

# THE ECONOMIC BURDEN OF ILLNESS FOR HOUSEHOLDS IN DEVELOPING COUNTRIES: A REVIEW OF STUDIES FOCUSING ON MALARIA, TUBERCULOSIS, AND HUMAN IMMUNODEFICIENCY VIRUS/ACQUIRED IMMUNODEFICIENCY SYNDROME

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**Abstract.** Ill-health contributes to impoverishment, a process brought into sharper focus by the impact of the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) epidemic. This paper reviews studies that have measured the economic costs and consequences of illness for households, focusing on malaria, tuberculosis (TB), and HIV/AIDS. It finds that in resource-poor settings illness imposed high and regressive cost burdens on patients and their families. Direct and indirect costs of illness for malaria were less than 10% of the household income, but still significant when combined with the costs of other illnesses. The costs of TB and HIV/AIDS were catastrophic for households (more than 10% of the income). Health service weaknesses in many countries, including low coverage, user charges, and poor quality of care, contributed to high costs. Poor households in developing countries with a member with TB or HIV/AIDS struggled to cope, highlighting the urgent need for a substantial increase in health sector investment to expand access to preventive and curative health services. Government and non-governmental interventions should also be broadened to encompass measures that reduce the substantial indirect costs associated with diseases such as malaria, TB, and HIV/AIDS.

## INTRODUCTION: PURPOSE AND SCOPE OF THE PAPER

Ill-health can contribute to impoverishment, broadly defined in this paper as processes of household asset depletion and income loss that cause consumption levels to fall below minimum needs, processes brought into sharper focus by the social and economic impact of the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) epidemic.<sup>1–3</sup> Concern about the links between ill-health and impoverishment has placed health at the center of development agencies' poverty reduction targets and strategies<sup>4,5</sup> and strengthened arguments for a substantial increase in health sector investment to improve access for the world's poorest people to combat poverty as well as reduce disease burdens.<sup>6</sup>

Household interactions with health services, and the costs people incur due to illness, are also central to the performance of health care interventions, particularly their coverage and equity implications. Existing cost barriers and quality weaknesses deter use of health services, particularly by the poor,<sup>7–9</sup> so services are often ineffective in reaching the poor and generate less benefit for the poor than the rich. Health services can also impose regressive cost burdens, with poor households spending a higher proportion of their income on health care than better-off households.<sup>10</sup>

This paper reviews studies that have measured the economic costs and consequences of illness for patients and their families, focusing on all illnesses, malaria, tuberculosis (TB), and HIV/AIDS. The three diseases were selected because they are major sources of morbidity and mortality in developing countries and their different severity and duration are likely to have different economic implications. The review addresses the following questions:

- What are the direct and indirect costs of illness to households?
- How do households manage or cope with illness costs?
- What is the impact of illness costs and coping strategies on household assets, income flows and processes of impoverishment?

- Is there evidence to suggest that health service characteristics exacerbate or mitigate illness costs for poor households?

The paper does not explore the macroeconomic costs of illness, for example, losses of tourism due to malaria, although these may be significant.<sup>11,12</sup>

## MATERIALS AND METHODS

**Conceptual framework and definitions.** Figure 1 presents the conceptual framework for the review that was derived from studies that have investigated the household costs of illness, coping strategies, and their economic consequences at the household level.<sup>9,13–15</sup> The household is the preferred unit of analysis for assessing the costs of illness because decisions about treatment and coping are based on negotiations within the household (but not necessarily from an equal bargaining position), illness costs are incurred by caregivers as well as the sick, and costs fall on the household budget.<sup>16,17</sup>

In response to perceived illness (Figure 1, Box 1), decisions are made about whether to seek treatment and from which source (Figure 1, Box 2). The health system is shown as a resource outside the household on which members can draw (Figure 1, Box 6). Illness costs are broken down into direct (Figure 1, Box 3a) and indirect costs (Figure 1, Box 3b). Direct costs refer to household expenditure linked with seeking treatment, including non-medical expenses such as transport or special foods. Indirect costs refer to the loss of household productive labor time for patients and caregivers. The term cost burden refers to direct or indirect costs expressed as a percentage of household income. Some analysts assume that a cost burden greater than 10% is likely to be catastrophic for the household economy,<sup>18,19</sup> meaning that it is likely to force household members to cut their consumption of other minimum needs, trigger productive asset sales or high levels of debt, and lead to impoverishment. However, this 10% figure is somewhat arbitrary because it may not be catastrophic for high-income households that can cut back on luxuries or for

