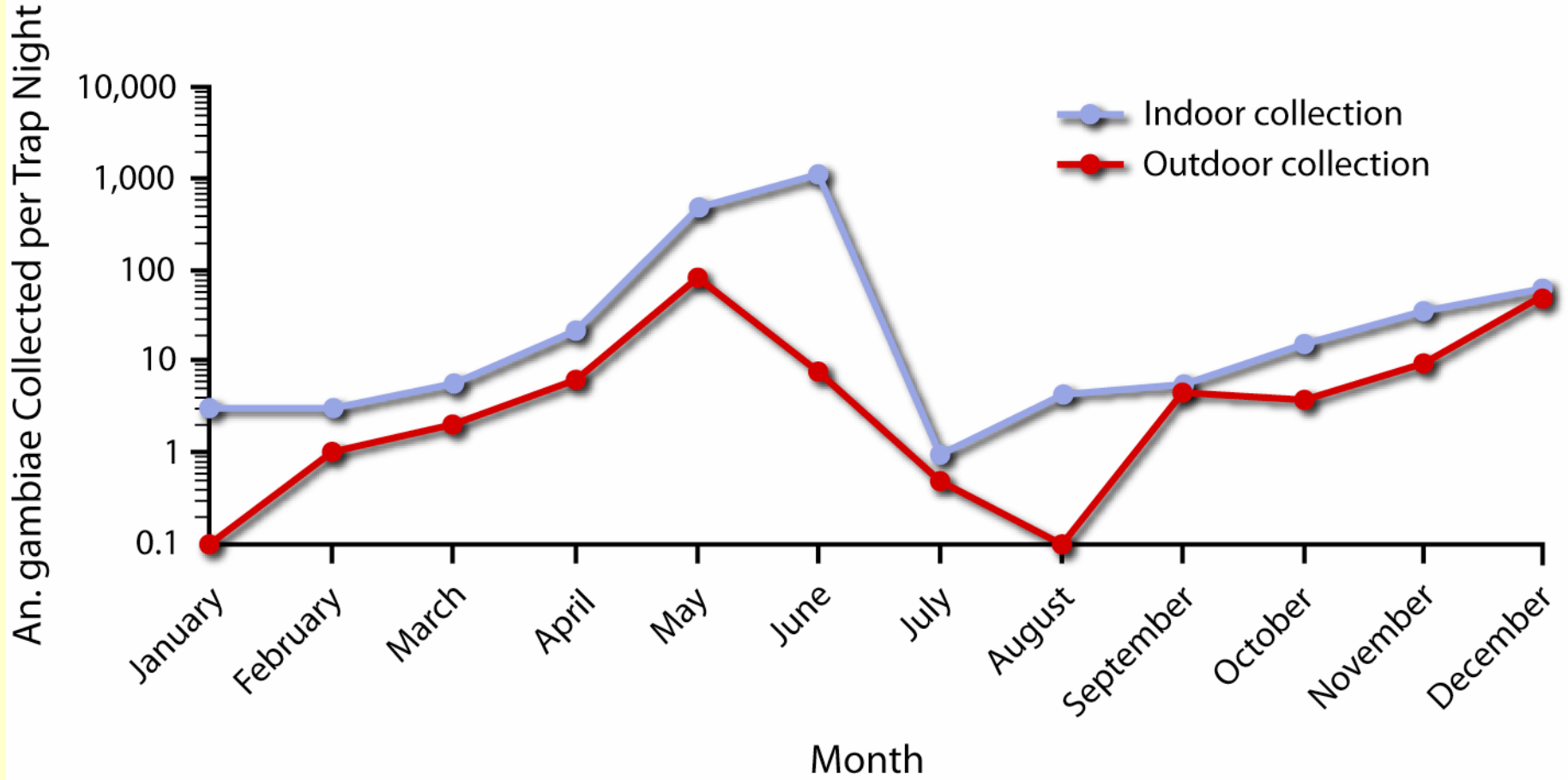
Photo: Clive Shiff

Small pools in the sunlight: breeding sites for *An. gambiae* and *An. arabiensis*

Nocturnal Periodicity



Matimbwa Village (An. gambiae) Matched Indoor/Outdoor Collections



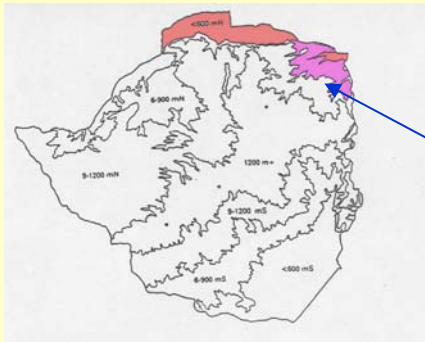
Adapted by CTLT from CDC

Zanzibar Malaria Control 1957-1968

- Control programmes commenced in 1958
- Vector Control commenced with dieldrin in 1959
- After 2 cycles parasite rate declined from 47% (Ingunja) to 1.0%. Pemba: 58%; declined to 1.7%
- Maintained until programme terminated in 1968. Resurgence occurred by 1973.

