References on malaria and agriculture


### Appendix 1. A summary matrix of selected studies on economic impact of malaria

<table>
<thead>
<tr>
<th>Study</th>
<th>Study site</th>
<th>Objectives</th>
<th>Methodology</th>
<th>Findings</th>
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</thead>
<tbody>
<tr>
<td>Alaba and Olumyiwa 2006</td>
<td>Rural Nigeria</td>
<td>To analyze the incidence of malaria in rural Nigeria and its implication for the country’s efforts to meet the targets of MDG</td>
<td>Cost of illness approach</td>
<td>Substantial resources and domestic output is lost annually to malaria attack in Oyo state.</td>
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<tr>
<td>Asante, Asenso-Okyere and Kusi 2005</td>
<td>Ghana</td>
<td>To estimate the impact of the burden of malaria on economic growth. To estimate the costs of malaria illness and control. To determine the ability and willingness to pay for malaria control.</td>
<td>Production function Cost of illness Willingness to pay</td>
<td>It is found that malaria has a negative effect on real GDP growth. A single malaria episode in the household resulted in an estimated average cost of $15.39.</td>
</tr>
<tr>
<td>Asenso-Okyere and Dzator 1997</td>
<td>Two districts in Ghana</td>
<td>To measure the cost of treating malaria</td>
<td>Survey of 1289 households</td>
<td>The average treatment cost of an episode including the direct costs and opportunity cost of traveling and waiting time is $8.67 or 3.7 days of male output or 4.7 female output</td>
</tr>
<tr>
<td>Asenso-Okyere, Dzator, Osei-Okoto 1997</td>
<td>Ghana</td>
<td>To estimate a disease-specific demand function for determining the utilization of the</td>
<td>Multinomial logit regression model</td>
<td>The choice of malaria care provider is found to be influenced by facility price, travel time.</td>
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<tr>
<td>Source</td>
<td>Country</td>
<td>Methodology</td>
<td>Findings</td>
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<tr>
<td>Attanyake, Fox-Rushby and Mills 2000</td>
<td>Sri Lanka</td>
<td>To measure and value the direct and indirect costs of perceived malaria morbidity at the household level</td>
<td>Survey of 1080 households from central province of Sri Lanka. To fully recover from malaria, a household on average incurs total cost of $7. It incorporates 22% as indirect cost, 24% as direct cost and 32% as indirect cost for households.</td>
<td></td>
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<tr>
<td>Brohult et al. 1981</td>
<td>Liberia</td>
<td>To assess the impact of malaria prophylaxis upon the physical working capacity of Liberian industrial workers</td>
<td>Group samples of industrial workers. There is no significant difference across groups of men with and without malaria prophylaxis in terms of hemoglobin concentration, haematocrit, blood volume and physical performance.</td>
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<tr>
<td>Chima 2003</td>
<td>General</td>
<td>To review problems in using the data of the direct and indirect costs of malaria prevention and treatment of the existing studies.</td>
<td>Literature review. Past studies generally focus on febrile illness; overestimate the cost of uncomplicated malaria but underestimate the costs of severe illness.</td>
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<tr>
<td>Chuma, Thiede and Molyneux 2006</td>
<td>Kenya</td>
<td>To develop and apply a framework that incorporate a range of factors in exploring the link between malaria, poverty and vulnerability at the household level</td>
<td>Cross sectional survey in dry and wet seasons. The impact of malaria on household economic status is extended slowly over time. Coping strategy adopted can have negative implication, influencing household ability to</td>
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<td>Study</td>
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<td>Methodology</td>
<td>Findings</td>
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<tr>
<td>Cropper et al., 1999</td>
<td>Tembien district of Ethiopia</td>
<td>To measure in monetary value the household costs in preventing malaria</td>
<td>Willingness to pay approach</td>
<td>The value of preventing malaria with vaccine is about $36 per household per year or 15% of the inputed annual income of the household</td>
</tr>
<tr>
<td>Endah and Ndambi 2006</td>
<td>Western Highlands of Cameroon</td>
<td>To examine the impact of malaria on food production</td>
<td>Epidemiological survey conducted on 515 people; blood sample and hospital laboratory</td>
<td>Malaria causes weakness of patients there by reducing labor outputs, causes cycles of interruptions and also causes deviation of funds from farm inputs to treatment cost for malaria</td>
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<tr>
<td>Ersado Amacher and Alwang 2003</td>
<td>Tigray Region in Ethiopia</td>
<td>To determine the interaction between investments, community health, adoption of productivity and land enhancing technologies by households</td>
<td>Cross section survey of 800 households; Econometric model (adoption sequencing)</td>
<td>Time spent on treating sickness and opportunity cost of caring for the sick affect adoption through its impact on household income and labor decision</td>
</tr>
<tr>
<td>Ettling et al. 1994</td>
<td>Malawi</td>
<td>To explore the knowledge, attitude, perception and practices of malaria</td>
<td>KAP survey on Malawian households</td>
<td>The location and severity of malaria are mostly determined by climate and ecology not poverty per se. The geographically favored region has been able to reduce malaria has grown substantially.</td>
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<tr>
<td>Gallup and Sachs 2001</td>
<td>Countries affected by Malaria across the world</td>
<td>To determine the cause of malaria between countries</td>
<td>Regression model Indexing</td>
<td></td>
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<td>Study</td>
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<tr>
<td>Gikandi et al. 2008</td>
<td>Rural Kenya</td>
<td>To evaluate barriers preventing pregnant women from using Insecticide Treated Nets (ITN) and Intermittent Presumptive Treatment (IPT) with sulphadoxine pyrimethaine (SP), 5 years after the launch of national malaria strategy in rural Kenya</td>
<td>Survey of 72 households</td>
<td>Although the use of ITN had increased by 10 fold, the use of IPT coverage remains low.</td>
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<tr>
<td>Girardin et al. 2004</td>
<td>Rural Cote d’ivoire</td>
<td>To assess the feasibility and quantify the microeconomic consequences and health impact of a project that aims at agricultural intensification through off-season vegetable farming</td>
<td>Survey of 64 households</td>
<td>During a single cabbage production cycle, those farmers who were prescribed sick because of malaria for more than 2 days had 47% lower yields and 53% lower revenue than farmers who missed a maximum of two days.</td>
</tr>
<tr>
<td>Greenwood 2005</td>
<td>General</td>
<td>To explore ways to improve malaria prevention and treatment</td>
<td>Literature review</td>
<td>Insecticide treated bed-nets is a simple but effective means of preventing malaria especially with the development of long-lasting nets in which insecticide is incorporated into the net fibers</td>
</tr>
<tr>
<td>Guiguemde et al. 1994</td>
<td>Bobo-Dioulasso town in Burkina Faso</td>
<td>To measure the household expenditure on malaria prevention and treatment for households in Bobo-Dioulasso town</td>
<td>Survey of households conducted over 6 months period</td>
<td>The average total costs of treating malaria for the 6 months are $42 per household. Malaria prevention techniques include chemical prophylaxis, aerosol</td>
</tr>
</tbody>
</table>
Hutubessy, Bendib and Evans 2001 | Various issues on malaria interventions | To explore the costs and consequence of various malaria control interventions by allocative efficiency | Literature review |
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To explore methodological improvement on interventions that would allow the result to be more generalized

