Housing and Malaria

RBM – Vector Control WG

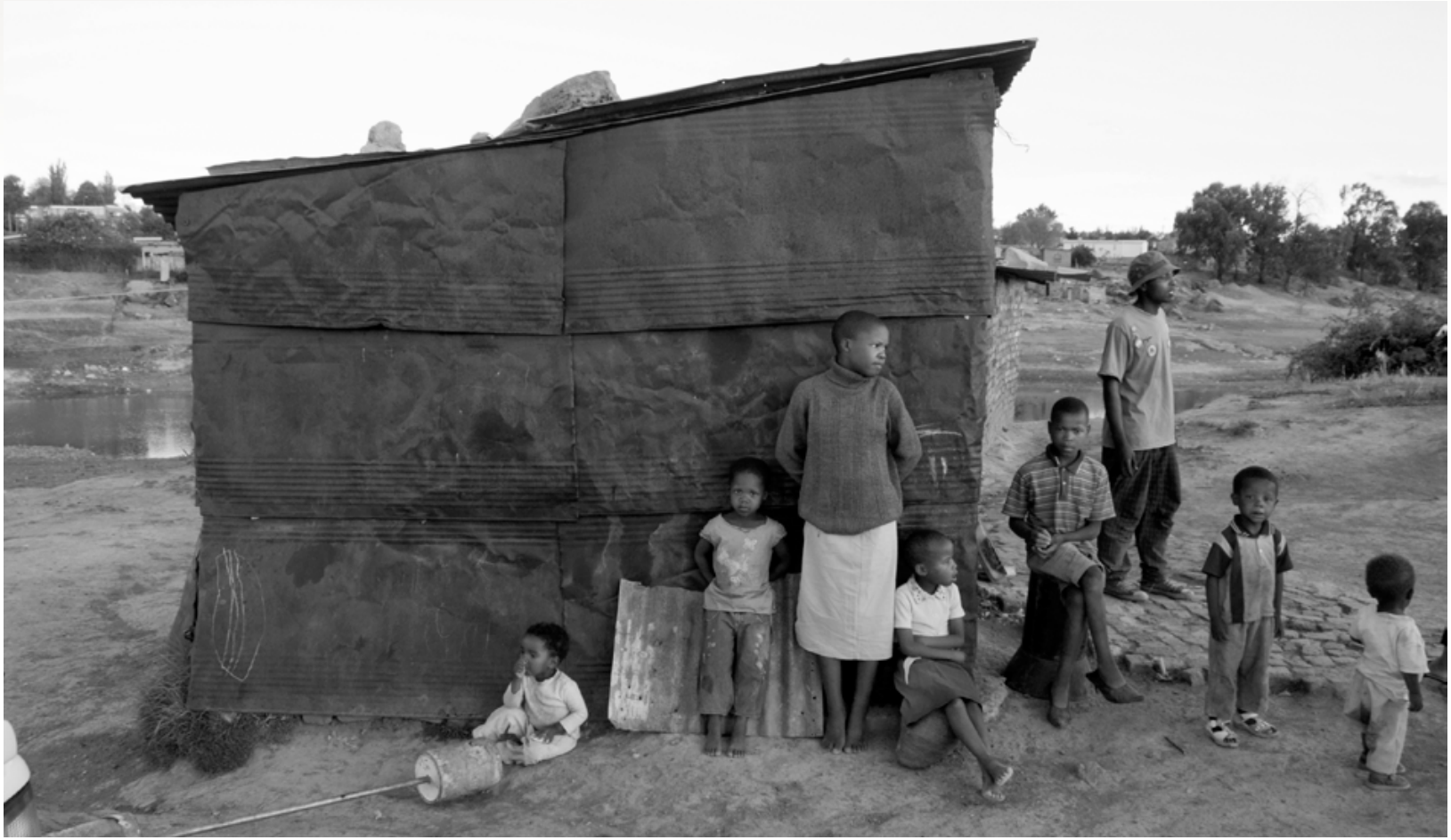
Feb 2014

Habitat's vision:

A world where everyone has a decent place to live.

