Use of IRS in South Africa and the LSDI

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Introduction

• Although low transmission, malaria remains one of the top 3 diseases in South Africa
• SA is on southern fringe of malaria distribution in Africa
• Low altitude area of
  – KwaZulu-Natal
  – Limpopo Province
  – Mpumalanga
Historical use of IRS in South Africa

- History before 1905 is unknown
- First control efforts in 1910 advocated quinine, screens and bednets
- Anti-larval measures in 1924
- 1933 kerosene-pyrethrum mixture sprayed inside houses and marked the start of indoor spraying
- 1946 DDT used for house spraying and larviciding
• 1996 DDT replaced by pyrethroid
• 1999 *An. funestus* resistant to pyrethroids
• 2000 back to DDT
• Lowest number of cases in history
Background

Mosquito vectors
• 2 major species complex
  – *An. gambiae* complex
  – *An. funestus* complex (eliminated 1974)
• Main malaria vector is *An. arabiensis*
• Of secondary importance is *An. funestus* (eliminated 2003)

Parasite Species
• Main parasite is *Plasmodium falciparum*
Trend in Reported Cases

![Bar chart showing the trend in reported cases from 1971 to 2004. The number of cases increases from 1971 to 1980, then remains relatively stable until 2001, where a dramatic increase occurs. The chart is titled "Trend in Reported Cases" and has the x-axis labeled "Year" and the y-axis labeled "No. of Cases."
The Last Epidemic in KwaZulu-Natal

- Pyrethroid resistant
  - *An. funestus*
  - November 1999

- S/P – *in vivo* trial
- >60% resistance

- DDT Re-introduced
- IRS s Mozambique 2000
- Combination therapy 2001

- >380%

- 91%

KZN Malaria Information System
• Major gains have been made in controlling malaria
• Encourage agriculture and tourism
• For the past 60+ years have had efficient malaria control strategies but malaria still remains a problem

Malaria Risk in SA in 1938 Prior to Control
Lubombo Spatial Development Initiative

- Malaria is not a country specific problem but a regional one
- Only way to improve malaria situation was to assist neighbouring countries
- Down-stream effect
- LSDI was set up – Moz, SW, SA
- LSDI is trilateral initiative aimed at developing the region for agriculture and tourism
• Malaria recognized impediment to development
• Co-ordinated malaria control initiated in 2000 in the 3 countries
  – Indoor spraying
  – Combination therapy
control programme implemented in stages -starting in the southern most district of Mozambique
- Prevalence levels initially were around 1% in KZN, 1% in Swaziland and over 60% in Mozambique.
MAPPING INSECTICIDE RESISTANCE

Insecticide Resistance
SOUTHERN MOZAMBIQUE

2000 / 2001

2003 / 2004

MAP LEGEND

- International boundaries
- Provincial boundaries

- Resistance
  - Complete susceptibility
  - Deltamethrin
  - Increase tolerance to P Y R
  - Lambdacyhalothrin
  - Lambdacyhalothrin + Deltamethrin

Lambdacyhalothrin Resistance
- Susceptible (5)
- Resistant (2)
All fixed structures were sprayed.

Window traps were placed in selected houses in sentinel site to monitor mosquito density.
Impact of IRS on Vectors

**Average** *A. funestus* group and *A. gambiae s.l.* per hut per day

*Zone 1*

![Graph showing impact of IRS on vectors.](image-url)
Impact of IRS on Prevalence

Malaria Prevalence in Mozambique (2 - <15 years)

- Zone 1
- Zone 1A (Mozal)
- Zone 2
- Zone 3
- Zone 2A (Boane)

Prevalence %

- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
Regional Malaria Reduction

Population protected 4.7M, Structures sprayed 1.8M, contiguous control area 100,000 km²
Achievements

- In the region, huge reductions in malaria were recorded.
- In the neighbouring countries malaria incidence on the increase but in LSDI area it decreased.
- St Lucia and surrounds are now classified as “malaria free”.
- Project has had such an impact that infected persons are scarce in South Africa and Swaziland.
Conclusions

• The LDSI malaria control programme shows that with effective vector control and antimalarials, malaria can be controlled.

• Furthermore, the LSDI has shown that regional control efforts are more effective than county-specific initiatives.