A HEALTHY FUTURE FOR ALL

Side Event: Safe and Effective Alternatives to the Use of DDT in Malaria Vector Control

Biovision Foundation, PAN International and IPEN invite you to a side event on alternative methods to the use of DDT in Malaria Vector Control.

30 APRIL 2013, 1.15 – 2.45 PM
Centre International de Conférences Genève (CICG), Room 4, Geneva

Chair: Fernando Bejarano, PAN Mexico, IPEN

- **The Concept of Integrated Vector Management (IVM)**
  (Charles Mbogo, icipe, KEMRI, Kenya)
- **Environmental Strategies and Community Mobilization to Fight Malaria in Senegal**
  (Abou Thiam, PAN Africa)
- **Malaria Management Models**
  (Michael Brander, Biovision Foundation, Switzerland)
- **The Importance of Funding for Alternative Approaches**
  (Carina Weber, PAN Germany)

Snacks and drinks are provided

Organized by:

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IPEN
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PAN
Pesticide Action Network International

Side Event – Alternatives to DDT
30 April 2013

13.15 – 13.25	Introduction by the Chair Fernando Bejarano, PAN Mexico, IPEN	
13.25 – 13.35	Charles Mbogo, icipe/KEMRI, Kenya	The Concept of Integrated Vector Managment (IVM)
13.35 – 13.45	Abou Thiam, PAN Africa, Senegal	Envirionmental Stategies and Community Mobilization to Fight Malaria in Senegal
13.45 – 13.55	Michael Brander, Biovision Foundation, Switzerland	Malaria Management Models
13.55 – 14.00	Carina Weber, PAN Germany	The Importance of Funding for Alternative Approaches
14.00 – 14.45	Questions and remarks from the audience	

Alternative methods, approaches, and tools for Malaria Control

Charles Mbogo, PhD

Kenya Medical Research Institute

wellcome trust

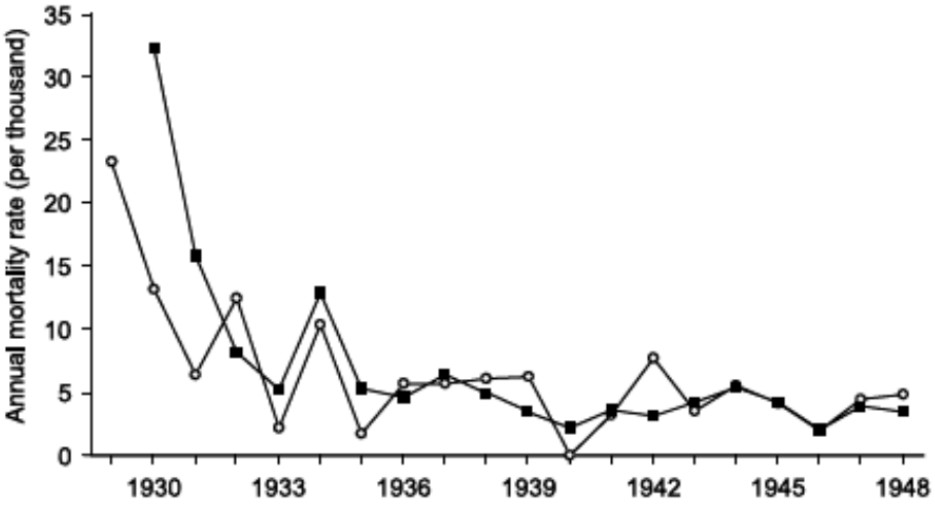
Vector-borne diseases – a major public health problem

- Vector-borne diseases account for a very significant part of total morbidity due to infectious diseases with malaria accounting to over 20%
- Vector borne diseases such as malaria, dengue, filariasis and trypanosomiasis is a serious impediment to development in many tropical countries
- Vector control is a key component in managing vector-borne diseases

Historical perspective:
1929-1947 – Zambia Roan Valley Copper Mines

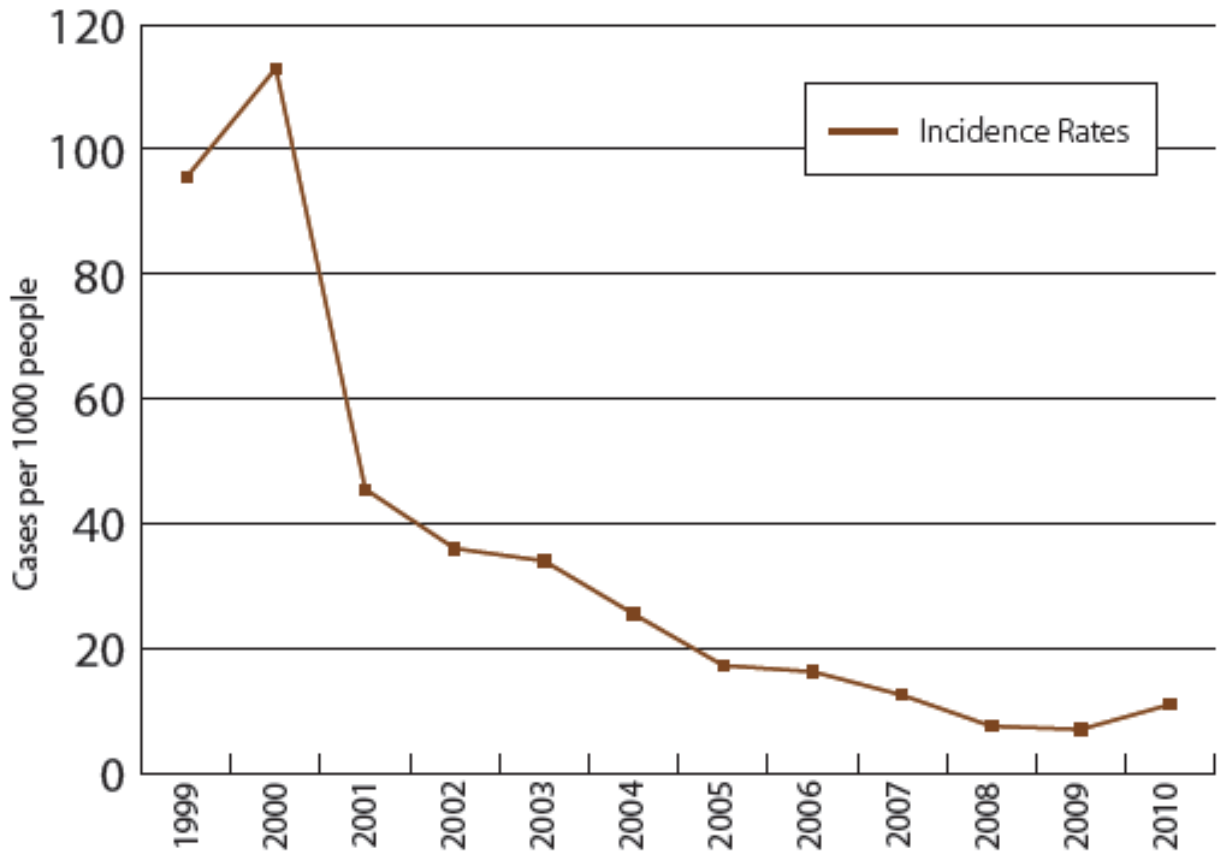
- Sustained Surveillance: Human cases, larvae and adult mosquitoes
- Larviciding
- Water Management
- Vegetation Clearance
- Drainage
- House Screening
- Quinine Treatment
- Bednets

What was the outcome?