Habitat for Humanity®

Habitat is increasingly approaching housing as a *process* – most people build incrementally



Habitat for Humanity®

HFHI Housing Quality Standards

These performance standards—drawn from the UN MDGs, the International Residential Building Codes, UN-HABITAT, and the SPHERE Guidelines for disaster response—define the quality of a new or a rehabilitated house by Habitat

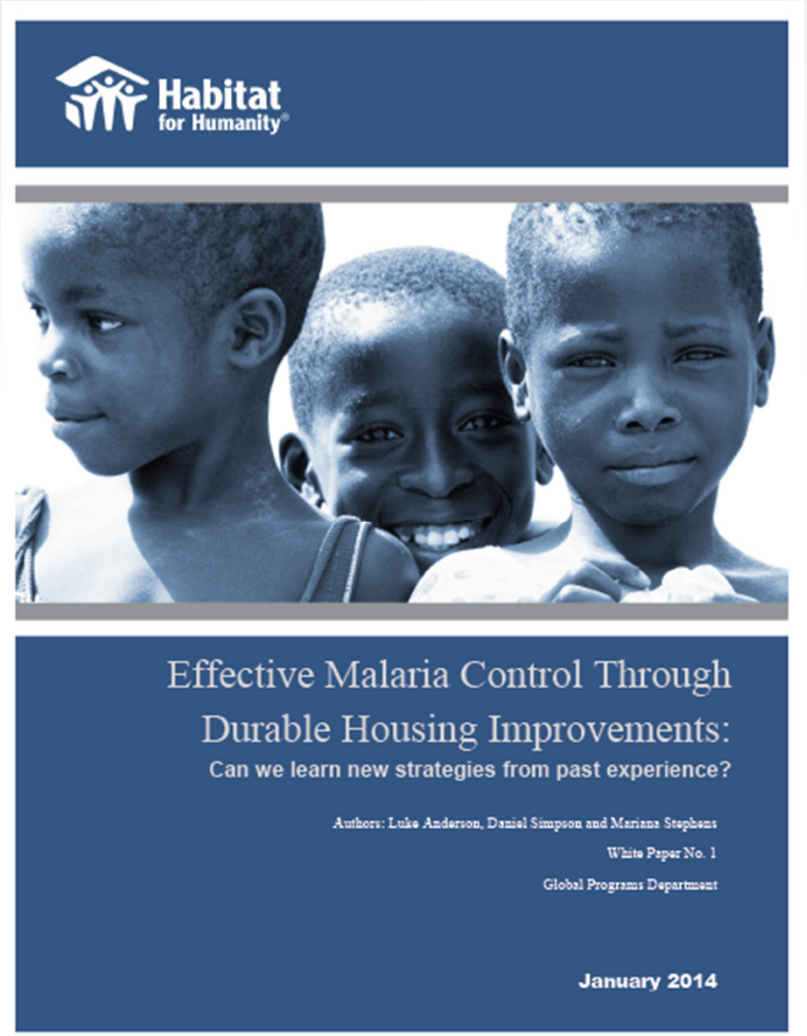
1. Design	a. Covered Area – 3.5 square meters per individual b. Materials – locally sourced c. Location – risks from natural hazards and disease
2. Durability	a. Disaster – specifications to withstand natural disasters b. Safety – durable enough to allow safe refuge
3. Secure Tenure	a. Tenure – formal and defacto rights to land – land ownership and/or us rights for building
4. Water	a. Quality – palatable for drinking without risk to health b. Access and Quantity – proximity to household
5. Sanitation	a. Access to toilets – proximity to household b. Design – sited and hygienically maintained c. Drainage – water erosion and standing water