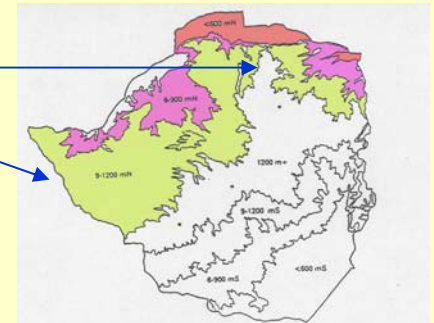
Seasonal Incursions of Malaria (and Vectors) in Zimbabwe

Over winter in low veld < 600 m



Spring, warmer conditions in higher ground: mosquitoes spread

Summer, rainy season, mosquitoes spread and malaria occurs in unstable conditions



Advantages of mosquito nets with insecticides

Hungry mosquitoes do not wait in the room, they are either killed or repelled after contact with the net.

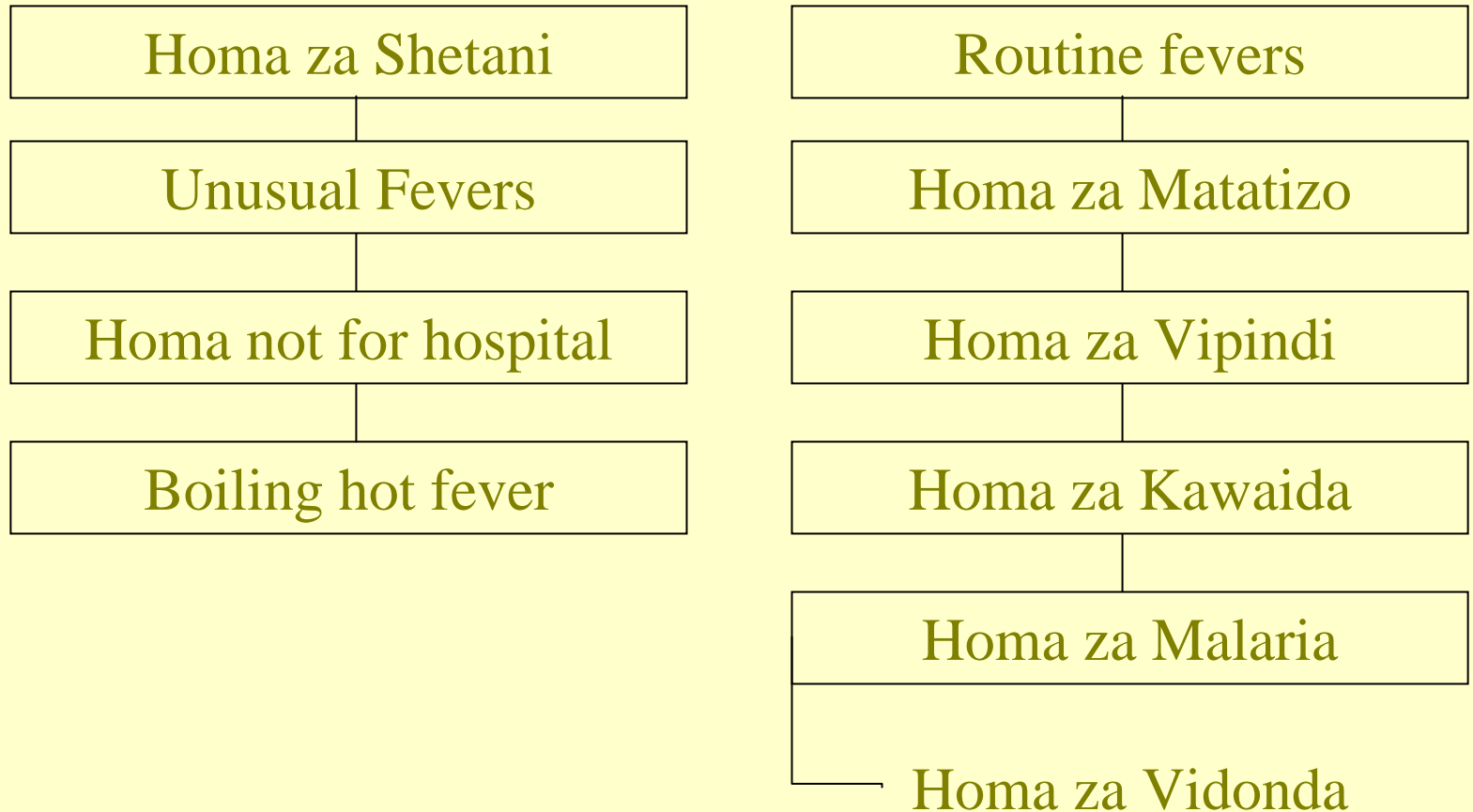
Mosquitoes die or escape after landing on the net.