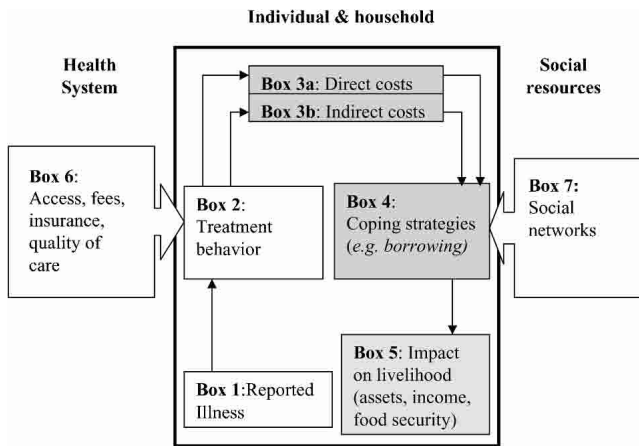


FIGURE 1. Conceptual framework for analyzing the economic burden of illness for households.

resilient households that can mobilize assets to pay for treatment.<sup>13</sup>

Direct and indirect costs will be influenced by type and severity of illness (Figure 1, Box 1) and health service characteristics (Figure 1, Box 6) that influence access and choice of provider. Illness costs going beyond the household's daily or monthly budget may trigger coping strategies such as borrowing or asset sales (Figure 1, Box 4). In situations of poverty where households struggle to meet daily food and fuel needs, the loss of a daily wage due to illness or a relatively small treatment expense is likely to trigger such strategies,<sup>13,14,20</sup> including claims on resources outside the household such as social networks or local organizations that offer credit (Figure 1, Box 7). Illness costs and coping strategies then have implications for household asset portfolios and processes of impoverishment (Figure 1, Box 5). The highlighted boxes in Figure 1 illustrate this paper's focus on illness costs, coping strategies, and the more limited evidence on links between illness and impoverishment.

**Methodologic and comparative difficulties with cost of illness studies.** Comparing cost of illness studies is difficult because of the different definitions and methods used to measure and quantify cost.<sup>21-23</sup> With respect to direct costs, all studies measure medical costs but some ignore non-medical costs such as transport. The scope of indirect cost measurement varies considerably across studies: some only include economically active individuals, but others include children and the elderly; most measure the time spent seeking treatment by the patient and caregiver and their loss of productive labor time due to illness. A few studies extend measurement to the cost of mortality in terms of lifetime income foregone. Perhaps the greatest variation arises from the different methods used to place a value on productive time lost, for example, an average wage rate, average daily output per adult, or the actual output and income lost for each respondent. Studies also varied in their units of analysis, for example, costs were expressed per episode, per month, or per year, and by per capita household spending or total household spending. No studies included the less quantifiable costs associated with suffering, grief, or social exclusion arising from illness.

**Methods.** Studies were identified through systematic literature searches using electronic databases, principally Medline, ISI Web of Science (Social Science Citation Index), Science

Direct, Social Science, and Ingenta. Internet sites likely to provide relevant information were used and a network of colleagues also provided unpublished reports. Studies were selected for review by the author if they included data or discussion on the costs of illness for patients and their families, household coping strategies in response to illness, or the repercussions of illness costs and coping for the household economy. Studies on the costs of health care provision or the macroeconomic costs of illness were excluded.

## RESULTS

**Direct illness costs.** Tables 1-4 summarize the direct costs of illness reported by studies from the four illness categories. Costs have been converted to 1999 US dollars to allow comparison, but within each table some comparisons should be made with caution because of methodologic differences (see table footnotes). In most all illness studies (Table 1), mean direct costs were estimated to be between 2.5% and 7.0% of household income. Two studies estimated the direct cost burden of illness to be catastrophic for households (greater than 10%).

Table 2 summarizes the direct costs of malaria. The highest costs were found in urban Cameroon and rural Ghana where patients attending public health care facilities pay high user fees for pharmaceuticals. The three studies that expressed spending on malaria as a proportion of income indicate that as a single disease malaria imposed a relatively low direct cost burden. When combined with other direct illness costs, however, malaria's economic significance for households is likely to be greater, for example, in Nigeria the direct malaria cost burden (2.9%) combined with other direct illness costs (US \$2.66 or 4.1%) produced a total mean direct cost burden of \$4.54 or 7% of household income per month.<sup>25</sup>

Table 3 shows that households incurred much higher direct costs for TB than for malaria. With the exception of the Malawi study, mean household spending on TB ranged from about \$50 to more than US \$100 over the treatment period (usually from 6 to 12 months), imposing cost burdens of 8-20% of annual income in already impoverished settings. In two studies, the cost burden was actually expressed as a much higher percentage of monthly income, for example, in Zambia

