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Long-term effects of insecticide-treated mosquito net (ITN) use during early infancy on mortality and malaria morbidity: A follow- up study in rural Burkina Faso

Promotionsfach: Public Health

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Malaria remains a major public health problem with approximately 154-289 million annual cases worldwide (2010). Moreover, malaria accounted for an estimated 490 000 - 836 000 deaths in 2010, of which 90% occurred in SSA. Most of the deaths prevail in children under 5 years old. Within African countries the prevalence of malaria infection and mortality in children under 5 years old remains particularly high in poor and rural populations. Though the disease has been the focus of international research and control-interventions awhile, malaria remains the main reason for high childhood morbidity and mortality in Burkina Faso and many other African countries.

The two main strategies for sustainable malaria control promoted by the WHO are malaria case management based on early diagnosis and treatment and malaria prevention through vector control by large scale distribution of ITNs/LLINs and/or the application of IRS.

As a consequence and massively supported by various Global Health Initiatives, the ITN intervention is now implemented continuously in SSA on a large scale.

Some time ago, controversy emerged on the possible negative long-term effects of ITN protection. On the basis of the findings from a large ecological study, ITN protection in early infancy was considered as potentially leading to excess mortality in older children due to interference with immunity development. This assumption is based on the hypothesis that in areas of intense and stable malaria transmission infants are protected by passively transferred immunity in the first months of life and when this period is finished they have already acquired functional immunity. ITNs are one of the main tools of malaria control and millions of infants are protected and may thus have a much reduced exposure to malaria. Thus, if this effect could be confirmed, it may have a large public health effect in SSA. However, long-term follow-up of children enrolled in African ITN studies has so far not supported such a hypothesis.

The goal of this study was to clarify whether ITN protection in early infancy is a risk factor for all-cause and malaria related mortality. Further aims were to determine ITN coverage, general morbidity parameters and malaria morbidity prevalence. In addition it should contribute to the existing knowledge of malaria morbidity in Burkina Faso.

The main findings were:

> ITN use in early infancy is not a risk factor of public health importance for excess mortality
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> In our birth cohort followed up under real life conditions, a total of 450 / 2944 (15.3%) children had died
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> Most of the deaths occurred in children under 5 years old

Most of the deaths recorded in the HDSS database were due to malaria

Long-term compliance with the ITN intervention was good in our study cohort

Self-reported mosquito net protection was high during the rainy season and the cold dry season, but not during the hot dry season

There were a total of 339 hospitalisations (range one to five per child), with the majority of children having been hospitalised only once

Most hospitalisations took place in a peripheral health station and main reasons were fever, vomiting and convulsions

Malaria prevalence was still high in our study cohort despite high individual coverage with the ITN intervention

Around 80% of children had detectable malaria trophozoites, mostly *Plasmodium falciparum*.

In conclusion, this study has demonstrated that ITN protection in early infancy is not a risk factor for mortality at older ages.In addition, the use of ITN during early infancy does not lead to a higher incidence of cerebral malaria and thus a higher mortality. Individual ITN protection appears to not sufficiently reduce malaria prevalence in high-transmission areas, with malaria continuing to be the major cause for morbidity of children in the Nouna area of rural Burkina Faso. This supports the importance of achieving universal coverage in malaria high transmission settings. Our figures on general morbidity suggest that access to formal health services is little and proper treatment of the prevalent diseases is not sufficiently offered. Massive strengthening of existing health services will be a prerequisite for the establishment of not only well-functioning malaria control programmes but as well other disease control programmes in SSA countries.