



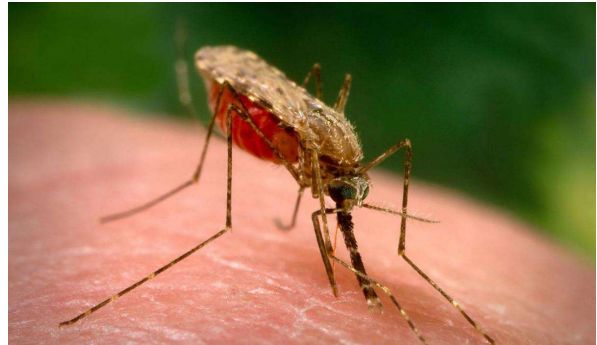
# *Anopheles*

## Prevention and control

Alireza Sanei-Dehkordi

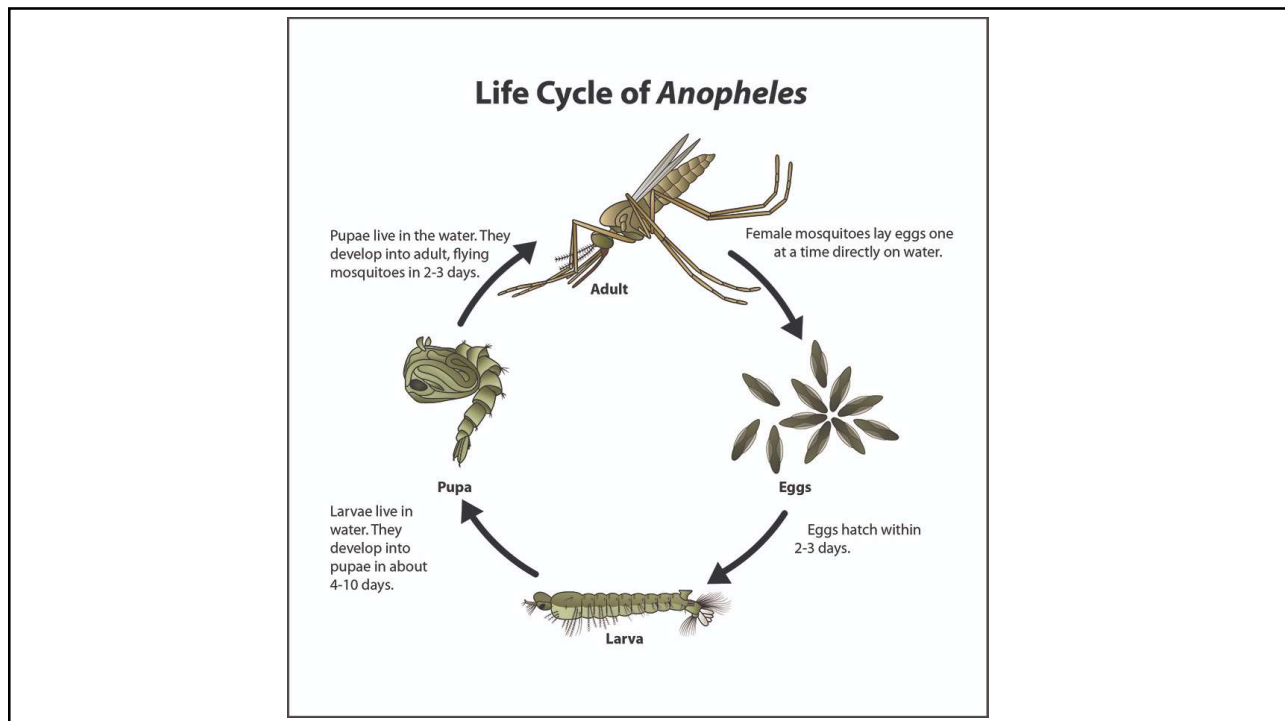