TABLE 1  
All illness studies: overview of direct cost burdens\*

Country	Direct costs as a % of household (hh) income (mean)	Sample size (hhs)
Paraguay <sup>24</sup>	2.5	
Guatemala <sup>24</sup>	16.0	
Burkina Faso <sup>24</sup>	4.4	
Burkina Faso <sup>17</sup> (rural)	3.7	566
Sierra Leone <sup>10</sup> (rural)	6.9	1,156
Uganda <sup>7</sup> (rural)	9.3/11.0	400
Nigeria <sup>25</sup> (rural)	7.0	2,040
South Africa <sup>24</sup>	4.9	
Sri Lanka <sup>14</sup> (urban)	6.5	323
Thailand <sup>24</sup>	3.4	
Thailand <sup>26</sup> (urban)	2.6	320
Vietnam <sup>27</sup> (rural)	7.1	1,024

\* Source: adapted from McIntyre and Thiede.<sup>22</sup> The studies from Makinen and others<sup>24</sup> only include medical expenses and not transport, etc. Most cost burdens are expressed as mean annual spending as a % of mean annual income. In Uganda and Sri Lanka, cost burdens are mean monthly spending as a % of mean monthly income.

TABLE 2  
Malaria studies: overview of direct costs\*

Country	Direct costs (US\$)			Direct costs as a % of household (hh) income	Sample size (hhs)
	Prevention	Treatment	Total		
			Per capita per month		
Malawi <sup>28</sup> (nationwide)	\$0.05	\$0.41	\$0.46	2.0	
Tanzania <sup>29</sup> (urban)	\$0.76				
Zaire <sup>30</sup> (urban)	\$0.97				
Cameroon <sup>31</sup> (urban)	\$1.29	\$2.05	\$3.34		
Cameroon <sup>32</sup> (urban)	\$1.74	\$2.67	\$4.41		
Cameroon <sup>33</sup> (urban)	\$2.10	\$3.88	\$5.98		
Burkina Faso <sup>34</sup> (rural)	\$0.09				
Burkina Faso <sup>35</sup> (urban)	\$0.93	\$1.18	\$2.11		
			Per hh per month		
Nigeria <sup>25</sup> (rural)		\$1.84	\$1.84	2.9	2,040
Sri Lanka <sup>36</sup> (rural)		\$1.91	\$1.91	2.0	1,080
			Per patient/per episode		
Ghana <sup>37</sup> (rural-all cases)		\$2.09	\$2.09		1,614
Ghana <sup>37</sup> (rural-facility)		\$7.38 (severe)	\$7.38		1,614
		\$3.72 (mild)	\$3.72		
Sri Lanka <sup>38</sup> (rural)		\$3.28	\$3.28		216

\* Source: adapted from Chima and others.<sup>21</sup> All prices are converted to 1999 US\$.

spending on TB treatment was equivalent to 99% of mean monthly income (converted to an annual burden in Table 3 by dividing by 12).

Table 4 summarizes direct costs incurred by households with a member with terminal AIDS, which included substantial funeral expenses in some cases. The AIDS-related treatment and funeral costs were exorbitant and, like TB costs, likely to be catastrophic for poor rural households in sub-Saharan Africa or Thailand, absorbing 50% or more of annual income. The research in Tanzania and Thailand also found that medical spending on AIDS deaths was higher than for non-AIDS deaths because of the long duration of the disease. However, the survey methods of the studies in Table 4 may have underestimated the costs of HIV/AIDS<sup>2</sup> because they did not allow lengthy encounters or observation. Thus, while the results of the Kagera study, for example, show an appalling situation, ethnographic and case study approaches have revealed even more serious economic devastation and struggling for some households.<sup>50,51</sup>

TABLE 3  
Tuberculosis (TB) studies: overview of direct costs\*

Country	Direct costs over treatment period (mean)	Direct costs as a % of annual household (hh) income	Sample size (hhs)
	Pre-diagnosis and post-diagnosis		
Thailand <sup>39</sup> (urban/rural)	\$131	8.6	673
India <sup>40</sup> (urban/rural)	\$60	13.0	304
Tanzania <sup>41</sup> (urban)	\$52	9.3	191
	Pre-diagnosis		
Bangladesh <sup>42</sup> (rural)	\$135	21.7	21
Zambia <sup>43</sup> (urban/rural)	\$49	8.3	202
Malawi <sup>44</sup> (urban)	\$12	5.0	179
	Post-diagnosis		
India <sup>45</sup> (urban)	\$111	18.4	16

\* All prices are converted to 1999 US\$. Some studies measured spending on TB treatment before and after diagnosis, but others measured spending only either before or after diagnosis. In the Thai study, the cost analysis was stratified by socio economic group, so the figure used is the direct cost of TB for the middle-income (but still poor) group. The direct cost figure from the Tanzanian study assumes an average duration of illness of 10 months. Costs as a % of income are estimates based on the studies' estimates of income or on my estimates of household income from other sources.