- Malaria morbidity reduced by by 70-95% within 3-5 yrs.
- The estimated costs per death and malaria attack averted were US$858 and US$ 22.20
- Maintenance Costs $22-$99 disability adjusted life year (DALY) averted

Malaria incidence rates at Konkola copper mines, Zambia, 1999-2010



IRS is integrated with larval control through active community participation. Larval control involves draining mosquito breeding habitats and larviciding using temephos.

Currently …

Use of Long lasting insecticide Treated Nets (LLINs)

Uses pyrethroids

Use of Indoor Residue Spray (IRS)

Uses pyrethroids, DDT, Carbamate, organophosphates

ITNs & IRS are the primary vector control tools due to their high effectiveness and scalability

LLINs and IRS challenged by insecticide resistance, shifts in vectors …

What does this mean….

The need for use of non-chemical approaches…

- Insecticide resistance has become a major issue in malaria control worldwide
- Outdoor transmission has become increasingly important
- Safe guard the environment
- Need new interventions that can reduce reliance on chemicals and are effective on indoor & outdoor transmission

Available Alternative non-chemical strategies

- **Environmental management**
  - source reduction
  - Habitat manipulation
  - Zoopophylaxis
  - Waste management
- **Mechanical**
  - House improvement – Screening,
  - Removal trapping
  - Polystyrene beads
  - House screening
- **Microbial larvicides**
  - Bti & Bs
- **Biological control e.g.**, fish
- **Botanicals e.g., neem oil**
- **Others (**GMM**,** Sterile insect technique (SIT),Fungi and viruses, Trapping methods**).**

Adaptive integrated vector malaria control in urban Malindi, Kenya

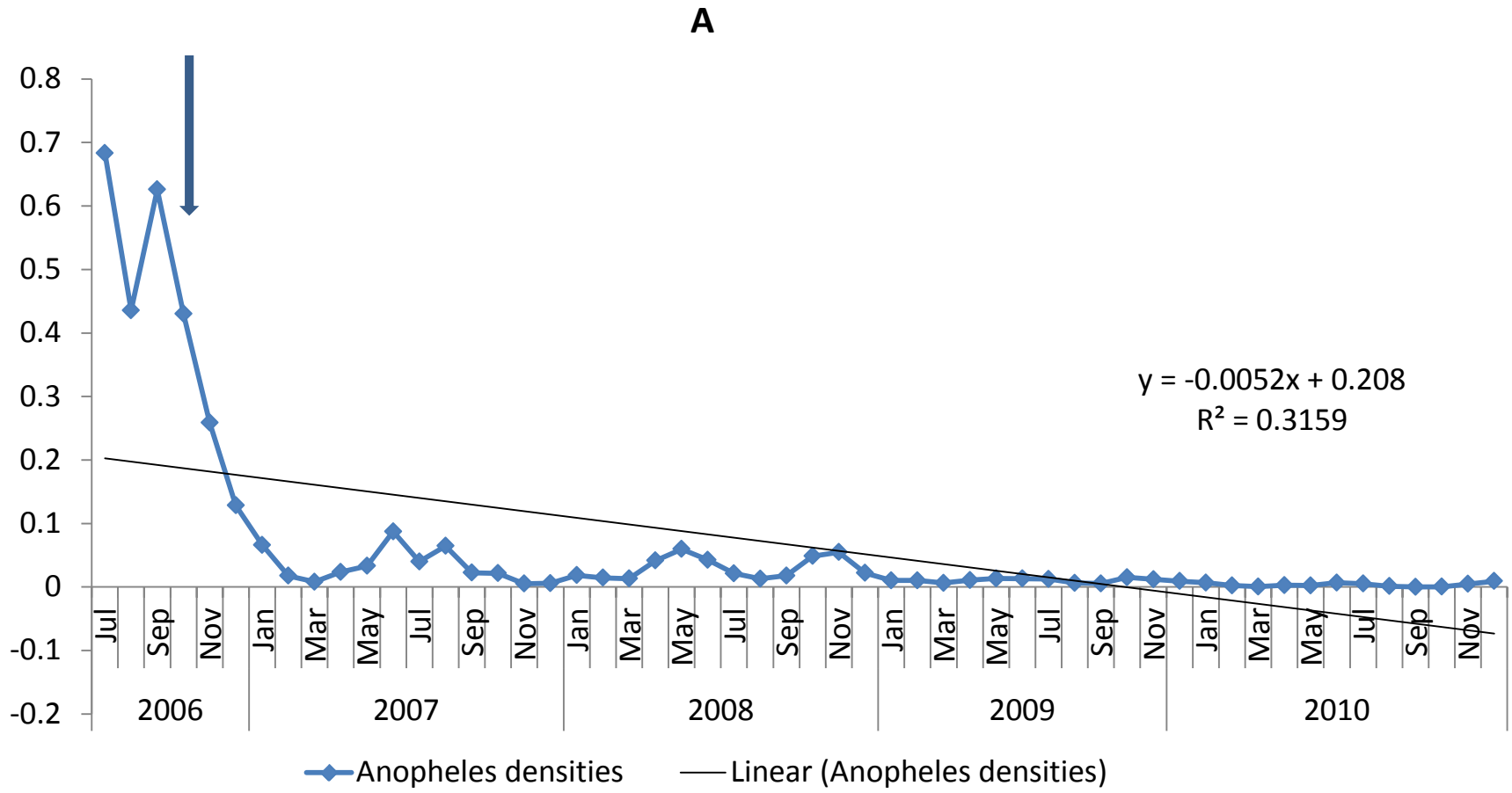
- Developed a community-based vector control plan which focuses on prevention strategy
  - Integrated Vector Management Approaches
    - Monitor epidemiological factors (malaria cases from HF)
    - Monitoring larvae and adult mosquitoes
    - Capacity Building-Inform, educate & empower
    - Larval Source Management- EM with Regular application of Bti/Bs on the rest of the habitats
  - Study area: 32 km^2
  - **<u>Main strategy</u>:** Adaptive management principles stipulate active participation of the communities

