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## **THE INVISIBLE CRISIS**

### **The Challenges of Fighting Malaria in Asia**

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## **OUR MALARIA MOMENT**

We live in a special time in the history of malaria. The international community is focusing an unprecedented amount of resources on ridding the world of a disease older than written history, with a track record of decimating armies, crippling economies and utterly confounding most brilliant scientific minds.

In 2001, the Global Fund to Fight AIDS, Tuberculosis and Malaria was founded under the auspices of the United Nations and the World Bank to try to make serious progress at doing something about the top three causes of preventable morbidity. Since then, the Fund has allotted some \$7.1 billion, about 60% of that to HIV/AIDS, 15% to TB and 25% to malaria.<sup>1</sup>

Around the same time as the introduction of the Global Fund, Bill Gates, founder of Microsoft Corporation and said to be the richest man on the planet,<sup>2</sup> started to give away most of his multi-billion personal fortune to worthy causes through the Bill & Melinda Gates Foundation.<sup>3</sup> At last count, Forbes magazine estimated him to be worth \$56 billion. Malaria in Africa is one of the top concerns. By 2005, the Gates Foundation became the biggest funder of malaria by disbursing \$258 million that year, overtaking the U.S. government.<sup>4</sup> In 2006, another American, Gates's confidant and bridge-playing buddy, Warren Buffet, announced that he would too would give away much of his wealth to charity. To accomplish this, Buffet, a legendary investor and the second richest man in the world according to some,<sup>5</sup> endowed the Gates organization with \$30 billion in stock, to be spent over the next quarter century.<sup>6</sup>

The global anti-malaria effort has more money now than it has had in a long time, mostly from developed world-based agencies and organizations. A 2005 study commissioned by the World Health Organization's Roll Back Malaria partnership estimated that funding went

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<sup>1</sup> THE GLOBAL FUND TO FIGHT AIDS, MALARIA AND TUBERCULOSIS WEBSITE. Available at: <URL:<http://www.theglobalfund.org/en/>>. [Accessed February 2007].

<sup>2</sup> KROLL, L., and FASS, A., ed., 2007. The World's Billionaires. *Forbes* [online], 8 March. Available at: <URL:[http://www.forbes.com/lists/2007/10/07billionaires\\_William-Gates-III\\_BH69.html](http://www.forbes.com/lists/2007/10/07billionaires_William-Gates-III_BH69.html)>. [Accessed March 2007].

<sup>3</sup> Timeline, Bill & Melinda Gates Foundation

<sup>4</sup> ANON., 2005. Gates Leads on Malaria Funding, Editorial, *The Lancet* 366, 5 November.

<sup>5</sup> KROLL, L., and FASS, A. *op. cit.*, Available at: [URL:http://www.forbes.com/lists/2007/10/07billionaires\\_Warren-Buffett\\_C0R3.html](http://www.forbes.com/lists/2007/10/07billionaires_Warren-Buffett_C0R3.html). [Accessed March 2007].

<sup>6</sup> BUFFET, W. E., 2007. Letter To the Shareholders of Berkshire Hathaway Inc, 28 February.

from a paltry \$19 million in 1999 to over \$600 million by 2004.<sup>7</sup> After decades of neglect, we now live in an era when it might be possible to make actual headway against malaria. That is, if this rare opportunity is not squandered.

No one can deny the toll that the disease has taken on Africa, as shown so vividly over and over again in the reams and reams (and hours and hours of audio or video) of mass media and academic works on the subject. The fickle nature of international geopolitics and “conventional wisdom” aside, the question must be asked: In facing down and trying to eliminate malaria as a global scourge, are the priorities and budget allocations what they should be? There is a growing amount of new evidence that Asia’s malaria problem, though of different characteristics, may arguably be just as serious as Africa’s, and that, dangerously, not enough attention is being paid to the issue. This is an imbalance that needs to be addressed urgently.