Shelter Report 2011

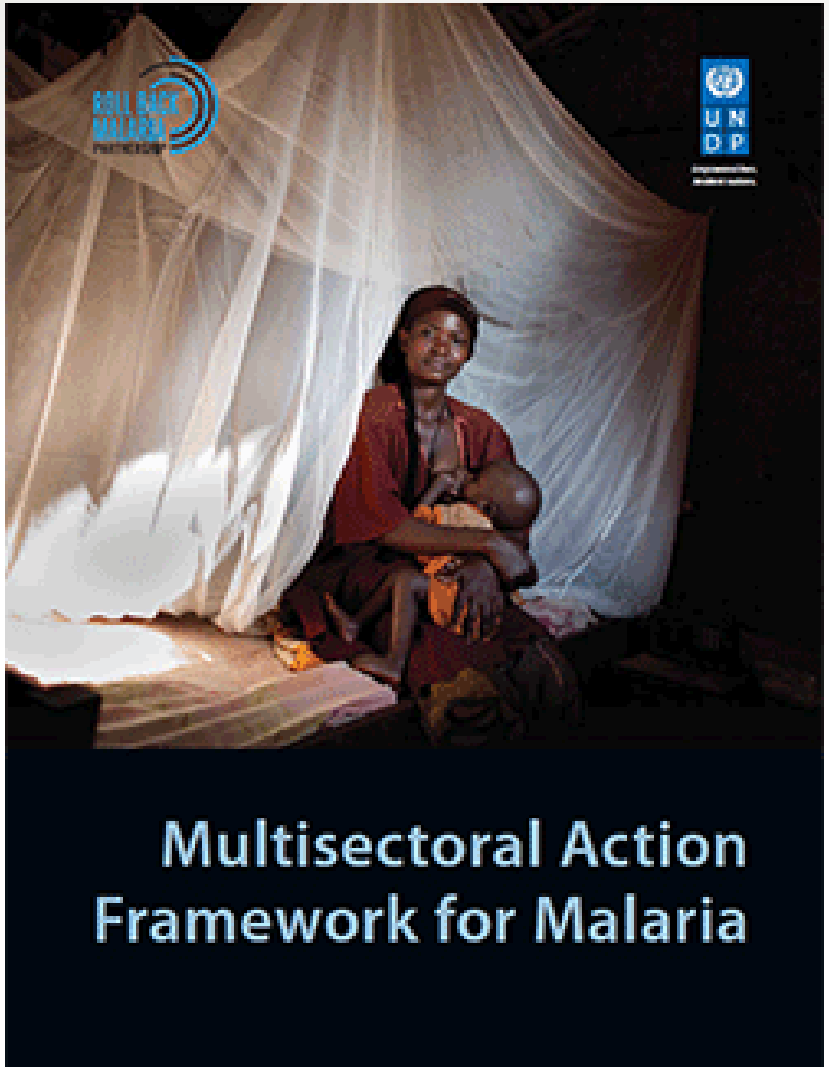
Housing and Health:
Partners Against Poverty

Overall take-away - To have long-term impact on global health, interventions that combine health
and housing are essential. Addressing the issue of adequate housing and healthy communities together is key in any successful health-focused strategy.

*** Chapter 4: Malaria**



- Focused on studies in Europe done in the early 1900's practices of "mosquito proofing" housing around the globe to reduce malaria.
- Rise of comparably quick and easy interventions like DDT overshadowed housing improvements.
- Is improved housing an effective strategy today?



Within this framework, housing improvements and use of LLINs, IRS, and durable wall liners are considered viable multisectoral malaria interventions.