To explore a way of measuring long term effects on malaria interventions

Konradsen et al. 1997 | Five villages in dry zones of Sri Lanka | To measure the economic cost of malaria to households in Sri Lanka | Survey of 298 household over a one-year period |

The annual economic cost to household for malaria is $15.56 and $47.46 for other illness

Konradsen, Van der Hoek, Amersinghe 1997 | Five villages in dry zones of Sri Lanka | To explore the community perceptions, preventive measures and illness behavior to malaria costs | 218 households surveyed |

Malaria was ranked the third most important concern and overall knowledge of malaria causes, symptoms, and treatment is high. Preventive measure by households include bed nets, mosquito coils and insecticides

Kumar et al. 2007 | India | To describe the magnitude of malaria burden in | Disability adjusted life years |

Retrospective analysis showed that disability adjusted
<table>
<thead>
<tr>
<th>Authors</th>
<th>Countries/Regions</th>
<th>Goal</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leighton and Foster 1993</td>
<td>Nigeria and Kenya</td>
<td>To examine the economic impact of malaria</td>
<td>Focus group discussion and secondary data</td>
<td>In Kenya, the agriculture sector suffers much in terms of lost agriculture production while in Nigeria the service sector is the one that is affected most.</td>
</tr>
<tr>
<td>McCarthy, Wolf and Wu 2000</td>
<td>Various countries across the world with special focus to Sub-Saharan African countries</td>
<td>To explore the cross sectional difference in malaria morbidity and examine the linkage between malaria and economic growth</td>
<td>Descriptive statistics regression model</td>
<td>There is a significant negative association between high malaria morbidity and the growth rate of GDP per capita</td>
</tr>
<tr>
<td>Russell 2003</td>
<td>General</td>
<td>To review and summarize studies that have measured the economic costs and consequences of illness for patients and families</td>
<td>Literature review</td>
<td>Nearly all studies presented evidence on what costs of illness had contributed directly and indirectly for patients and how costs might be lowered through improvement in the health service delivery or financing</td>
</tr>
<tr>
<td>Picard and Mills 1992</td>
<td>Two districts in Nepal</td>
<td>To analyze the extent, and incidence and the loss of effective work time caused by malaria</td>
<td>Literature review</td>
<td>The mean pair-wise difference in period worked wholly or partially disabled by illness in the month preceding interview were respectively 5.31 and 1.21 days</td>
</tr>
<tr>
<td>Sachs and Malaney 2002</td>
<td>Various countries across the world</td>
<td>To explore the global malaria transmission patterns</td>
<td>Literature Review</td>
<td></td>
</tr>
<tr>
<td>Sauerborn et al. 1991</td>
<td>Burkina Faso</td>
<td>To estimate the direct and indirect costs in Burkina Faso</td>
<td>Survey of 626 households in Solenzo medical district of Burkina Faso in 1985</td>
<td>Cost per case was averaged $5.96 and cost per capita is $1.96. Indirect cost due to mortality is $0.79 per capita, and direct cost incurred by users (e.g. transportation and direct purchases) is $0.22 per capita.</td>
</tr>
<tr>
<td>Sawyer 1993</td>
<td>Brazil</td>
<td>To analyze the economic and social consequences of malaria in colonization projects of the settler populations in new frontier areas</td>
<td>Descriptive analysis</td>
<td>High malaria prevalence interferes with the scope and stability of permanent agricultural settlements, and it imposes economic and social costs which extend far beyond immediate need for control and treatment of the disease</td>
</tr>
</tbody>
</table>