Fifty kinds of Anopheles mosquitoes transmit the Plasmodium parasite that causes malaria. There are four types of the parasite (*Plasmodium vivax*, *P. ovale*, *P. malariae* and *P. falciparum*), but most cases are from *P. falciparum* and *P. vivax*. Historically, *P. falciparum* infections have been known as “serious malaria” while *P. vivax* as the more “benign” form. The other important factors that determine the severity of malaria outbreaks include patients’ level of immunity as determined by their age and previous exposure and access to and use of effective treatment. Most of the malaria in Africa, where 80% of malaria deaths are widely believed to occur, is attributed to *P. falciparum*.<sup>8</sup>

WHO estimated in the World Malaria Report from 2005, the last year it was made, that 60%<sup>9</sup> of all malaria cases happen in sub-Saharan Africa. The region also accounts for three quarters of *P. falciparum* infections in the world. The UN health authority pegged the number of total malaria cases globally at between 300 to 500 million per year.<sup>10</sup> Since then, however, these presumptions have been challenged and the international community has been slow to react appropriately.

In a landmark March 2005 Nature magazine article, a group of researchers led by Robert Snow published a study illustrating how the likely number of *P. falciparum* outside of Africa has been dramatically underestimated. Instead of 10%, they believe it should be closer

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<sup>7</sup> WADDINGTON, C., MARTIN, J., and WALFORD, V., HLSP Institute, 2005. *Trends in International Funding for Malaria Control*, a report prepared for the Roll Back Malaria Partnership, August 2005.

<sup>8</sup> ROLL BACK MALARIA PARTNERSHIP, 2005. *World Malaria Report* [online]. Available at: <URL:<http://www.rbm.who.int/wmr2005/>>. [Accessed March 2007]

<sup>9</sup> RBM WEBSITE, 2005. Available at: <URL:[http://www.rbm.who.int/wmr2005/html/exsummary\\_en.htm](http://www.rbm.who.int/wmr2005/html/exsummary_en.htm)>. [Accessed March 2007].

<sup>10</sup> RBM, *op. cit.*

to 25% to 30%. Not because there is less malaria in Africa, but because the incidence of the disease outside of Africa – mostly in Asia – was not calculated correctly. This happened because “passive” national reporting statistics were used. That is, the “official” WHO malaria figures outside Africa were based on what under-resourced governments formally collected and confirmed, resulting in numbers lower than probable clinical cases. For Africa, allowances were made for the inefficiencies of the healthcare systems, so a more scientific process using population and transmission rates was employed.

Utilizing the same method and factoring in their new projection of 515 million *P. falciparum* episodes, this dramatically boosts the widely accepted working figure of 27.3 million cases of malaria outside of Africa. For South and East Asia alone, the new estimate is 128.75 cases of *P. falciparum*, or 100 million-plus more that was previously not recognized in the region. This computation means malaria in Pakistan, for example, might actually be greater by 1,000 times than reported.<sup>11</sup>

To compound the situation, there remains an incredible dearth of information about the burden and society-level effects of infections due to *P. vivax*. This type of malaria poses a risk to 2.6 billion people, mostly in Asia,<sup>12</sup> versus 2.2 billion for *P. falciparum*.<sup>13</sup> *P. vivax* alone likely accounts for between 25% to 40% of global malaria,<sup>14</sup> and 52% of these cases occurring in South and East Asia, 15% in the Eastern Mediterranean, 13% in South America.<sup>15</sup> There could be 250 million *P. vivax* infections annually.<sup>16</sup>

Though only around 5% of African malaria is due to *P. vivax*, but that still represents up to 15 million cases a year there.<sup>17</sup> It is believed that *P. vivax* is not a serious threat for Africa, because it requires the presence of the Duffy antigen in the blood to propagate and most

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<sup>11</sup> SNOW, R. W., GUERRA, C. A., ABDISALAN, M. N., MYINT, H. Y., and HAY, S. I., 2005. The global distribution of clinical episodes of Plasmodium falciparum malaria, *Nature* 434, 10 March.

<sup>12</sup> PRICE, R. N., TJITRA, E., GUERRA, C. A., WHITE, N. J., and ANSTEY, N. M., 2007.

*Vivax Malaria: Neglected and Not Benign*, manuscript awaiting journal publication in September.