Components of LSM

- Biolarviciding - Bti

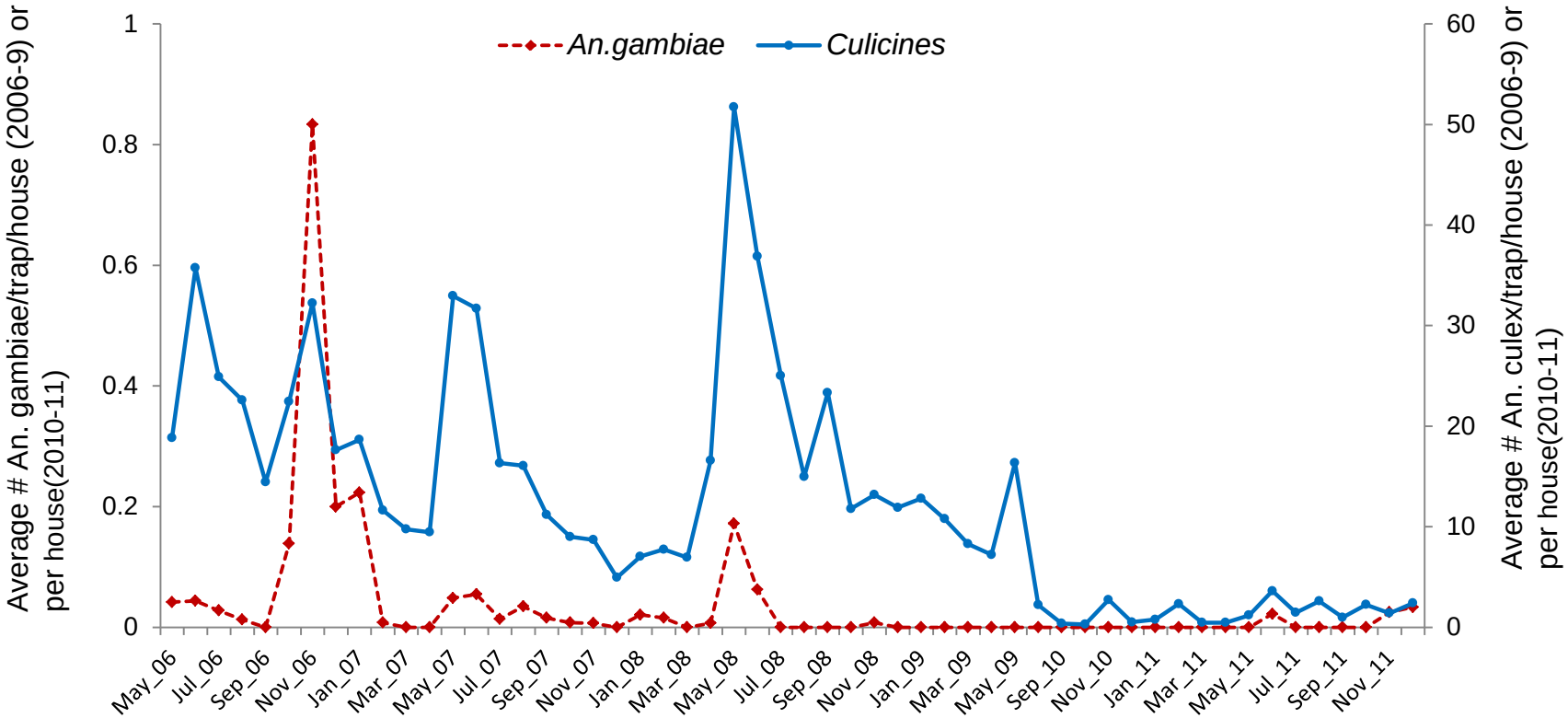
- Environmental management – filling and draining

An. gambiae Larval densities



There has been a steady decline in larval densities overtime (56.2%). Most productive habitats such as abandoned swimming pools and wells have been well managed

Adult mosquito relative density in Malindi (Kenya) from May 2006 to December 2011

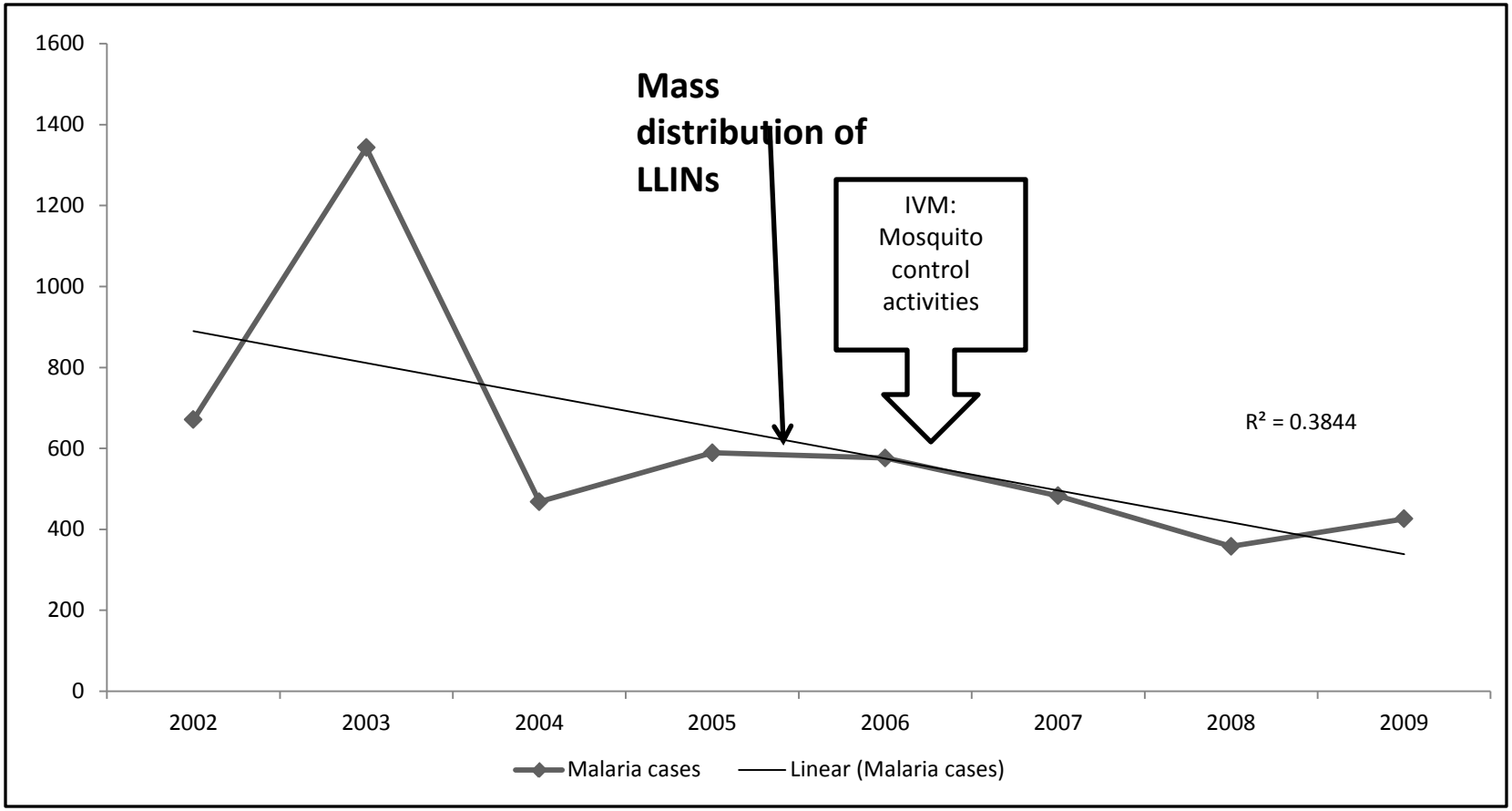


The Mosquito densities were highest between Jun – Nov 2006

Overtime there has been a steady decline of Anopheles indoor densities (>90%) and Culex spp by >65%.