Mosquitoes fail to find holes or other small opening to enter.

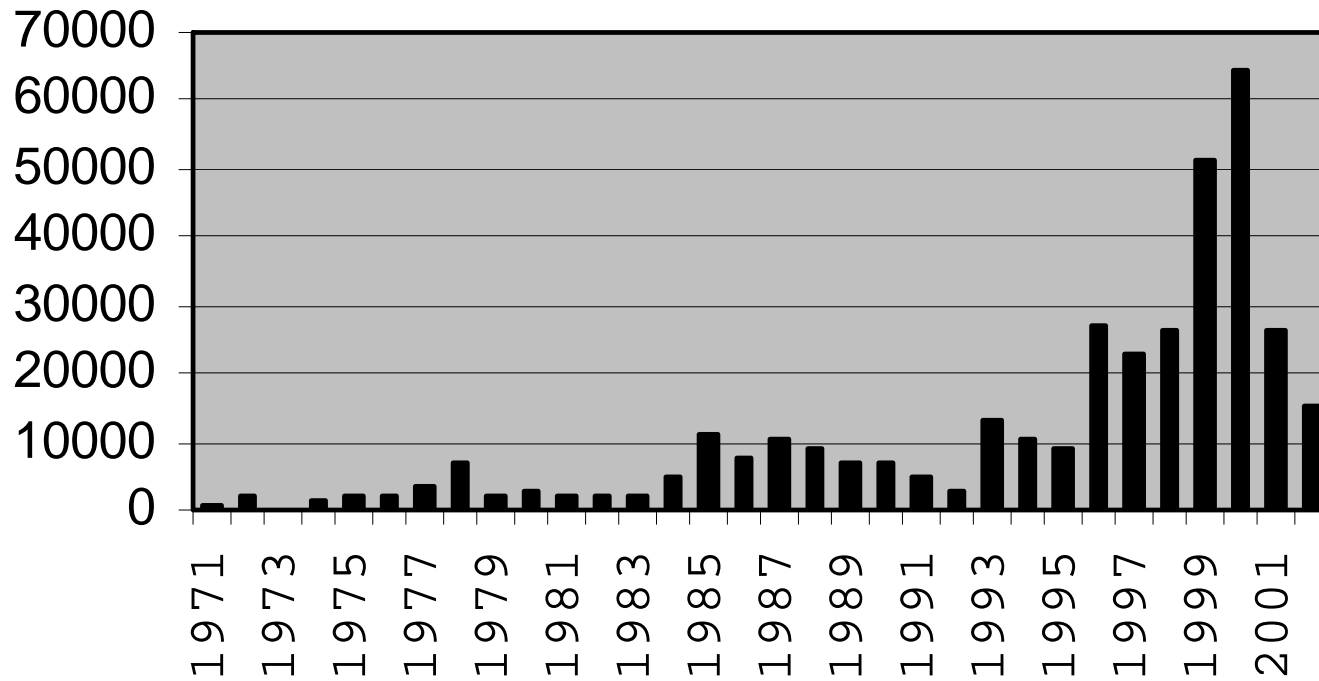
A person sleeping in the same room without a net also receives some protection



Fevers Called Homa



Malaria Cases – South Africa



Eco-Epidemiological Zones

- African savannah malaria: holoendemic or mesoendemic
- Fringe malaria (Africa), desert or highland unstable, seasonal or periodic
- Global plains and valleys: various vectors, various breeding sites
- Forest related malaria
- Urban malaria
- War and refugee malaria

Urban Malaria Control

- Mapping to identify mosquito breeding sites
- Aerial photography to determine problem areas
- Identification of breeding sites
- Environmental management, drainage and application of bye-laws

Integrated VECTOR Management...?

- A new term that is appearing to “integrate” into malaria control
- Appears to follow “integrated pest management BUT..?”
 - There are no parasites or predators to attack mosquito populations.
 - The concept is vague and there are few scientific data
 - Techniques include habitat modification to reduce mosquito breeding... again little evidence against most vector species
 - Sounds compatible with ecological principles, and is supported by USAID and WHO. But how...?

Integrated Vector Management

- Reduction of breeding sites?
- Draining swamps and flooded areas
- Use of fish to eat mosquito larvae
- Grass cutting and detritus removal
- Peridomestic source removal (spade work!)
- Problem of nuisance mosquitoes