**Medical and non-medical direct costs.** The proportions spent on medical and non-medical items varied due to demand factors such as preferences for special foods and supply factors such as service availability, distance, and user fee policy. In Ghana, the relatively high direct cost of treating malaria (Table 2) was linked to pharmaceutical costs at public facilities and private shops: 62% and 70% of malaria spending was on pharmaceuticals for mild and severe cases, respectively.<sup>37</sup> In contrast, in Sri Lanka where public treatment is free, medical costs were a low proportion of direct costs (32%<sup>36</sup> and 14%<sup>38</sup>) compared with the costs of transport (22%<sup>36</sup> and 21%<sup>38</sup>) and in particular special foods (46%<sup>36</sup> and 32–52%<sup>38</sup>). The high level of spending on special foods was linked to Ayurvedic beliefs about diseases of heat and cold and the need to counter the heating effect of malaria with (expensive) oranges and sweet drinks. Spending on TB treatment also revealed the importance of transport and special food costs. The most extreme case was in Zambia where spending on non-medical items was dominant (78%), mainly on transport (27%) and special foods (44%). The foods were not usually part of patients' diets due to their expense, but as therapy for TB patients spent an average \$21.00 per month (44% of a month's income) on meat, eggs, vegetables, oranges, and orange-flavored soft drinks.<sup>52</sup> These are hidden costs of illness but critical to household ability to pay for treatment.

**Distribution of direct costs across households and time.** Direct costs were regressive, imposing a greater burden on poor families than better-off families. Although the poor in general spend less on treatment than other income groups (due to lack of access, inability to pay, greater use of public services), the spending is a higher proportion of income. Among all illness cost studies, regressive cost burdens were identified in India,<sup>53</sup> China,<sup>15</sup> Thailand,<sup>26,54</sup> Vietnam,<sup>27</sup> and Sierra Leone.<sup>10</sup> In Vietnam, for example, mean household health expenditure over the whole sample was 7.1% of income (Table 1), but 19.4% for the poorest quartile compared with only 3.9% for the richest.<sup>27</sup> Only one malaria study<sup>28</sup> and two TB studies<sup>39,44</sup> stratified analysis by income group and all three

TABLE 4  
HIV/AIDS studies: overview of direct costs of terminal AIDS cases\*

	Direct costs (US \$)			Direct costs as a % of annual household (hh) income	Sample size (hhs)
	Over terminal period	For funeral	Total		
Tanzania <sup>46</sup> (Mwanza)	\$72	\$45	\$117	Towards 100%	73
Tanzania <sup>3</sup> (Kagera) (male deaths)	\$83	\$80	\$163	50–100%	
Tanzania <sup>3</sup> (Kagera) (female deaths)	\$39	\$56	\$95	50–100%	
Cote d'Ivoire <sup>47</sup>				8.4%	107
Thailand <sup>48</sup>	\$1,076	\$1,596	\$2,672	> 100%	116
South Africa <sup>49</sup>				34%	728

\* All prices are converted to 1999 US\$. Costs as a % of income are estimates based on the studies' estimates of income or on my estimates of household income from other sources. HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome.

found regressive cost burdens. Annual spending on malaria treatment in Malawi, for example, was estimated to be 28% of annual income among very poor households compared with only 2% for other households.

Direct illness costs were distributed unevenly across households and a minority incurred very high costs that raised the mean above the median. Median figures therefore usually reflect more accurately the costs facing the majority of households, but in most of the studies only the mean was presented. In Sri Lanka, for example, the mean direct cost burden for all illnesses was 6.5% of monthly income (Table 1), but the median was only 1.3%. The mean cost figures listed in Tables 1–4 also smooth cost fluctuations over time that can have a significant bearing on affordability. Health expenditures tended to be lumpy, coming in peaks that intensified cost burdens over a few days or weeks.