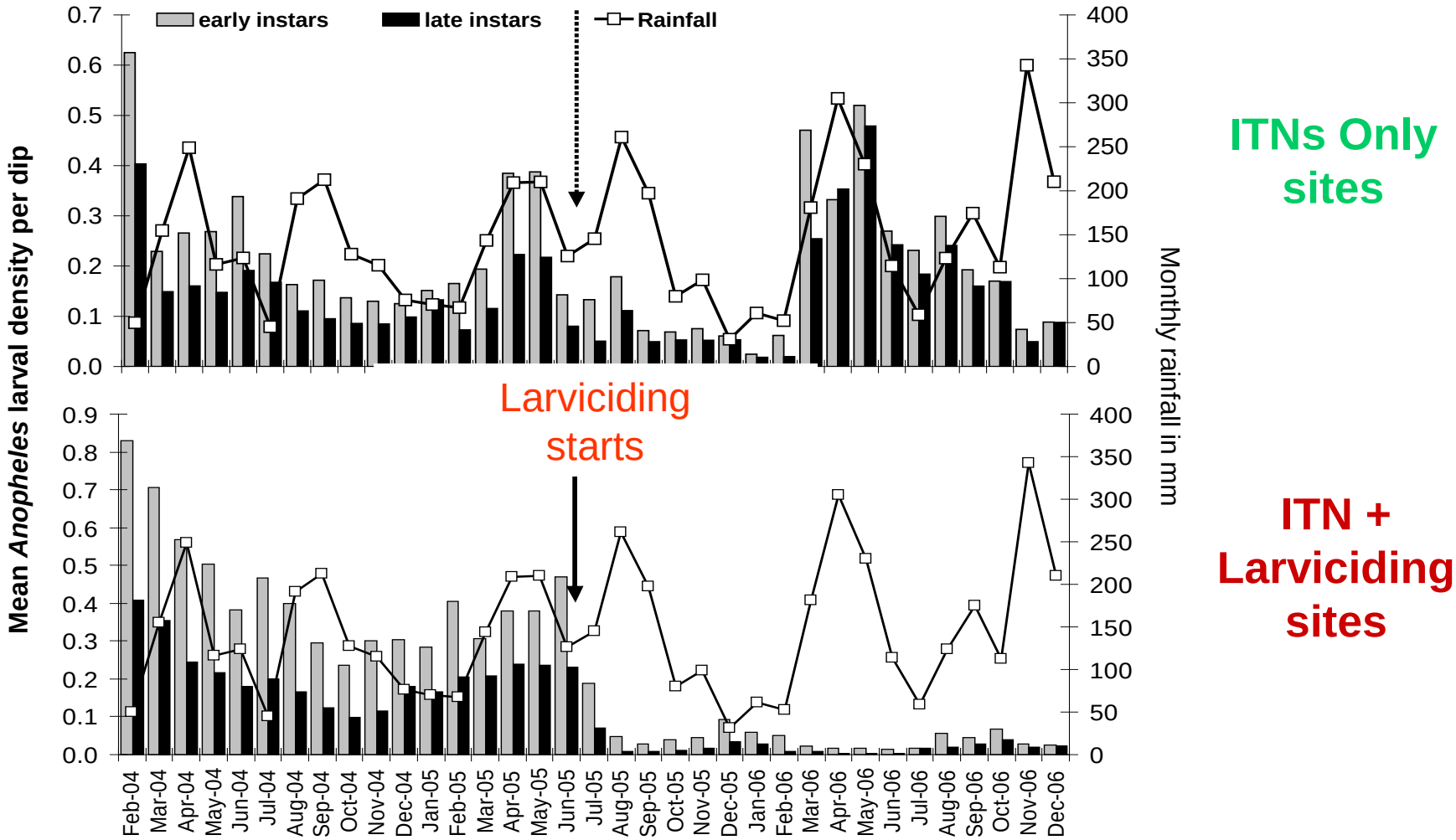
Small upsurges (peaks) are seen coinciding with rainfall season (Apr –June)

Malaria cases in under 5 years in Malindi, 2002-2009



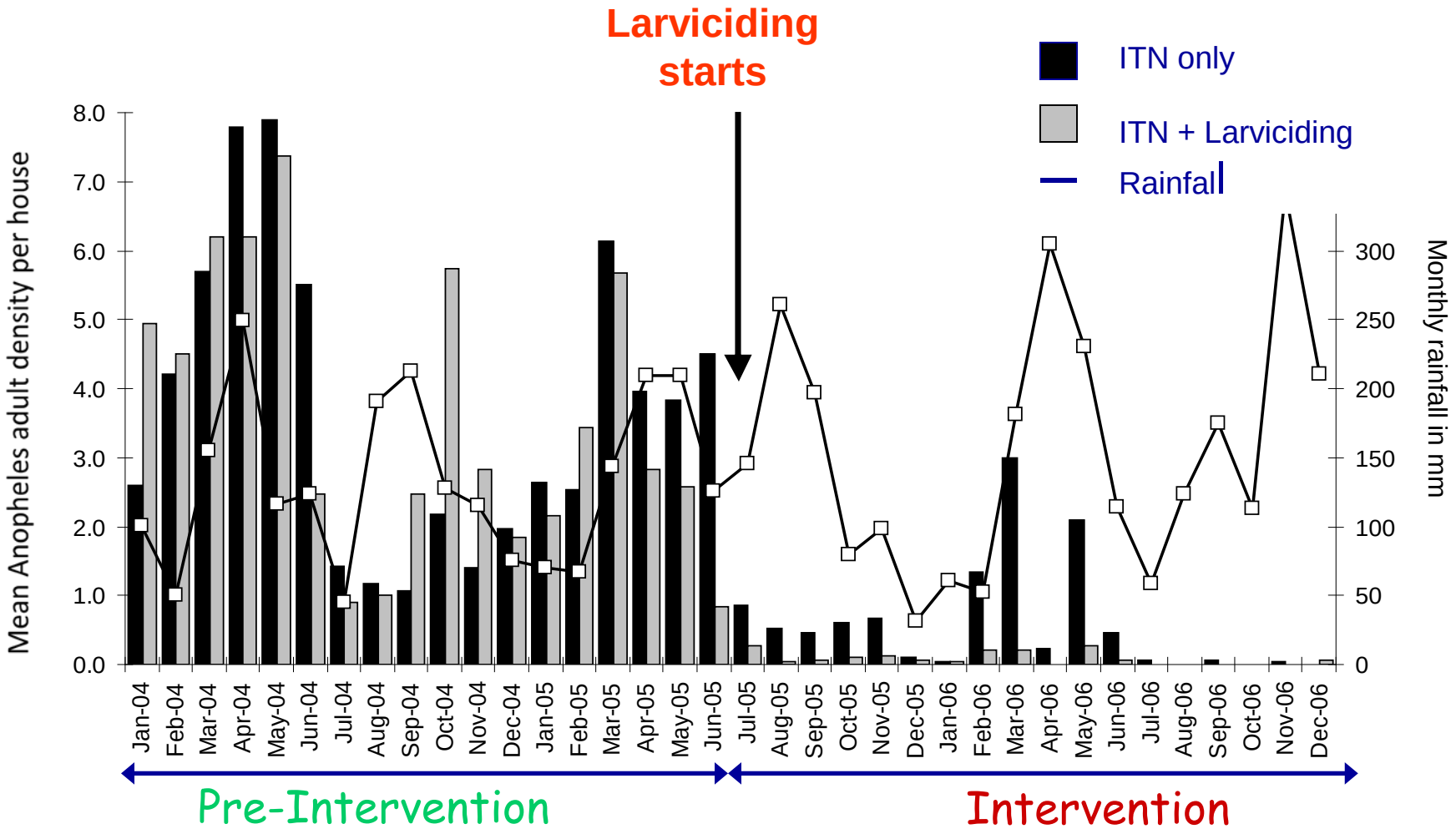
A 62% reduction in malaria cases was achieved between 2002-2009