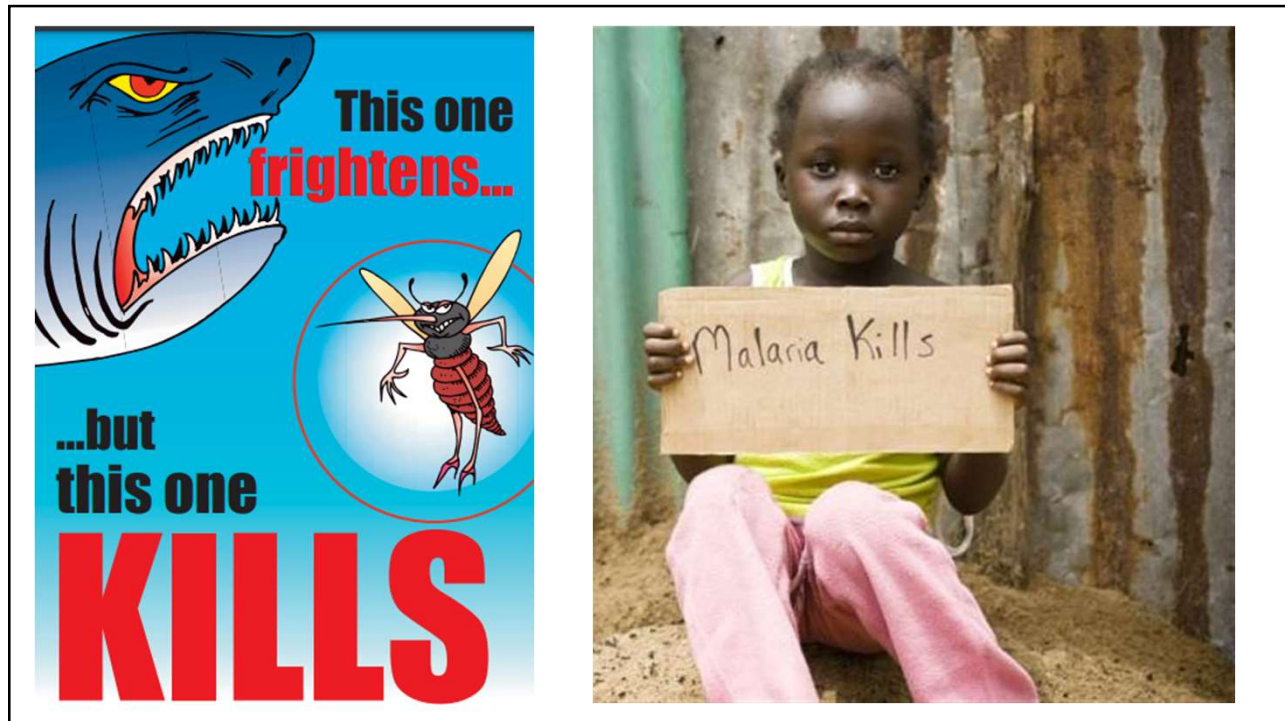
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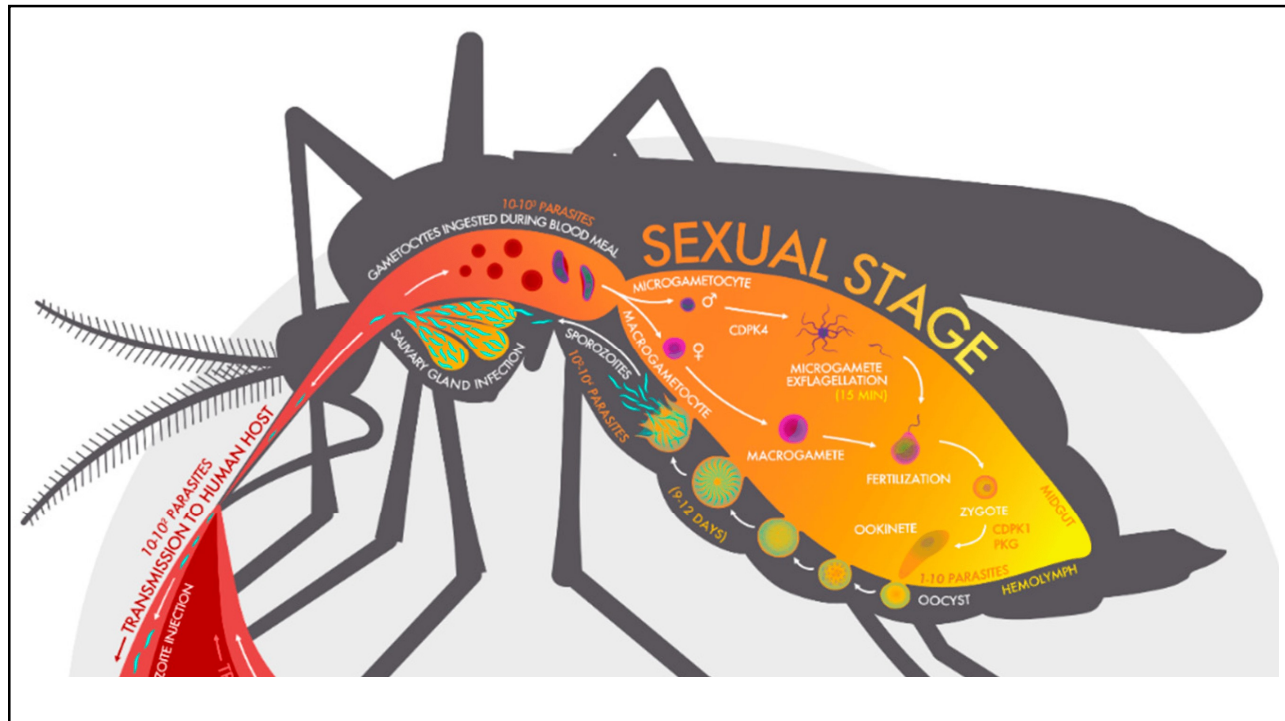
2023