<sup>13</sup> SNOW et al, *op. cit.*

<sup>14</sup> HAY, S. I., GUERRA, C. A., TATEM, A. J., ABDISALAN, M. N., and SNOW, R. W., 2004. The Global Distribution and Population at Risk of Malaria: Past, Present, and Future, *The Lancet Infectious Diseases* 4, June.

<sup>15</sup> PRICE et al, *op. cit.*

<sup>16</sup> *Ibid.*

<sup>17</sup> *Ibid.*

Africans do have this. Other research, however, has begun to document *P. vivax* infections in Duffy-negative blood in Africa.<sup>18</sup>

### **MALARIA IN ASIA: THE INVISIBLE CRISIS**

In the modern history of man, every issue that has caught the general public's imagination typically has had a symbol, a human face. Who can forget the skeletal African child on parched, dry earth (Ethiopian famine crisis), a lone student in front of an advancing tank on a Beijing street (China's Tiananmen democracy movement crackdown), and the hooded Iraqi detainee with wires attached to his body anticipating electrical shock (the U.S. military's Abu Ghraib prison scandal)?

Photographs of African children popularly illustrate the war against malaria. What the big international organizations concerned with malaria have chosen for their webpages is clearly representative of this. The big round eyes of an African child stare out from the top of the Bill & Melinda Gates Foundation website's main page on malaria, featuring a dramatic backlit scene of bednets being hung.<sup>19</sup>

An entire class of African boys and girls, dressed in peach and khaki school uniforms adorns the "official" World Bank malaria site. One of them holds a homemade wooden placard that declares in English: "Malaria poses a serious threat in our community." A box next to the photo showcases information, podcasts and a slick slideshow on Africa Malaria Day 2006.<sup>20</sup> A section on the 2007 version of the event (April 25 this year) takes up nearly a quarter of the screen when visiting the WHO's Roll Back Malaria web page. All the stories on the front are about Africa.<sup>21</sup>

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<sup>18</sup> RYAN, J.R., STOUTE, J.A., AMON, J., DUNTON, R.F., MTALIB, R., KOROS, J., OWOUR, B., LUCKHART, S., WIRTZ, R.A., BARNWELL, J.W., ROSENBERG, R., 2006. Evidence for Transmission of *Plasmodium vivax* Among a Duffy Antigen Negative Population in Western Kenya, *American Journal of Tropical Medicine and Hygiene*, October, 75(4):575-81.

<sup>19</sup> GATES FOUNDATION MALARIA WEBSITE. Available at: [URL:http://www.gatesfoundation.org/GlobalHealth/Pri\\_Diseases/Malaria/](http://www.gatesfoundation.org/GlobalHealth/Pri_Diseases/Malaria/). [Accessed March 2007].

<sup>20</sup> WORLD BANK WEBSITE. Available at: <URL:<http://www.worldbank.org/malaria>>. [Accessed March 2007].

<sup>21</sup> RBM [online]. Available at: [URL:http://www.rbm.who.int/](http://www.rbm.who.int/). [Accessed March 2007].

The UN health agency's Global Malaria Program section has for its most prominent blurb, highlighted in red and in capital letters, says: "Help save African babies as you are helping to save the environment." The headline is complimented with a photo of an adult hand wiping the brow of a weak-looking black infant in repose.<sup>22</sup>

Using a digital clippings service, the indispensable tool of journalists and the policy-makers alike, tells an even clearer story. On Nexis, a search for news stories yields a curious and quantifiable situation. The exercise looked for articles that appeared in major wire services (like Agence France Presse, the French news agency) and newspapers in English over the last two years, from February 2005 to February 2007. Keying in "malaria" and "Africa" produced 74 results. In contrast, "malaria" and "Asia" came to exactly four, including an AFP story from August 2006 that was carried thrice by different media outlets. Looking for the same in major US papers got 36 hits for Africa and zero for Asia. Under a non-English news search, there were 23 on Africa and none on Asia.<sup>23</sup>

Global advocacy in the case of RBM includes programs in North America, Europe and Africa. They have activities in the U.S., the U.K., Germany, France, Spain, Mali, Ghana, Cameroon, Ethiopia, Kenya and Mozambique. RBM produced a graphic saying that this provided "an overview of where dedicated resources are being committed for targeted malaria advocacy." These countries are highlighted in bright orange against a grey world map. Asia is entirely dark.<sup>24</sup>

To the rest of the world, the emergency in Asia is all but invisible. But on the ground it is a story of tragic neglect, of living and dying on the fringes of the global consciousness, a testament to a myopia in the efforts to make a real difference in the fight against malaria.