Anopheles larvae densities significantly reduced



Source: Fillinger et al., 2009

Anopheles adults



Source: Fillinger et al., 2009

Challenges

- Need for indicators that true IVM is in progress, not re-branding of parallel vector control programmes
- Scaling-up
- Strengthening capacity & problem of maintaining trained personnel
- Strengthening inter-sectoral collaboration
- M & E – is it there? Need capacity building for evaluation of control programmes & judicious use of pesticides
- Measure cost-effectiveness of IVM programmes

Conclusion

- 52% of malaria cases is attributable to modified environmental factors: Land use, deforestation, water resource management, transportation, settlement siting, housing, and drainage.

- Alternative, non-chemical methods are available and should be encouraged, wherever feasible, to help reduce the reliance on chemical insecticides

- Active involvement of community & community empowerment: apply low technology interventions

Thank You!

Environmental Strategies and Community Mobilization to Fight Malaria in Senegal

Dr. Abou THIAM
Pesticide Action Network Africa
Dakar, Senegal

Side Event: "Safe and Effective Alternatives to the Use of DDT in Malaria Vector Control ", April 30, 2013
Centre International de Conférences Genève (CICG), Geneva

Background

Malaria : Serious health problem in the World and particularly in Africa.

Between 300 and 500 million cases noted yearly, of which 9 of 10 occur in Africa (WHO, 2010).

In Senegal, the disease is the number one reason of mortality and morbidity (PNLP, 2007).

Background (continued)

Several methods are used against the disease:

- Insecticide Treated bed Nets (ITNs);
- Indoor Residual Spray (IRS);
- Bitherapie (combination of Amodiaquine - Sulfadoxine Pyrimétamine: ACT)

Background (continued)

Problems:

- effects of insecticides on the environment
- resistance of vectors (*Anopheles sp*)
- and parasites (*Plasmodium falciparum*)

Objectives of pilot project

Control malaria in a small village in Senegal without using synthetic chemical insecticides

Means used:

- biological control of vectors,
- environmental management,
- and community involvement in the entire process.

Methodology

- **evaluation matrix to collect information on:**

- vectors and parasites;
- malaria victims (age, sex, social status, etc.);
- information and knowledge of the population on malaria;
- national and local actors;
- primary control used in the village: chemicals, insecticide-treated bed nets (ITNs);
- and other information….

Methodology (continued)

- Analysis of reports and documents dealing with malaria in Senegal and elsewhere;

- Analysis of data from the Beer health centre from 2008 to 2011;

Methodology (continued)

- interviews and discussions with resource persons (NGO, health workers, researchers, local authorities,…) ;

- preparation and use of a questionnaire in the village;

Activities and results

- **Workshops in Dakar and Beer**

- **Report on malaria situation in Beer**

Vector resistance to chemicals:

- *Anopheles* (*A. gambiae* and *A. funestu*) resistant to :

- Permethrin
- Deltamethrin
- Lambdacyalothrin,
- and DDT.

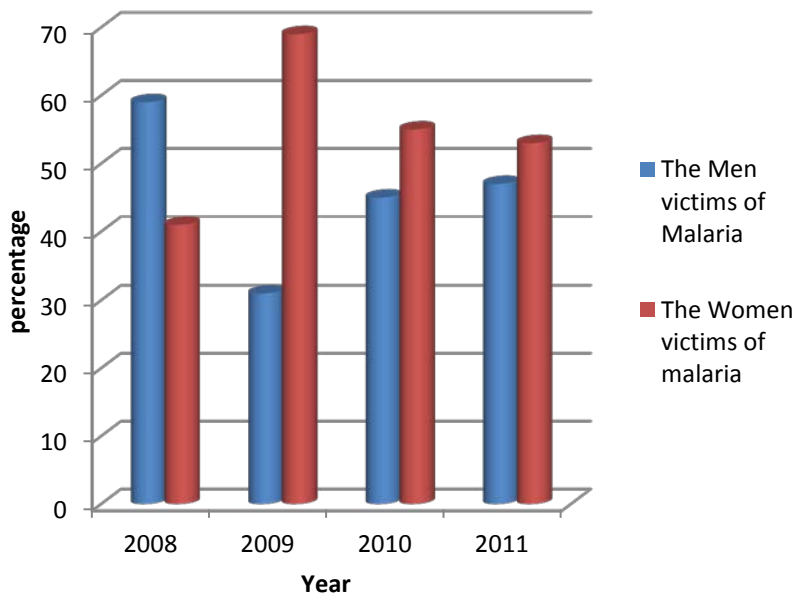
Activities and results (continued)

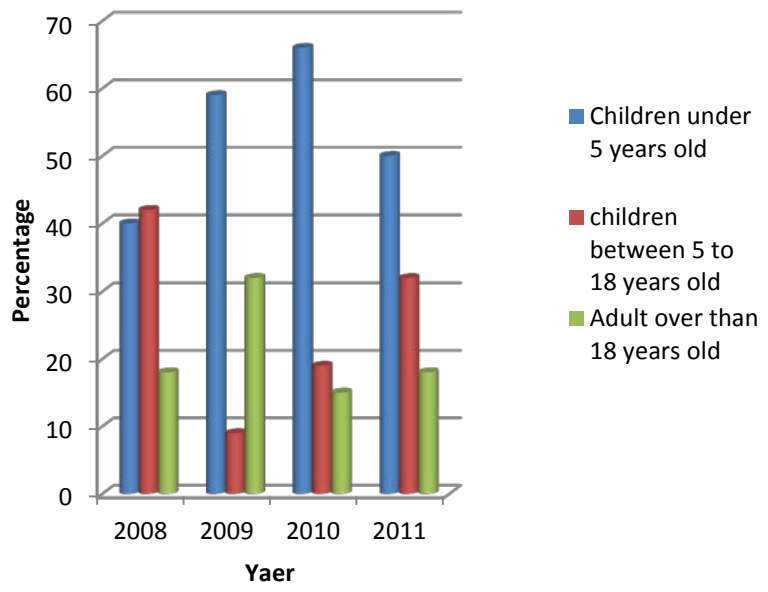
- Parasites : *Plasmodium falciparum* resistant to :

  - pyrimethamine;
  - and chloroquine.