- ✓ Malaria is an infectious disease caused by the parasite *Plasmodium* and transmitted by female *Anopheles* mosquitoes
- ✓ There are approximately 530 *Anopheles* species,
- ✓ only 30–40 transmit malaria in nature.
- ✓ Only females can blood-feeding
- ✓ Bite people and animals, usually late in the evening or at night.







## Insecticidal Nets (INs)



## Long-lasting insecticidal nets (LLINs)



Recommended for large-scale deployment

## Pyrethroid-only long-lasting insecticidal nets (LLINs)

Should be deployed for the prevention and control of malaria in children and adults living in areas with ongoing malaria transmission



## Pyrethroid-PBO ITNs

Instead of pyrethroid-only LLINs can be deployed for the prevention and control of malaria in children and adults in areas with ongoing malaria transmission where the principal malaria vector(s) exhibit pyrethroid resistance



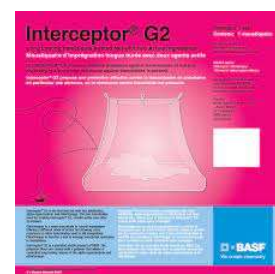
**OlysetPlus<sup>+</sup>**

The Next-Generation Net  
with Added Protection

Well Received by  
RBM Partners

## Pyrethroid-chlorfenapyr ITNs

Should be deployed instead of pyrethroid-only LLINs for prevention of malaria in adults and children in areas with pyrethroid resistance.



## Pyrethroid-pyriproxyfen ITNs

Pyrethroid-pyriproxyfen ITNs can be deployed instead of pyrethroid-only LLINs for the prevention of malaria in adults and children in areas with pyrethroid resistance.



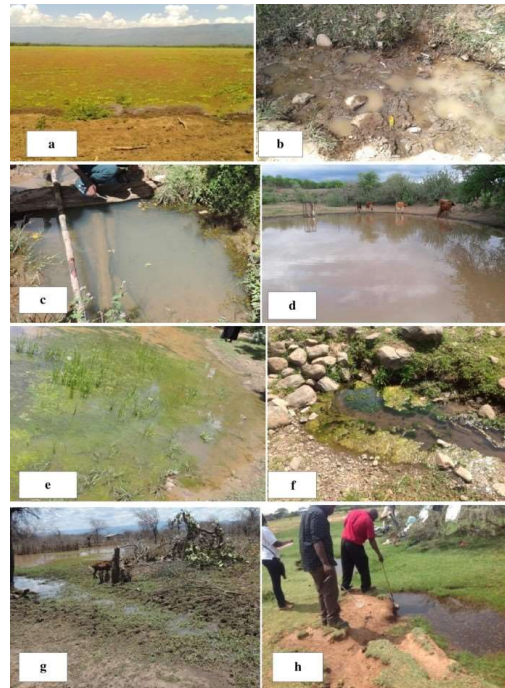
## Indoor residual spraying

IRS should be deployed for the prevention and control of malaria in children and adults living in areas with ongoing malaria transmission.



## Larval habitat modification and/or larval habitat manipulation

No recommendation can be made because the evidence on the effectiveness of a specific larval habitat modification and/or larval habitat manipulation intervention for the prevention and control of malaria was deemed to be insufficient.



## BIOLOGICAL CONTROL

### Larvivororous fish

No recommendation can be made because no evidence on the effectiveness of larvivororous fish for the prevention and control of malaria was identified



## Topical repellents

The deployment of topical repellents in areas with ongoing malaria transmission is not recommended if the aim is to prevent and control malaria at the community level.