Using 'housing design' to fight malaria

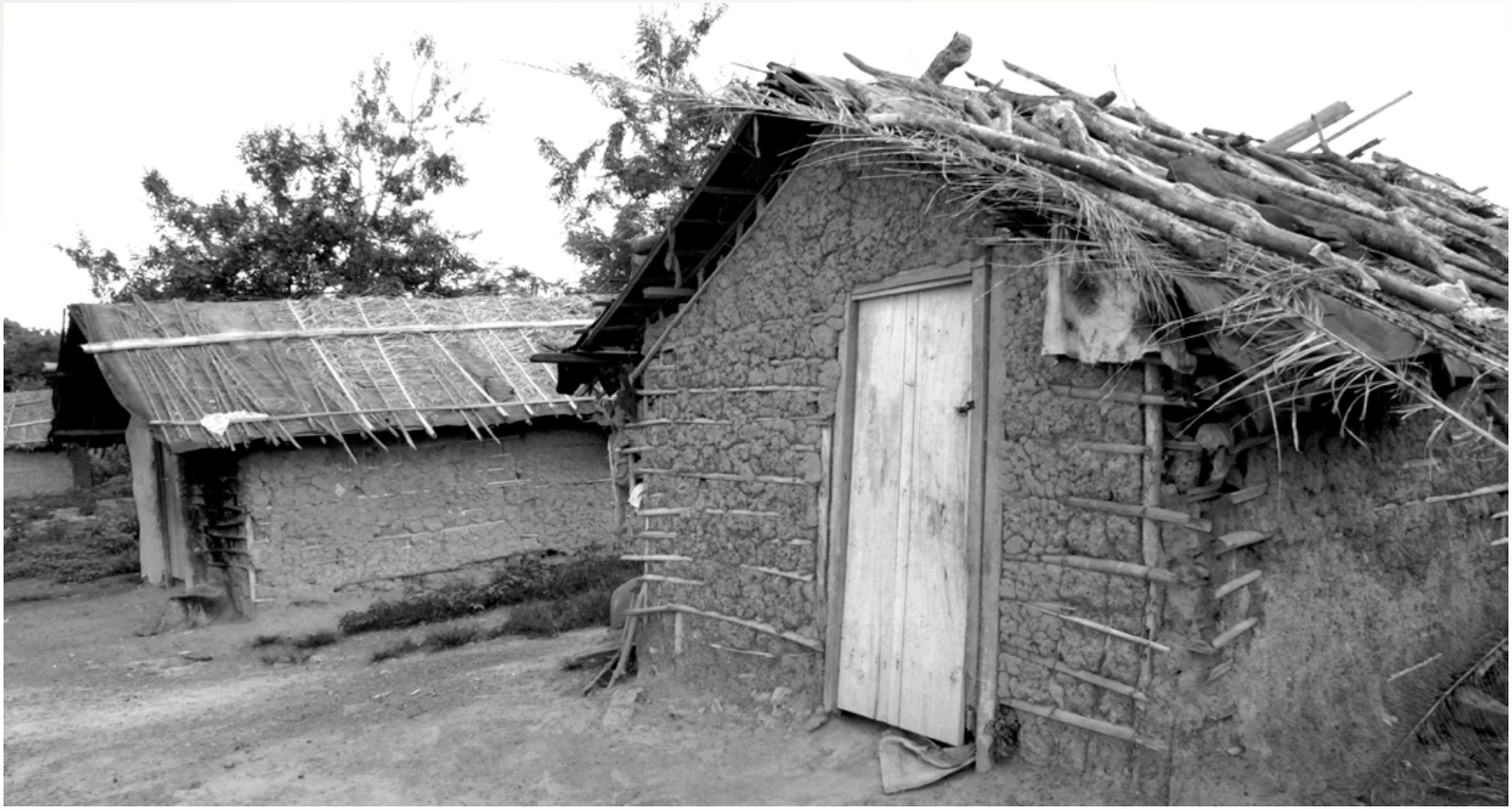
Housing: Ill-ventilated and ill-lighted houses provide ideal indoor resting places for mosquitos

- Simple modifications of typical rural house design can be an effective and relatively inexpensive method of reducing indoor mosquito vector densities and consequently decreasing malaria transmission.

- Public health scientists have shown the potential for house design to protect people against malaria, yet this type of intervention remains virtually ignored.

- Studies show that house modifications is likely to be acceptable and is expected to be the greatest benefit when used in combination with other malaria control strategies.

Evidence Base: Malaria and housing



Habitat for Humanity®

Malaria and Housing - United States

Early studies helped spread practices of screening houses against mosquitoes to the United States.

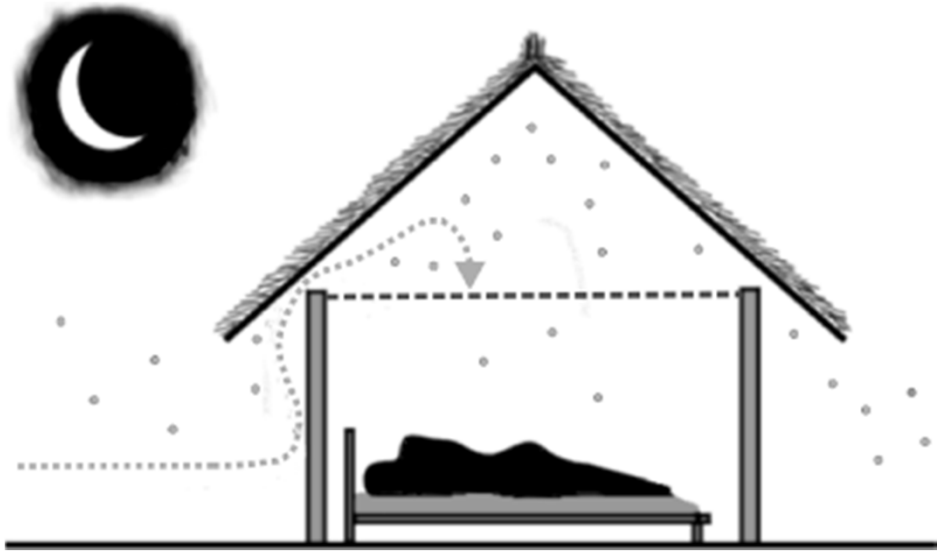
•1921 malaria Survey in Missouri found that people living in well-made homes with good screens had less malaria than those who lived in well-made homes without screens (5% vs.12%, respectively).