Activities and results (continued)

- Impact of malaria on the population between 2008 and 2011





The main victims of malaria are women and children under 5 years

Activities and results (continued)

- Information and knowledge on malaria in the population of Beer :
  - 93% of the population not educated on malaria;
  - 63% not informed about the prevention means;

Activities and results (continued)

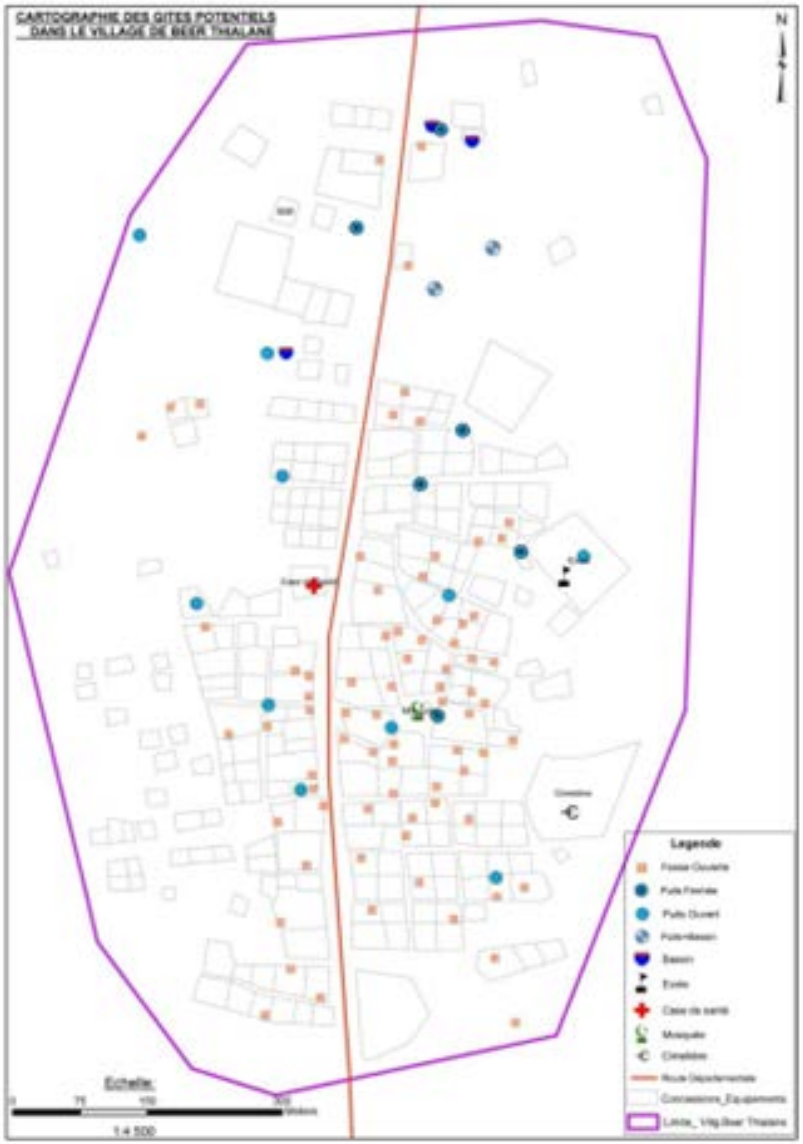
- Means of prevention against malaria

- Chemicals : more than 80%,
- Insecticide treated bed nets (ITN): 70%;

- Environmental management
- household refuse present in 93% of concessions;
- stagnant waters present in 64% of concessions ;

Activities and results (continued)

Mapping of potential breeding sites



Activities and results (continued)

❖ **Development of information and awareness tools:**

- 2 booklets on malaria control with environmental strategies were prepared and widely distributed

Activities and results (continued)

- 2 films on malaria were carried out

  - the 1st introduced the situation at the beginning of project and views of actors implicated, as well as control methods used;

  - the 2nd presented achievements and evidence of beneficiaries, political, traditional and religious authorities….

Activities and results (continued)

- **Capacity building of community health actors :**

- 20 Community actors of health trained in environmental strategies against malaria;

- training manual developed for community health actors

Activities and results (continued)

❖ information and awareness activities

Interactive radio programs

→ mass sensitization

Talk Sessions

→ 80 persons educated on malaria

Activities and results (continued)

HomeVisits

- 32 chiefs of families educated

❖ Sanitation session

- improved quality of life;

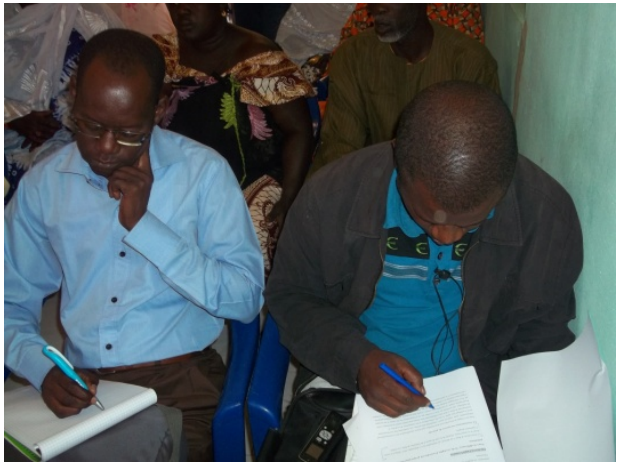
- monitoring committees established,

- regular sanitation sessions and activities in the entire village.

Activities and results (continued)

- Activities succeeded in:

introduction of environmental education in Beer primary school;



Activities and results (continued)

- Fall in cases of malaria in the village;
- Improving care through better equipment in the health centre;
- Fall in number of patients referred to the health centre;
- Fall in rate of student absenteeism at the school through better support of the health center;

Perspectives

Consolidating the gains by :

- characterization of water points;
- type of breeding sites;
- developing a map of the distribution of *Anopheles* breeding sites in the village

Perspectives (continued)

- community training in the identification of *Anopheles* larvae and monitoring of breeding sites;

- wide dissemination of the results for an adoption of environmental strategies in malaria control in other villages in Senegal and Africa.

