

BACKGROUND:

Despite the extensive ownership and use of insecticide-treated nets (ITNs) over the last decade, the effective lifespan of these nets, especially their physical integrity, under true operational conditions is not well-understood. Usefulness of nets declines primarily due to physical damage or loss of insecticidal activity.

METHODS:

A community based cross-sectional survey was used to determine the physical condition and to identify predictors of poor physical condition for bed nets owned by individuals from communities in Kwale County, coastal Kenya. A proportionate hole index (pHI) was used as a standard measure, and the cut-offs for an 'effective net' (offer substantial protection against mosquito bites) and 'ineffective nets' (offer little or no protection against mosquito bites) were determined (pHI ≤ 88 (about ≤ 500 cm² of holes surface area) and pHI of > 88 (≥ 500 cm² of holes surface area), respectively).

RESULTS:

The vast majority (78%) of the surveyed nets had some holes. The median pHI was 92 (range: 1-2,980). Overall, half of the nets were categorized as 'effective nets' or 'serviceable nets'. Physical deterioration of nets was associated with higher use and washing frequency. Young children and older children were found to use ineffective bed nets significantly more often than infants, while the physical integrity of nets owned by pregnant women was similar to those owned by infants. Estuarine environment inhabitants owned nets with the worst physical condition, while nets owned by the coastal slope inhabitants were in fairly good physical condition. The results suggest that bed nets are optimally utilized when they are new and physically intact. Thereafter, bed net utilization decreases gradually with increasing physical deterioration, with most net owners withdrawing physically damaged nets from routine use. This withdrawal commonly happens following 1.5 years of use, making bed net use the most important predictor of physical integrity. On average, the nets were washed twice within six months prior to the survey. Washing frequency was significantly influenced by the bed net colour and bed net age. Lack of knowledge on reasons for net retreatment and the retreatment procedure was evident, while net repair was minimal and did not seem to improve the physical condition of the nets. The "catch-up" bed net distribution strategies are sufficient for ensuring adequate ownership and utilization of 'effective nets' in the targeted groups, but bi-annual mass distribution is necessary to provide similar ownership and utilization for the other groups not targeted by "catch-up" strategies.

CONCLUSIONS:

Monitoring and maintenance strategies that will deliver locally appropriate education messages on net washing and repair will enhance the effectiveness of malaria control programmes, and further research to assess ineffective nets need is needed.