**Health service provision and direct costs of illness.** Financing and delivery arrangements and quality of care influenced patient interactions with public and private providers and therefore direct costs. With respect to public financing policy, user fees contributed to high direct costs of malaria in Ghana<sup>37</sup> and high TB costs in Zambia,<sup>52</sup> Thailand,<sup>39</sup> and Tanzania.<sup>41</sup> Serious illness requiring hospitalization also caused very high direct costs in countries where fees were charged and the poor or informal sector workers lacked insurance. In contrast, in Sri Lanka where public hospital inpatient (IP) treatment is free at the point of delivery, the mean direct cost burden for hospital IP cases was only 1.2% of household monthly income,<sup>14</sup> compared with the total direct cost burden of 6.5% (Table 1). Free hospital treatment is a core component of the Sri Lankan government's universal coverage policy that aims to protect the majority, particularly the poor, from catastrophic illness costs. The country's public health services are almost unique among developing countries because they have achieved a pro-poor benefit incidence.<sup>55</sup>

Direct cost burdens were exacerbated by the widespread

preference to use private providers for illnesses requiring outpatient treatment, particularly in urban settings and even by the poorest. In Sierra Leone, for example, a minority of high cost treatment episodes involving private doctors (or hospital care) accounted for more than 50% of direct costs.<sup>10</sup> If half of these cases had been treated at local health centers, the mean cost burden would have decreased from 6.9% (Table 1) to 5.6%. Similarly, in Sri Lanka the mean direct cost burden of 6.5% (Table 1) was inflated by people's preference to use private doctors and pharmacies for outpatient treatment, with private consultation fees making up 40% of all household spending on illness.<sup>14</sup> Poor quality of care at public facilities was a key factor explaining preferences for private providers, in particular crowds and long waiting times and cursory consultations, and in sub-Saharan Africa the lack of basic inputs such as pharmaceuticals and staff. Some malaria studies, for example, revealed patient reluctance to use public health facilities due to long waiting times and poor interpersonal quality of care.<sup>36,37</sup>

**Indirect and total illness costs.** Lost labor time due to illness often means household capacity to earn income is reduced at a time when it needs additional money to pay for treatment. Table 5 summarizes three studies that measured the direct and indirect costs of all illnesses for households. In rural Burkina Faso, indirect costs were the largest component (69%) of total costs and the time lost by healthy caregivers was almost equal to the time lost by the sick. In Sri Lanka, higher direct costs reflected the urban setting and widespread use of private providers for outpatient services. Table 5 shows that mean total illness cost burdens could be interpreted as catastrophic if the threshold of 10% is used, even in Sri Lanka where public services are free, raising the important policy question of how to better protect households from illness costs.

The indirect costs of malaria are likely to be a key determinant of the disease's overall costs because adults give up

TABLE 5  
All illness studies: summary of direct, indirect, and total costs\*

Country	Direct costs (% of hh income)	Indirect costs (% of hh income)	Total costs (% of hh income)	Sample size (hhs)
Burkina Faso <sup>17</sup> (rural)	\$5.70 (3.7%)	\$12.53 (8.1%)	\$18.26 (11.8%)	566
Nigeria <sup>25</sup> (rural)	\$4.54 (7.0%)	\$2.41 (3.7%)	\$6.95 (10.7%)	2,040
Sri Lanka <sup>14</sup> (urban)	\$7.66 (6.5%)	\$5.21 (5.0%)	\$12.87 (11.5%)	323

\* All prices are converted to 1999 US\$. hh = household.

activities to care for children when they are afflicted or the disease directly strikes the economically active population. Studies in Africa have found that indirect costs make up more than 75% of total household malaria costs.<sup>37,56,57</sup> Nearly all studies from Africa found that sick adults lost 1–5 days per malaria episode, depending on severity.<sup>21</sup> Similar levels of disruption to normal activity days per episode have been found in Sri Lanka.<sup>36,58,59</sup> In one study, the number of episodes over the year ranged from 0 to 5 per individual and from 0 to 11 per household, and were concentrated in the rainy season when agricultural activities and therefore the opportunity costs of lost time were greatest.<sup>59</sup>

The estimated value of days lost due to malaria was quite high given the poverty settings of the studies, for example, in Ghana \$7.63 per episode,<sup>37</sup> in Sri Lanka \$4.78 per episode,<sup>36</sup> and in Malawi \$1.54.<sup>28</sup> However, these figures do not provide a clear picture of total income losses and their significance because they do not consider all malaria episodes over the year and the income losses need to be expressed as a proportion of income.

Several studies attempted indirect cost burden calculations and indicate that income losses from malaria can be of great economic significance to households, ranging from 2% to 6% of annual income (Table 6). Although the indirect costs of malaria were less than 10% of household income, these burdens must be interpreted in the light of other indirect illness costs. For example, in one of the Sri Lankan studies<sup>59</sup> when a 6% income loss from malaria was added to other indirect illness costs (US \$52 per year or 18% of annual income), the mean total indirect cost burden was 24%. In Nigeria, indirect costs from malaria were actually higher (US \$1.31 or 2% of income) than all other illnesses combined (US \$1.10 or 1.7%).