Thank you for your attention

Malaria Management Model (MMM)
Costs and Benefits of DDT versus Non-DDT Malaria Control

Michael Brander, Project Coordinator, Advocacy & Policy, Biovision

Topics

1. **Why Decision-making tools? What kind of tools?**
2. **An Example: Malaria Management Model (Costs and Benefits of DDT versus Non-DDT Malaria Control)**
3. **Conclusion**

Challenges to decision-making

- Multiple actors and levels
- Trade-off between different policies and sectors
- Complex decision: interdependent and dynamic
- Delays, Feedback Loops, Non-Linearities
- Context specific (e.g. resistances)
- Uncertainties existing (e.g. impact, environmental risks)
- Human / environment interaction (e.g. breeding sites)
- Limited resources (e.g. limited budget)

Key criteria for a good decision-making tool

- **Purpose**: Optimal allocation of resources to interventions or combinations of interventions for malaria (vector) control in an effective, safe and sustainable way:
  - Comprehensive (including environmental, social and economic factors)
  - Flexible to be adaptable to different local conditions
  - Easy-to-use (e.g. with a simplified user face)
  - Transparent to be replicable by users and open to scrutiny

Partnership - BiM

Biovision, CH

- Policy Dialogue
- Funding

icipe, KEN

- Research and expertise
- IVM pilot projects
- IVM capacity building

Millennium I., US

- Socio-economic Modelling
- Analytical tools for policy analysis

Multi-level Approach

- Community Level (Kenya)
- National Level (to be included in T21 models)
- Regional Level (SSA)

Topics

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Malaria Management Model: Purpose

Assess the costs and benefits of the continued use of DDT in IRS versus its rapid phase-out, considering

- Sub-Sahara Africa Region
- Alternative Combinations of Interventions:
  - ITN
  - IRS (with and without DDT)
  - Environmental Management
- Case Management
- The broader socio-economic development framework (economic production, education, health)
- Issues of scientific uncertainty

Malaria Management Model: Publication

- PLoS ONE
- Peer-reviewed Article
- Application of the Malaria Management Model to the Analysis of Costs and Benefits of DDT versus Non-DDT Malaria Control
- http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027771

Malaria Management Model: Results

- **Phase-out of DDT for IRS is more expensive** than continuing the current mix of interventions (12% higher total costs)

- Additional benefits: **Avoided risks of loss of agricultural exports** in the range between 1 and 5% matches the higher costs.

- **Shift towards a stronger focus on insecticide treated bed nets and environmental management** would allow for a cost-effective phase-out.

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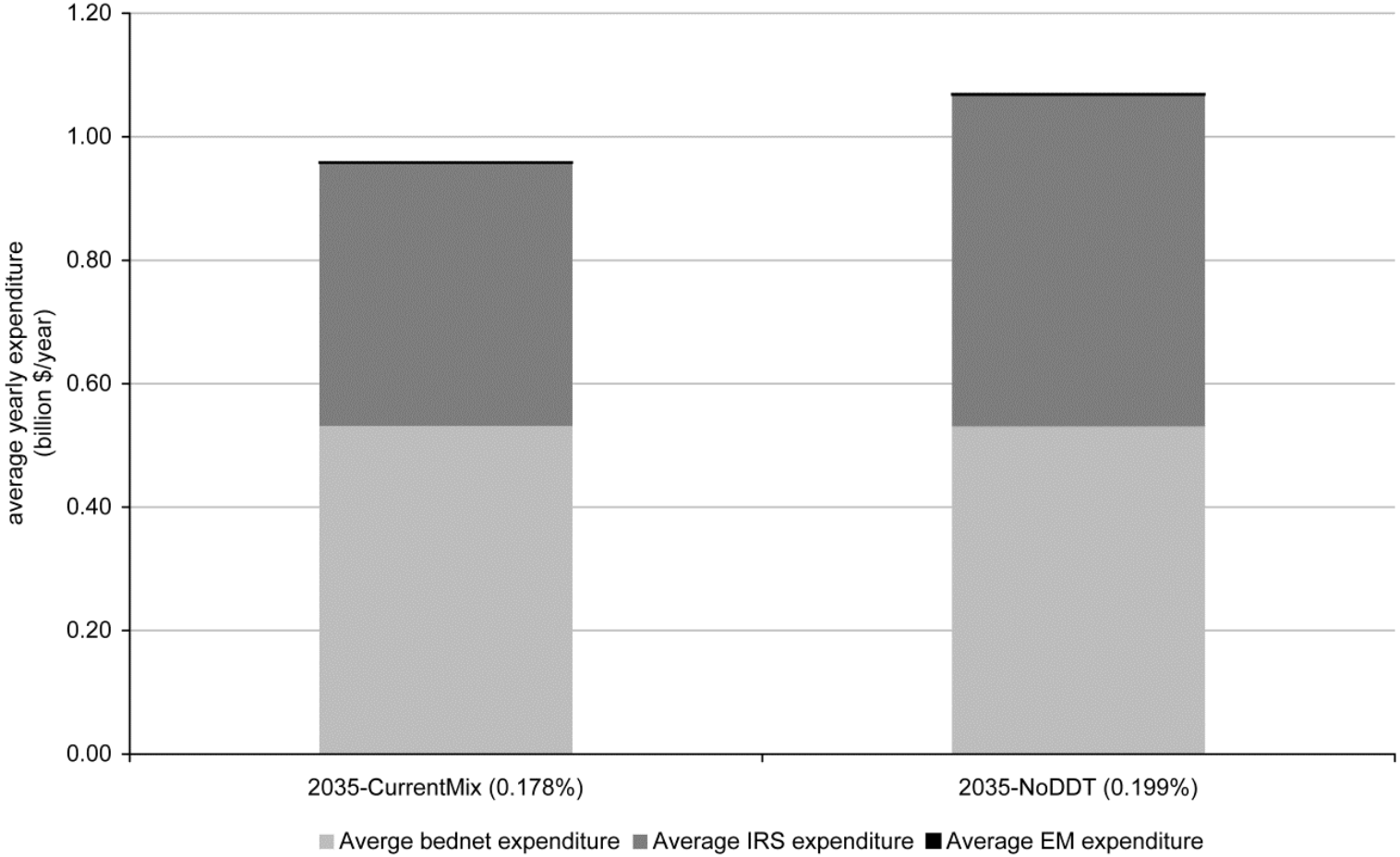

