

# How long do bednets last?

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## Main Points

- Long-lasting bednets don't last forever.
- Understanding bednet longevity is vital.
  - Planning and budgeting campaigns.
  - Testing manufacturers' claims.
- Current understanding is incomplete.
- Properly monitoring bednets in the field is not expensive.



## Current definition of Long-lasting Insecticidal Bednet (LLIN)

- WHOPEP – WHO Pesticide Evaluation Scheme
  - Makes recommendations – not an approval agency
  - Phase I: After 20 laboratory wash/rinse cycles
    - $\geq 80\%$  mosquito mortality and/or
    - $\geq 95\%$  knockdown
  - Phase II: Experimental Hut studies
  - Phase III: Field studies
- Currently recommended:
  - Olyset
  - PermaNet
  - Interceptor
  - Netprotect
  - Duranet



## Issues of Wear and Tear

- WHOPEP focuses on insecticide activity
- WHO Specifications for Netting (2007)
  - Burst Strength: 250 kPa, minimum



## Laos and Ghana Studies

- Lao PDR
  - Shirayama et al., *Public Health* (2007) 121, 122-129.
  - Olyset nets, 2-3 years in the field.
  - 40% had holes and tears.
- Ghana
  - Smith et al., *AJTMH* (2007) 77, Suppl. 6, 243-248.
  - PermaNet 1.0, 3 years in the field.
  - Nearly all had holes and tears.
- Challenged our assumptions about bednet lifetimes.
- Physical deterioration is an important issue.
- Repairs are uncommon.
- Burst strength is a questionable indicator.
- Needed: side-by-side studies of bednet durability.



## Examples: Ghana Bednets



## Possible causes of deterioration

- Possible Causes
  - Snagging on sharp objects
  - Washing/scrubbing
  - Burns / Hot surfaces
  - Rats and other animals (drawn to food stains?)
  - Children
- Initiation vs. worsening of damage
- Repairs could slow deterioration

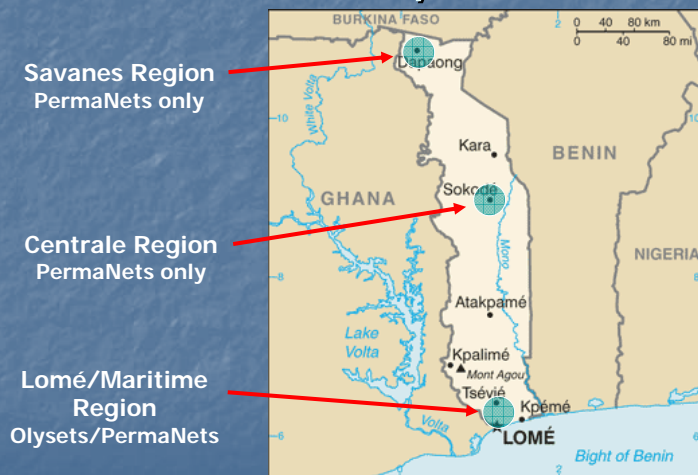


# Togo Study

- Objectives
  - Evaluate condition of bednets distributed during Dec 2004 measles/malaria campaign.
  - Compare Olyset and PermaNet 2.0 distributed in Lomé/Maritime Region.
  - Compare PermaNet 2.0 distributed in three regions of Togo.
- Sponsor: IFRC
- Agencies: CDC; Programme Nationale de Lutte contre le Paludisme (PNLP), Togo



## Togo Bednet Collections January 2008



## Togo Results (so far)

- December 2007 survey results used to identify households with campaign nets.
- 200 bednets collected.
  - Lomé/Maritime Region
    - 50 Olyset Nets
    - 50 PermaNets
  - Savanes Region – 50 PermaNets
  - Centrale Region – 50 PermaNets
- Bednets appear to be widely used.



## Togo Results (so far)

- Difficulty in identifying nets.
  - People getting from other sources, esp. in Lomé.
  - Nets with non-2004 or no date of manufacture.
  - Lost or faded labels (mainly on PermaNets).
  - Discarded nets not considered.
  - Potential to skew results.
  - Example: Centrale Region
    - 50 PermaNets collected with 2004 date.
    - Other manufacture dates: 2002 (2), 2005(4), 2006(3).
    - 10 found with unreadable labels.
    - 7 found with missing labels.
    - 4 Olyset Nets found.
    - All were households indicated by survey as having nets from the 2004 campaign.



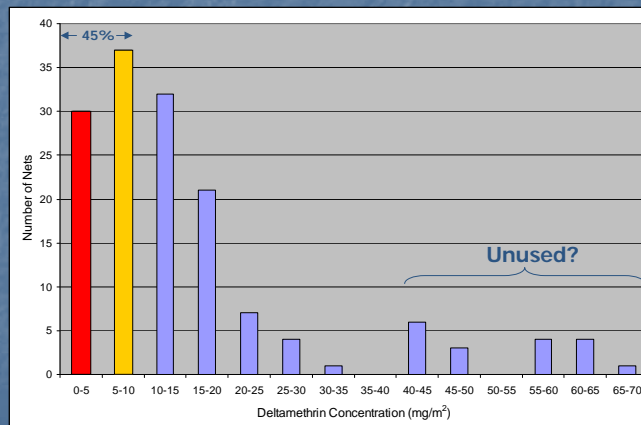
# Togo Results (so far)

- Insecticide Assay of PermaNets
  - Portable X-ray Analyzer
  - Deltamethrin only – unsuitable for Olyset
  - Non-standard method



# Togo Results (so far)

Deltamethrin content in 150 PermaNets



## Togo Nets – Next Steps

- Document physical deterioration of nets.
- Measure residual insecticide by standard methods.
- Bioassay nets to determine effectiveness against pyrethroid-susceptible mosquitoes.



## Recommendations

- Begin prospective monitoring – plan before distributing.
- Tag nets with marker unique to the campaign to facilitate sampling.
- Monitor nets annually.
  - Minimizes sampling error from discarded nets.
  - Provides advance warning re. timing followup.
- Include bednet monitoring in campaign budget (1%).
- Develop improved laboratory testing.
  - On-site surface insecticide assay.
  - Physical tests for netting – beyond burst strength.
- Monitor mosquito populations for insecticide resistance.
- Incorporate “Care and Repair” message in education efforts.
- Replace Togo nets ASAP.