This is dangerous not only since the problem is serious, but also because some of what is going on in the region could have grave consequences for true malaria control, prevention and eradication. Antimalarial drug resistance, for example, has its epicenter in Asia, incubating a new frontier for the international crisis. The tales from the frontlines belie a raging problem that is a quiet humanitarian disaster.

They tell you that the boomtown of Ruili in Yunnan Province is China's Western-most city. It is also known for other superlatives: for its number of drug addicts, the biggest jade market in the country, the volume and wide variety exotic timber that courses through the town. Once sleepy and backward, Ruili throbs with legitimate and less so commerce derived from

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<sup>22</sup> WHO MALARIA PAGE. Available at: [URL:http://www.who.int/malaria/](http://www.who.int/malaria/). [Accessed March 2007].

<sup>23</sup> NEXIS. Searched on <URL:<http://www.nexis.com>>. [Accessed March 2007].

<sup>24</sup> RBM [online]. Available at: [URL:http://www.rollbackmalaria.org/mawg.html](http://www.rollbackmalaria.org/mawg.html). [Accessed March 2007].

trade with Myanmar. The resource-rich, diplomatic relationship-poor state shares a vast and porous land border with this part of China. The whole year round, the city has Christmas-light-decked karaoke bars where over-rouged young women entertain businessmen. Much goes unmentioned about the charms of Ruili.

The one thing that people do talk about quite openly is the risks some local residents take to get rich. So much of Ruili's wealth comes from adventures deep in the jungles of Myanmar to extract precious gems and cut down rare trees. Many who go in never come back, and some of those who do suffer terrible fevers make them shiver for days. Myanmar's malaria risk is well-known and well-feared in Ruili.<sup>25</sup> In many Asian countries, the malaria threat may not have caught the popular international imagination and featured largely in the reading material of policy-makers, but it is a problem difficult to miss on the frontlines.

Here are some snapshots according the Roll Back Malaria country profiles:

- MYANMAR  
(Population: 50,519,000; Annual per capita GDP, adjusted for PPP: \$1,691)<sup>26</sup>

RBM acknowledges malaria to be the biggest cause of morbidity and mortality in Myanmar. Four out of five infections are attributable to *P. falciparum*. Between 1991 and 2000, the pariah state officially declared no less than 56 outbreaks. In 2003, at least 2,476 people were declared to have died from the disease and the RBM 2005 report says: "Given poor access to healthcare in remote areas where most cases originate, the total malaria burden is likely to be higher than reported." Seven in ten cases were found in patients older than 15 years old. Adult migrant workers working in the forests account for 60% of cases. To fight the disease, there was \$33 million available, mostly from government coffers.<sup>27</sup>

- TIMOR LESTE  
(Population: 947,000; Annual per capita GDP, adjusted for PPP: \$800)<sup>28</sup>

The world's newest nation, once a Portuguese colony, then a part of Indonesia, was born after decades of bloody strife and a Jakarta-sponsored 1999 referendum. Malaria cases are

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<sup>25</sup> SENO, A. Reporting trip for Newsweek to Ruili, Yunan Province, China, Winter 2002.

<sup>26</sup> WIKIPEDIA. Available at: <URL:<http://en.wikipedia.org/wiki/Myanmar>>. [Accessed March 2007].