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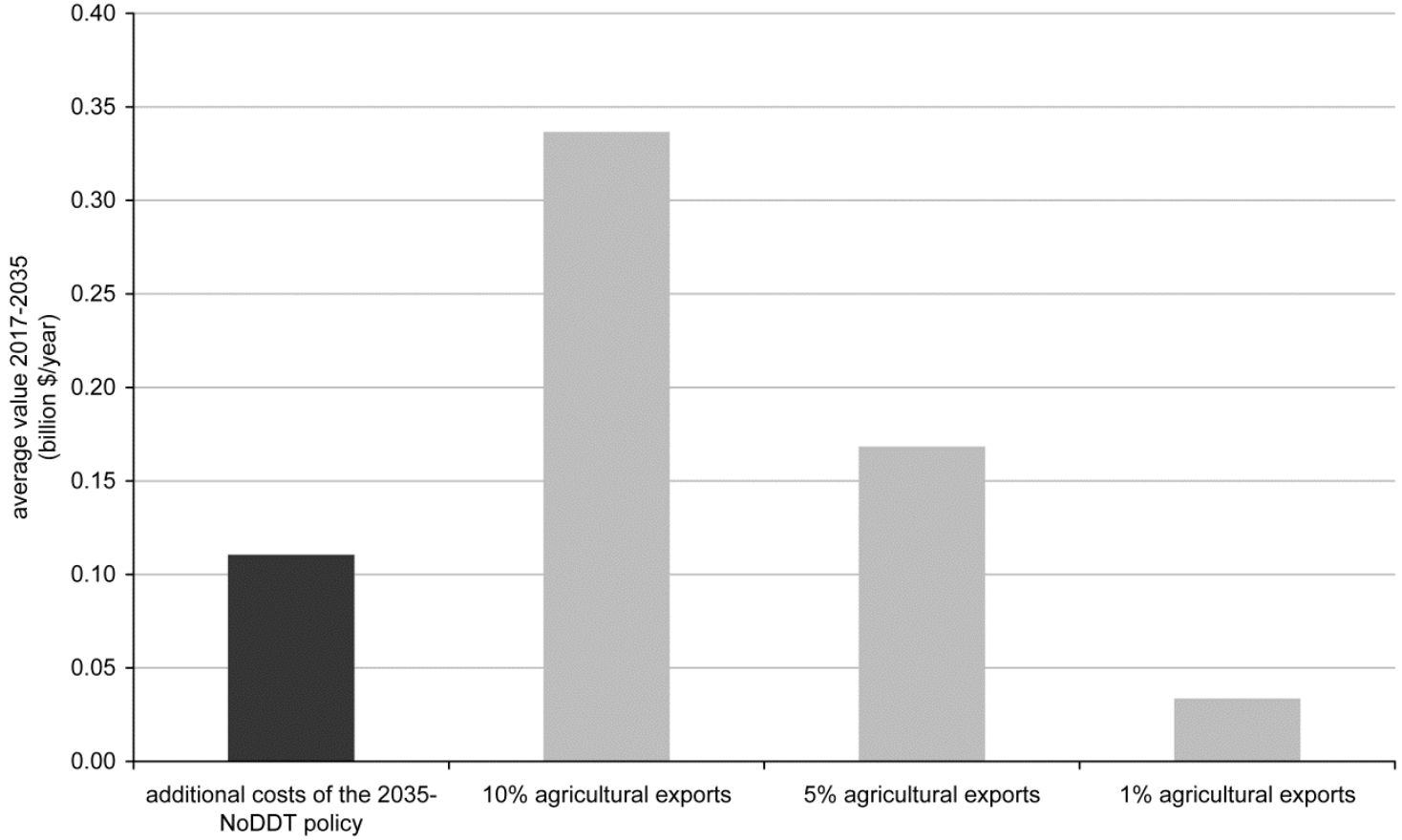

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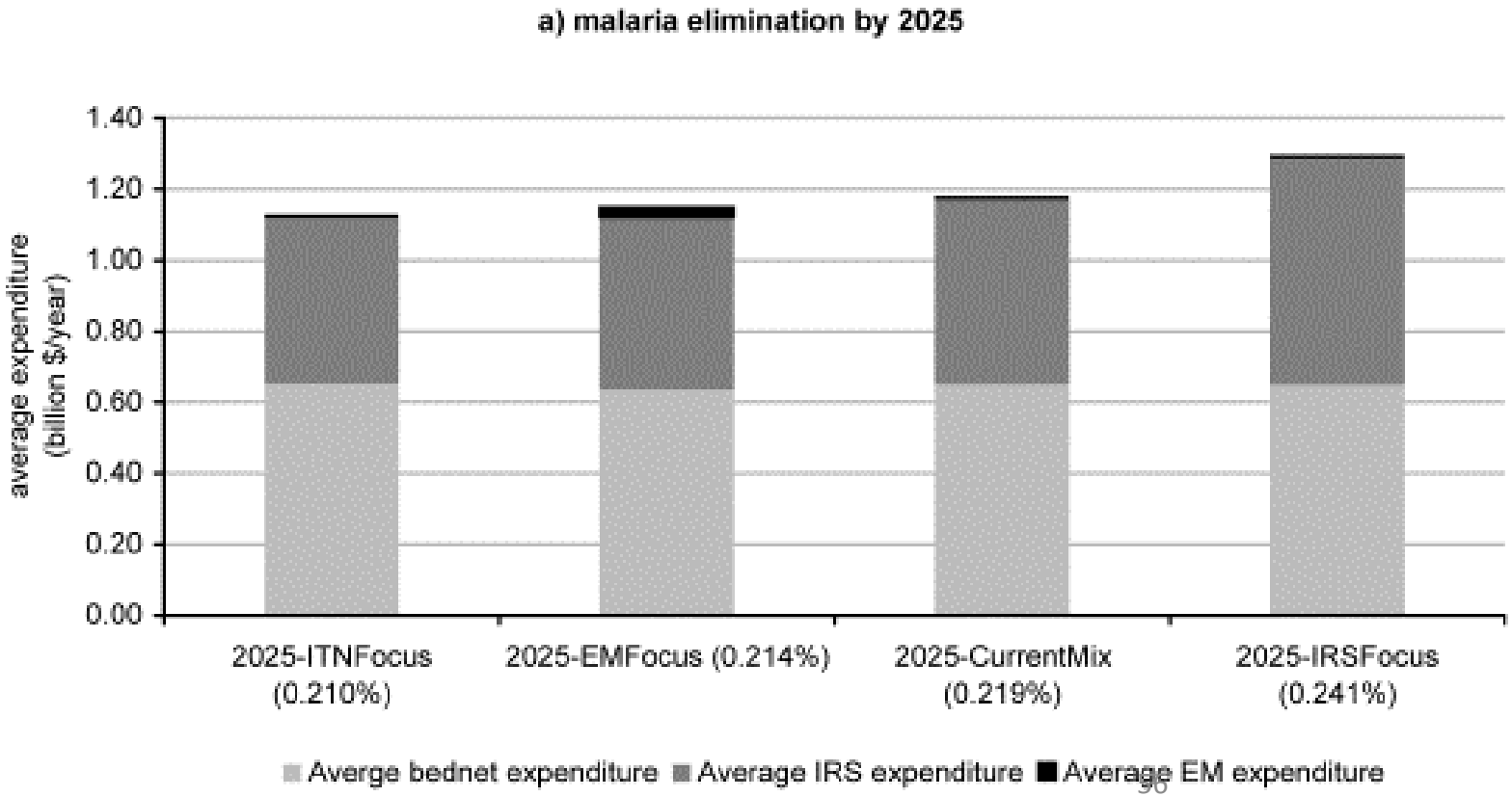

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Conclusion

- Scenario Models with scenario analysis can inform discussions about malaria control policies and the use of DDT, and informed trade
- Allow for informed trade offs
- Phase-out of DDT has additional costs, but:
  - Likely to lead to reduced costs for alternatives
  - Additional benefits and avoided risks
- Shift towards a stronger focus on environmental management

Thank you for your attention.

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