## Spatial/Airborne repellents

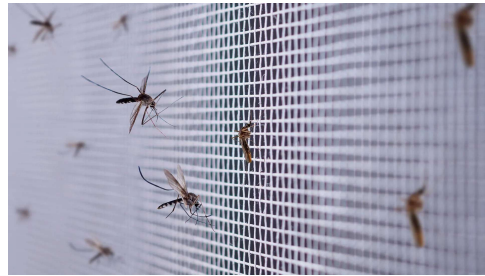
No recommendation can be made because the evidence on the effectiveness of spatial/airborne repellents for the prevention and control of malaria was deemed to be insufficient.





## House screening

Screening of residential houses can be used for the prevention and control of malaria in children and adults in areas with ongoing malaria transmission



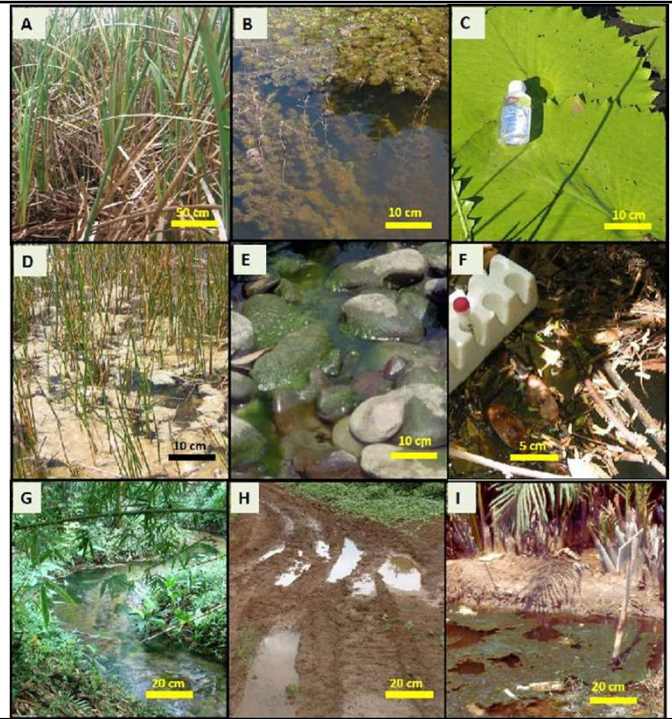
## Larviciding

Insecticides can be regularly applied to water bodies for the prevention and control of malaria in children and adults as a supplementary intervention to ITNs or IRS in areas with ongoing malaria transmission where aquatic habitats are few, fixed and findable.



## Larval habitat modification and/or larval habitat manipulation

No recommendation can be made because the evidence on the effectiveness of a specific larval habitat modification and/or larval habitat manipulation intervention for the prevention and control of malaria was deemed to be insufficient.



## Mosquito's pathogens

**1- Viruses** : Cytoplasmic Polyhedrosis

Viruses

**2- Protozoans** : *Bracheola algerae* &

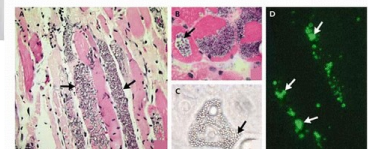
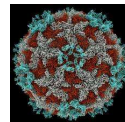
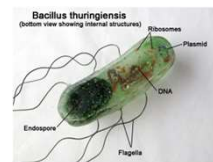
*Vavraia culicis*

**3- Fungi**: *Coelomomyces*, *Lagenidium* and *Culicinomyces*

**4- Parasitic nematodes** : *Romanermis culicivorax*

**5- Bacteria**

*Bacillus thuringiensis*, *Bacillus sphaericus*



# Genetic Control

More killing power

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The "sterile insect technique" has been used against disease-carriers since the 1950s but genetically engineered "autocidal" animals should be even more effective