A few studies estimated the total household cost of malaria by adding direct and indirect cost estimates, for example, in Malawi 7.2% of annual income,<sup>28</sup> in Nigeria 4.9%,<sup>25</sup> in Sri Lanka 6.7% of monthly income,<sup>36</sup> and in Kenya 9–13% of annual income.<sup>60</sup> Only the Malawi study disaggregated total costs of malaria by socioeconomic group and found them to be regressive: the average total cost burden was 7.2% but for the very poor it was a potentially catastrophic 32% of annual income.<sup>28</sup>

The indirect costs of TB were higher than those for malaria because of the long duration of the disease, long delays before proper diagnosis, and its prevalence among the economically active population.<sup>39,40,41,43,52</sup> Table 7 summarizes the data available on the direct, indirect, and total costs of TB and shows the catastrophic proportions of household income absorbed by the disease in already impoverished settings. The financial hardship caused by TB, particularly for the poor, is likely to deter many poor people from seeking treatment.<sup>52</sup> In Vietnam, for example, focus group discussion participants argued that poor people needed to work and could not afford to

seek TB treatment for fear of losing earnings and even their job.<sup>61</sup>

In addition to the catastrophic direct costs of HIV/AIDS (Table 4), the indirect costs of the disease are also considerable because in its latter phases HIV/AIDS makes ill and kills children and prime-age adults. From this morbidity and mortality flow many indirect costs for the household economy, the most common being the loss of a breadwinner and income earning opportunities, and diversion of productive labor to caring, particularly in the latter phases of the disease when the patient is very sick and requires constant and long-term care.<sup>1,2,3,46–49,62–68</sup> For example, in Tanzania males with AIDS lost an average of 297 days of productive work over an 18-month period and women lost 429 days.<sup>64</sup> Women lose more days than men because in general they work longer hours, perform both productive and reproductive activities, and are more likely to be caregivers within the household.<sup>22</sup> In Thailand, 35% of the households with an AIDS death ( $n = 116$ ) felt a serious impact on agricultural production, leading to a 48% reduction in family income.<sup>48</sup>

The serious indirect costs of AIDS-related morbidity and mortality require understanding, but quantifying complex and diverse indirect costs over time is difficult and perhaps of less use than research that generates knowledge on household responses and impacts. Therefore, understanding the indirect costs of AIDS, malaria, and TB cannot be complete without analysis of the coping strategies adopted by households to deal with illness.<sup>9,13,21,22</sup> On the one hand, ignoring a household response such as labor substitution to mitigate the indirect costs of illness would lead to overestimation of indirect costs. On the other hand, ignoring borrowing and asset sales that undermine future income streams and threaten the sustainability of the household economy would lead to underestimation of costs. To fully understand the economic impact of illness, it is necessary to go beyond health expenditures and lost activity days to examine coping strategies and their implications for livelihood sustainability.

**Coping, struggling, and impoverishment.** In response to illness, household members make decisions about treatment and if the illness is serious they may have to reallocate tasks to cope with the loss of a worker or to care for a sick child, and borrow money to pay for treatment or replace lost earnings. These coping strategies can be defined as actions that aim to manage the costs of an event or process (e.g., illness) that threatens the welfare of one or more members of the household. Ultimately coping strategies are seeking to sustain the economic viability and sustainability of the household.<sup>9</sup>

Several studies have identified household coping strategies in response to illness and some have categorized these,<sup>9,13,22</sup> distinguishing between strategies that deal with direct costs (e.g., borrowing) and indirect costs (intra-household labor substitution), and between cost prevention strategies (ignor-

TABLE 6  
Indirect costs of malaria as a proportion of income

Country	Unit of analysis	Indirect costs as % of household (hh) income	Sample size (hhs)
Malawi <sup>28</sup> (nationwide)	Annual cost of all episodes	2.6%	
Sri Lanka <sup>36</sup> (rural)	Monthly cost per episode	4.9%	1,080
Sri Lanka <sup>59</sup> (rural)	Annual cost of all episodes	6.0%	216
Nigeria <sup>25</sup> (rural)	Monthly cost of all episodes	2.0%	2,040

TABLE 7  
Tuberculosis (TB) studies: summary of direct, indirect, and total household costs\*

