# Supplementary Appendix

This appendix has been provided by the authors to give readers additional information.

Supplement to Reimer L.J., Thomsen E.K., Tisch D.T., el al. Insecticidal Bed Nets and Filariasis Transmission in Papua New Guinea. N Engl J Med 2013

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Population dynamic models to predict the probability of transmission extinction

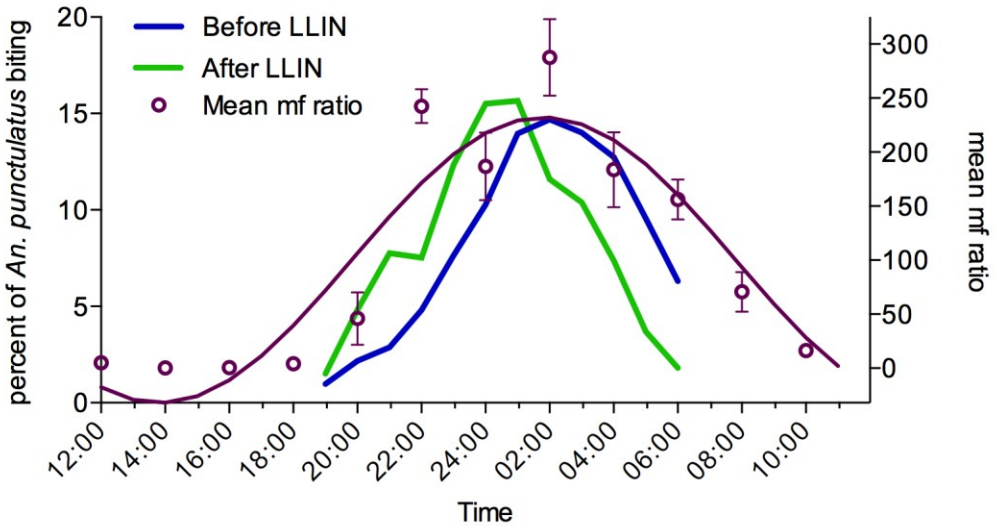
A population model of *Wuchereria bancrofti* infection was developed based on community-specific data describing concurrent mosquito human biting rates and age-specific microfilaria prevalence from Papua New Guinea, Tanzania, and India using previously defined differential equations.[1] The variables of these equations include the estimated adult worm burden, microfilarial level, the average number of infective third-stage larvae per mosquito, and a measure of the experience (exposure or Annual Biting Rate) of the human host with *W. bancrofti* infection. Details of the equations of the model are available in Additional File 1 of reference 1.

The model used for this study was fitted to age-stratified microfilaria prevalence data collected in 2008 from each of the five study villages using a Monte-Carlo based Bayesian calibration framework. Five hundred parameter vectors providing the most likely fits to data were used to calculate a range of 500 threshold biting rates. The probability of transmission extinction associated with the observed monthly biting rates before and after introduction of long lasting insecticidal nets (calculated by multiplying the daily biting rate by 30 then transforming to the natural logarithm) was calculated by determining their exceedance probabilities using the complementary cumulative density of the threshold biting rates estimated for each village.[2,3]

Methods for Figure S1

Mf periodicity

Two adult volunteers from Nanaha village with microfilaria densities >3000 mf per mL at 2400h were identified and accommodated in the Papua New Guinea Institute of Medical Research guest house near Maprik, East Sepik Province. Starting at 1200h, 60 µL finger prick blood samples were obtained from each individual at two-hourly intervals for 24 hours. Thick blood smears were prepared, stained with 4% Giemsa and microfilaria counts determined by microscopic inspection. Theoretical microfilarial periodicity was calculated using a modified trigonometric method.[4] This method results in values expressed as the microfilaria ratio which is defined as the microfilaria density at a single time point divided by the mean density of all times over a 24-hour period. This approach to measure periodicity was used instead of actual microfilaria densities in order to eliminate variation caused by individual differences in infection characteristics as described in reference 4.




FigS1: Changes in anopheline biting time following introduction of long lasting insecticidal nets and nocturnal periodicity of microfilaremia in two Papua New Guinea study participants. Microfilaria (mf) ratios are indicated by purple circles and a purple line. The anopheline biting times in the 24 months before long lasting insecticidal nets were introduced are indicated by the blue line and those in the 11 months after nets were introduced by the green line.

References for Supplementary Appendix

1. Gambhir M, Michael E. Complex ecological dynamics and eradicability of the vector borne macroparasitic disease, lymphatic filariasis. PloS one 2008;3:e2874.
2. Gambhir M, Bockarie M, Tisch D, et al. Geographic and ecologic heterogeneity in elimination thresholds for the major vector-borne helminthic disease, lymphatic filariasis. BMC biology 2010;8:22.
3. Michael E, Malecela-Lazaro MN, Kabali C, Snow LC, Kazura JW. Mathematical models and lymphatic filariasis control: endpoints and optimal interventions. Trends in parasitology 2006;22:226-33.
4. Aikat TK, Das M. A modified statistical method for analysis of periodicity of microfilaria. The Indian journal of medical research 1977;65:58-64.