Title: Estimation of malaria related mortality in children under five years of age using passive surveillnce method in rural Western Kenya

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Abstract: Plasmodium falciparum infection is associated with a high risk of severe disease and death especially among those with little or no acquired malaria immunity such as children between the age of 6-24 months. Malaria-associated deaths occurring in the community, estimated to be about 90% of all malaria deaths, cannot be ascertained through most of the routine surveillance systems in countries of Africa. The objective of this study was to evaluate the effectiveness of civil registration in monitoring under-five deaths during the period of a malaria control intervention study in western Kenya. Retrospective and prospective methods of monitoring mortality in children < 5 years old between April 1997 and March 1998 were used in a population of about 125,000. The study was conducted along side a community-based randomized controlled trial of insecticide-treated bednets (ITBN) which was on-going in western Kenya. The study used civil registration (CR) as the main methodology to review and analyze all deaths of children < 5 years. The study compared the representativeness, completeness, timeliness and cause-specific diagnosis of burial records against mortality surveillance data gathered during ITBN trial which were considered the gold standard. The latter included retrospective biannual census, prospective vital registration (VR) and verbal autopsy (VA). During the one-year period (Apr 97-Mar 98), there was consistency in the mortality trends reported through CR and the rainfall pattern in both the sites with a significant proportion of under-five deaths occurring during the rainy seasons. The proportion of deaths reported through CR and census of children < 1 year and those between 12 - 59 months were similar while for VR, CR under-reported deaths for all age groups. In the Project Site, CR attributed 51.2% of the deaths to measles followed by malaria with 26.0% while VA ascribed 56.8% of the deaths to malaria and only 1.0% of the deaths to measles but the seasonal mortality trends for both CR and VA were similar. Among the postneonates, malaria had sensitivity of 94.1% versus 35.9% specificity and positive predictive value of 35.2% for single cause of death while for multiple causes of death, malaria had sensitivity of 96.1%; specificity of 15.6% and PPV of 75.4%. Although the routine government mortality statistics on under-five years of age child mortality in western Kenya were incomplete, they still represented seasonal and demographic trends in mortality in this age group. CR, however, under-reported malaria and over-estimated measles deaths. VA, on the other hand, provided a better estimate on cause of death for under five year old children. The algorithm could be used as a substitute for the clinicians in deriving cause of death based on VA data. Finally, CR had potential particularly regarding the monitoring of temporal and seasonal trends in child mortality, but was currently under-utilised.