Country	Direct hh costs (% annual hh income)	Indirect hh costs	Total hh cost	Sample size (hhs)
Thailand <sup>39</sup> (urban/rural)	\$131 (8.6%)	\$53 (2.3%)	\$184 (10.9%)	673
India <sup>40</sup> (urban/rural)	\$60 (13%)	\$117 (26%)	\$177 (40%)	304
Zambia <sup>43</sup> (urban/rural)	\$49 (8.3%)	\$28 (4.8%)	\$77 (13.1%)	202
Tanzania <sup>41</sup> (urban)	\$52 (9.3%)	\$447 (80%)	\$499 (89.3%)	191

\* All prices are converted to 1999 US\$. In the Thai study, the cost analysis was stratified by socioeconomic group, so the figure used is the indirect cost of TB for the middle-income (but still poor) group. The indirect cost figure from the Tanzanian study is a middle or average estimate involving productivity losses for eight months. Costs as a % of income are estimates based on the studies' estimates of income. hh = household.

ing illness, non-treatment, [Figure 1, Box 2]) and cost management strategies (borrowing, selling assets, labor substitution [Figure 1, Box 4]).

Although studies have documented strategy types and sequences, few have adopted a longitudinal design to evaluate the implications of strategies for the household economy, in terms of assets, income and consumption patterns, debt levels, and livelihood sustainability (Figure 1, Box 5). In other words, more research needs to ask the questions: are strategies successful or sustainable, in terms of preserving assets, sustaining production and income levels, and averting the collapse of the household? Or do strategies damage asset portfolios, reduce income and consumption, lead to high levels of debt, and threaten the sustainability of the household economy and its existence as a social unit? <sup>9</sup>

Two key factors influence household ability to cope with illness costs successfully. The first is the household's vulnerability or ability to cope with a shock, which is founded on its asset portfolio that includes tangible assets such as physical and financial capital, and less tangible assets such as education (human capital) and social resources. The latter are the social networks on which claims can be made to obtain other resources, particularly information, opportunities, and support. Social resources include kin and friendship networks, links to influential contacts, and membership in organizations such as credit associations or funeral societies. Evidence from developing countries shows that networks are one of the most important resources mobilized by households to obtain money to pay for treatment,<sup>9,13,15,27,69-75</sup> but some evidence suggests that the poorest have the weakest social resources and are more likely to be excluded from inter-household community support mechanisms.<sup>9,14,27,69</sup> Second, ability to cope successfully will be influenced by the type, severity, and duration of illness. As this review has demonstrated, different diseases impose different direct and indirect cost burdens, triggering strategies of different magnitude and risk to livelihood sustainability. Four categories of illness based on work by McIntyre and Thiede<sup>22</sup> are used below to structure a brief review of coping strategies and their economic success or impact. The categories reflect the types of disease reviewed in this paper.

**Acute mild or moderate illness.** Common illness shocks affecting households, particularly those with young children, were commonly managed through use of savings, pawning jewelry, borrowing, and temporary cuts in other spending.<sup>9,13,14,20,22,27,69-75</sup> Most studies did not follow up the implications of these strategies for the household, although one might assume that minor illnesses posed least threat to the household economy and that small loans could be repaid and assets replenished. Nevertheless studies in Sri Lanka, Viet-

nam, and Bangladesh found that minor illnesses could still pose significant shocks to vulnerable households with few assets, forcing them into debt or to deplete their few remaining assets (jewelry, savings) to meet minor health care expenses.<sup>14,20,27</sup>

**Recurring illness such as malaria.** A range of strategies to mitigate or manage the costs of malaria have been observed in Africa and southern Asia with intra-household labor substitution the most common response to mitigate indirect costs.<sup>21,58,59</sup> The opportunities that households possess for labor substitution will crucially affect whether malaria leads to output and income losses, but empirical evidence on the extent of labor substitution and, in particular, its impact on output and other activities, is limited. Overall, although the disease burden of malaria is large, no clear evidence was found on the links between malaria and impoverishment at the household level.

**Chronic and long-term illness.** In developing countries with few government safety nets, chronic conditions such as TB impose high costs over time if regular treatment is required and if the sick are incapacitated. The studies reviewed show that the high costs of TB (Tables 3 and 7) triggered either cost prevention strategies (do not seek treatment or abandon treatment)<sup>43,52,61,76,77</sup> or relatively risky asset strategies to mobilize substantial sums of money.<sup>39,40,77</sup> In Thailand, the investigators refer to the financial impact of TB for poor households as devastating, with 15% of poor households selling property and 10% taking out loans to meet the direct costs of TB.<sup>39</sup> In India, 67% of rural patients and 75% of urban patients incurred TB-related debts, 11% of schoolchildren of parents with TB (n = 276) discontinued their studies, and an additional 8% took up employment to support their families.<sup>40</sup> The overwhelming impression is that TB cost burdens are high and cause strategies that reduce assets, increase debts, and cause vulnerability to future shocks, raising concerns about the sustainability of coping strategies.