•In 1930's substantial reduction in incidence of disease in Alabama after 700 homes were screened compared to control areas without screening.

Malaria and House – Africa (Malawi)

In a household based cross sectional study in Malawi *(Wolff CG et al. BMJ 2001),* children in **300 Habitat** improved homes were 44% less likely to have respiratory, gastrointestinal, or malaria illnesses.

Malaria and House – Africa (Equatorial Guinea)



.

Bioko Island, Equatorial Guinea *(Bradley J, et al. PLOSone Nov 2013)* study to assess trends in housing characteristics and their effect on malaria infection in households.

Prevalence of infection:

- Open eaves was 23% compared to 18.8% for those living with closed eaves
- Unscreened was 20.1% versus 9.1% in screened homes.

Malaria and House – Africa (Kenya)

Randomized control study in Kenya *(Atieli H et al. Malaria Journal 2009)* found that Papyrus mats ceiling modification reduced house entry by *Anopheles gambiae s.l* and *Anopheles funestus* densities by between 78–80% and 86% respectively compared to unmodified houses.

Malaria and House – Africa (Ethiopia)

Randomized control trial in Ethiopia *(Massebo F, Lindtjorn B Malaria Journal 2013)* found that screening doors and windows, and closing openings in eaves and walls with mud reduced the overall indoor densities of *An. arabiensis* by 40%

The housing improvements cost $7.34 per house.

Malaria and House – Africa (Gambia)

Changes in house design reduce exposure to malaria mosquitoes (*Lindsay S, et al. Tropical Medicine and International Health 2003)*

<u>House entry reduction :</u>

Plywood ceiling: 59%

Synthetic-netting ceiling 79%

Insecticide-treated synthetic-netting ceiling 78%

Plastic insect-screen ceiling 80%

Eaves closed with mud 37%

Malaria and House – Africa (Gambia)

Randomized control trial *(Kirby M et al. The Lancet 2009)* effect of two different house screening interventions on exposure to malaria vectors and in anaemia in children - 462 houses included. Mean # of A. gambiae caught in houses w/o screening was 37.5 per trap per night, 15.2 in houses with full screening, and 19.1 in houses with screened ceilings.

Malaria and Housing – Pakistan and India

These studies informed HFHI's work with OVCs

- British army mosquito proofed their barracks while stationed in Pakistan in 1925 and reduced the incidence of malaria by 68%.
- Army barracks screened in India, brought a 72% reduction in incidence relative to the previous year.

Research questions to inform HFHI's program interventions

- In what contexts (urban vs rural) are housing improvements effective at controlling malaria transmission?
- Are housing improvements cost-effective on a large scale?
- Sustainability – How will access to materials and expertise be maintained over time?
- Include housing improvements as long-term malaria solutions in programs like PMI?

To help HFHI answer these research questions, we are in discussions with WHO, CDC, private sectors, and donors about pilot work in African setting.

Habitat for Humanity®

Possibilities for the future

- Work to incrementally improve housing as part of anti-malaria programs.
- Include malaria-prevention strategies in home-building and home-improving projects partnering with housing micro-finance institutions.
- Integrated Vector Management (IVM): A multi-disease approach *(denque, lymphatic filariasis, arboviruses,and others)*

Center for Innovation in Shelter and Finance (CISF)

Our purpose:

The Center exists to facilitate collaboration between public, private, and third sector actors in the market to develop sustainable, and innovative housing solutions.

Our vision:

To serve as a place of knowledge, expertise, advice, and innovation, enabling poor families to acquire adequate housing.

Habitat for Humanity | Center for Innovation in Shelter and Finance

BUILD Malaria Out!

"Malaria control programs should consider targeted housing improvements as a sustainable additional intervention to reduce transmission"