## Sterile insect technique

ZAP MALE FLIES WITH RADIATION TO MAKE THEM STERILE



RELEASE MILLIONS OF STERILE MALES



MALES MATE WITH WILD FEMALES



BUT EGGS DON'T HATCH



## Autocidal technique

ADD GENE TO MOSQUITO THAT KILLS OR DISABLES ADULT FEMALES



RELEASED MALES MATE WITH WILD FEMALES



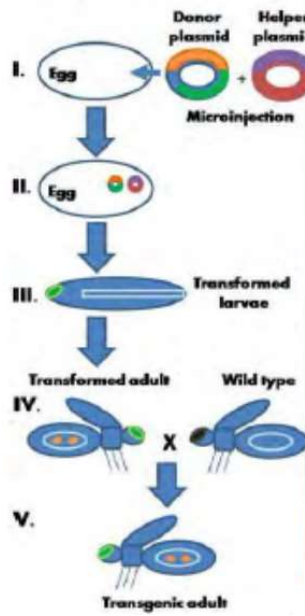
EGGS HATCH AS NORMAL AND LARVAE DEVELOP



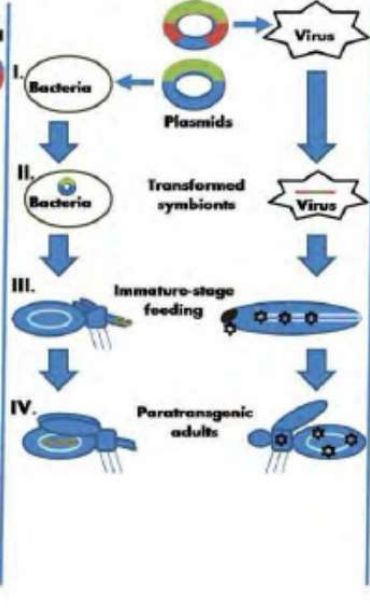
MALE OFFSPRING DEVELOP NORMALLY AND PASS ON GENE TO MORE WILD MOSQUITOES. FEMALES DIE



## A. Transgenesis



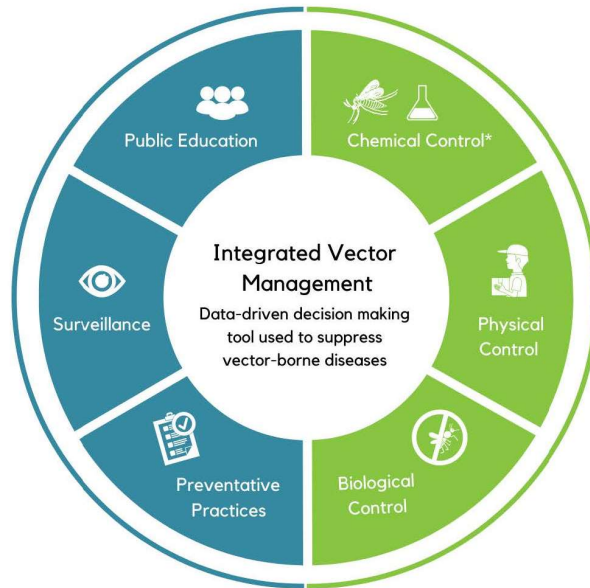
## B. Paratransgenesis



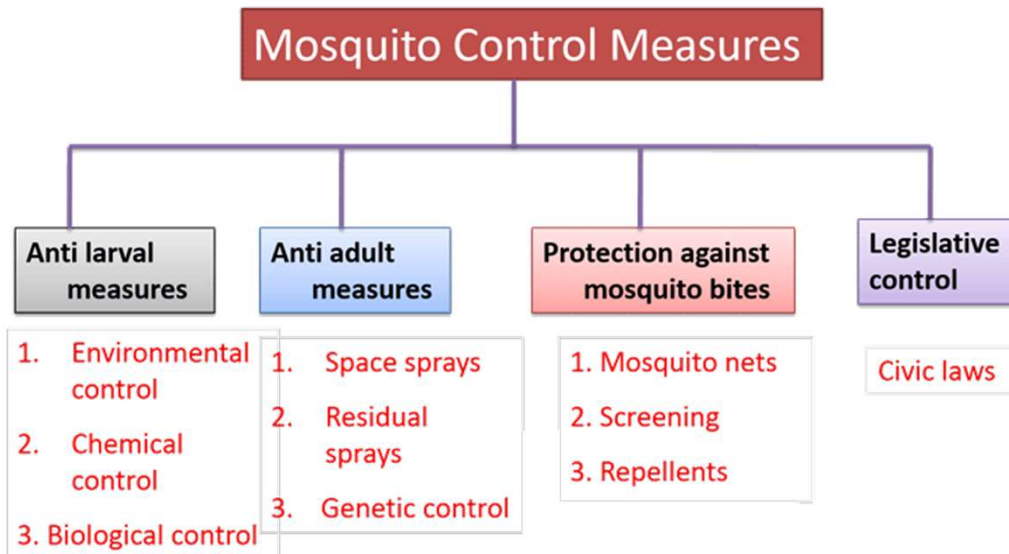
# Trap



# Integrated vector management (IVM)



## Integrated vector control approach for mosquito



# Monitoring and Evaluation



THANKS FOR YOUR ATTENTION