

STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, March 6, 2007
Sequoia Hall Room 200
(Cookies at 3:45 in 1st Floor Lounge)

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**The Malaria Attributable Fraction: Definition, Inference and Sensitivity
Analysis**

Malaria is an infectious disease caused by a parasite. Malaria is an important public health problem in many countries. A major symptom of malaria is fever. An important epidemiological quantity for measuring the burden of malaria is the proportion of fevers that are attributable to malaria, called the malaria attributable fraction (MAF). A difficulty in estimating the MAF is that it is difficult to diagnose a fever as being due to malaria parasites compared to other illnesses such as influenza, pneumonia, viral hepatitis or typhoid fever. Microscopic examination of blood for malaria parasites helps to diagnose a fever as being due to malaria, but children living in areas of high malaria endemicity often tolerate malaria parasites without developing any signs of disease; consequently, a fever may not be attributable to malaria even if the child has malaria parasites in his or her blood. We consider estimation of the MAF based on data on fever incidence and parasite density in the blood. We present a potential outcomes framework for defining the MAF, and analyze previously proposed estimators in this framework. We show that the classical estimator depends on an assumption that parasite densities among children are effectively randomly assigned, and present evidence that this assumption does not hold. We develop a sensitivity analysis that assesses the sensitivity of inferences to departures from a random assignment of parasite densities assumption.