**Terminal and steadily deteriorating health: HIV/AIDS.** The catastrophic costs that accompany HIV/AIDS mean that many households in developing countries struggle rather than cope,<sup>22,68</sup> and the viability of the household is often threatened. Studies show that HIV/AIDS causes a process of household impoverishment through loss of income<sup>48,63</sup> and productive asset sales,<sup>46,62,64,78</sup> strongly pointing to the need for collective responses from government and civil society.<sup>22</sup> Household capacity to cope with the costs of AIDS was further undermined because stigma generated social exclusion, weakening support networks, and community resources were weak, often because many households had been affected.

## DISCUSSION

In resource-poor settings, illness imposed high and regressive cost burdens on patients and their families. Even in Sri Lanka where public health services are free at the point of delivery the total cost of all illnesses was more than 10% of monthly household income. Total cost burden estimates for malaria were less than 10%, but for TB and HIV/AIDS they were catastrophic for households (i.e., more than 10%) and indirect costs were usually the dominant cost component.

Health service weaknesses in many countries, including low coverage, user charges, and poor quality of care, contributed to high direct and indirect costs for patients. Evidence from TB and HIV/AIDS studies, for which the costs of illness were highest, showed that households struggled to cope and adopted unsustainable strategies that damaged asset portfolios and caused or sustained impoverishment. Because household assets in resource-poor settings were inadequate to cope with the costs of these diseases there is an urgent need for more collective health service and resource provision to support household treatment and coping strategies.

One conclusion from this review is the need for further microeconomic research on the household costs of illness, household responses, and their implications for poverty. Such work would, in all probability, demonstrate more comprehensively the huge economic burden of illness for households in developing countries and add weight to international calls for more investment in disease prevention and pro-poor curative health services. International research efforts also need to develop a common illness cost and impact methodology to allow more meaningful comparisons of the economic burden of illness across settings and diseases. Through more cross-country comparisons, research efforts could also ensure that different epidemiologic, health service, and economic factors influencing costs and coping are represented.<sup>21,23</sup> Disaggregated illness cost data by socioeconomic group was also scarce in the studies reviewed, possibly because measuring income or socioeconomic status is immensely difficult. This meant information for policy-makers about the groups most affected by illness and the economic impact of illness on the poorest was limited.

Some policy-related questions or points for discussion also arise from this review. First, high costs of illness for malaria and catastrophic costs for TB and HIV/AIDS strongly justify efforts to improve coverage of preventive measures, particularly among the poor. In Ghana, for example, the cost of controlling malaria was estimated to be lower than the value of lost output from the disease.<sup>37</sup> A study in Nigeria concluded that the high level of resources that households devoted to malaria treatment indicated little was being done to control the disease and that far more preventive work was needed, particularly the promotion and provision of insecticide-treated nets.<sup>25</sup> Two recent reviews of the economic impact of malaria concluded that the disease's economic impact is enormous and requires immediate action to improve control,<sup>21</sup> particularly through better targeted anti-malaria campaigns so that the poor gain access to prevention (and treatment) measures.<sup>23</sup>

Second and echoing the recommendations of the World Health Organization Commission on Macroeconomics and Health,<sup>6</sup> far more investment is needed in close-to-client curative services to expand access to treatment and reduce the

direct and indirect costs of illness to households. Protection against high direct treatment costs for serious illnesses is particularly important, for example, through efforts to expand coverage of tax- or insurance-based financing systems that protect households from catastrophic payments at the time of illness. One area for discussion is whether to develop financing mechanisms that pay for all treatment costs and cover the majority of sick people, or to target protection at catastrophic costs incurred by the minority.

Third, health policy research and debates need to be broadened because even if health services are improved they cannot protect households from all illness costs, in particular expenditure on non-medical items and indirect costs. The high total cost burden of illness in Sri Lanka, for example (Table 5), despite the country's pro-poor health system, raises an important question for health policy-makers and researchers in other developing countries: how can health policy be broadened to encompass measures that reduce non-medical direct costs and the substantial indirect costs associated with diseases such as malaria, TB, and HIV/AIDS? Which household assets and community responses can government and non-governmental organizations (NGOs) support? Are there innovative social security measures that governments can develop, working alongside NGOs and community-based organizations, to help protect households from the hidden costs of illness? These are questions for future research and debate across countries.

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