<sup>27</sup> RBM, *World Malaria Report 2005*

<sup>28</sup> WIKIPEDIA. Available at: [URL:http://en.wikipedia.org/wiki/Timor](http://en.wikipedia.org/wiki/Timor). [Accessed March 2007].

split 50-50 between *P. vivax* and *P. falciparum*. In 2003, 31,819 infections and eight deaths were reported, to which RBM comments: “Underreporting from districts also limits the use of malaria for cases and deaths in understanding the extent of the burden of disease.” No records on patient demographics are available. By 2005, the country received \$2.9 million in funding.<sup>29</sup>

- CAMBODIA

(Population: 14,900,000; Annual per capita GDP, adjusted for PPP: \$2,600)<sup>30</sup>

Emerging from a devastating civil war that may have killed a million of its citizens,<sup>31</sup> malaria continues to stalk Cambodia. The disease prevails as a top reason for hospitalization and death. Almost 90% of the nation’s malaria is caused by *P. falciparum*. For 2003, the government recorded 492 fatalities and 71,258 cases, a seventh of which were found in patients between the ages of 15 and 49 years old. Cambodia got \$10 million in funding from the Global Fund.<sup>32</sup> For 2006, USAID (which allocated \$3.45 million for malaria in Asia), gave Cambodia \$1.48 million, the most it channeled to any single country in Asia.<sup>33</sup>

- INDIA

(Population: 1,100,000,000; Annual per capita GDP, adjusted for PPP: \$3,700)<sup>34</sup>

India hosts Asia’s biggest malaria problem, most of which is concentrated in the states of Maharashtra, Gujarat, Andhra Pradesh and Orissa. A quarter of all cases have been found in Orissa, which lies in the east of the country. According to national statistics, *P. vivax* causes 53% of all infections in India. For 2003, almost 1,000 people perished because of malaria and there were 1.78 million cases. It was found that 25% of patients were between five and 14 years of age and 67% between 15 and 19. From 1997 to 2005, the World Bank disbursed \$140 million to combat the disease in India. The budget from the national government, through the Ministry of Health, was \$49 million. In 2005, the Global Fund set aside \$30 million for two years of anti-malaria activity.<sup>35</sup>

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<sup>29</sup> RBM, *op. cit.*

<sup>30</sup> WIKIPEDIA. Available at: [URL:http://en.wikipedia.org/wiki/Cambodia](http://en.wikipedia.org/wiki/Cambodia). [Accessed March 2007].

<sup>31</sup> RBM, *op. cit.*

<sup>32</sup> WIKIPEDIA. Available at: [URL:http://en.wikipedia.org/wiki/India](http://en.wikipedia.org/wiki/India). [Accessed March 2007].

<sup>33</sup> RBM, *op. cit.*

<sup>34</sup> WIKIPEDIA. Available at: [URL:http://en.wikipedia.org/wiki/India](http://en.wikipedia.org/wiki/India). [Accessed March 2007].

<sup>35</sup> RBM, *op. cit.*



These countries have different natural environments, economics, and political conditions yet their malaria problems share several notable themes. One is the significance of *P. vivax* cases, in the Indian situation where it is more than half, establishing the dominance of the type there. Two, the level of poverty in these countries, which is certainly comparable to that found in Africa. Three, in Asia the bulk of those who fall ill overwhelmingly tend to be teenagers or adults. (In contrast, in Africa, most infections are in children under five years old.) Four, the limited funding available to fight the disease. These RBM case numbers, based on the old system, probably represent a fraction of actual disease burden.

### **“SHOW ME THE MONEY”**

Economics has classically been defined as the study of how limited resources might be allocated to try to satisfy unlimited needs. This tension is a recurring theme in so many fields of enquiry, not the least in public health policy. This is why setting the right priorities and acting on them is crucial. The beauty of applying the language of economics to public health is that often abstract situations suddenly become describable and quantifiable. The distinct disadvantage of relying on measurable economic metrics to define policy is that when there is scant information, this can be confused for the problem not existing.

When RBM asked the agencies that participated in its evaluation why they were involved with fighting malaria, the top reason was clear: economics. The questionnaire said: “This survey aims to identify trends in TB and malaria funding and the reasons behind the trends. What factors determine the funding decisions taken by your organization in relation to TB and malaria?” Respondents cited the impact on poverty alleviation. “Where poor and marginalized populations are particularly affected by malaria, they were prepared to finance malaria activities,” the report concluded.<sup>36</sup>

Perhaps one of the most crucial inflection points for the modern malaria cause was when Jeffrey Sachs, currently director of the Earth Institute at Columbia University, produced research underscoring the economic case for doing something about the disease. He articulated his arguments in a February 2002 article that got plenty of attention. He concluded by saying that “effective malaria prevention and treatment” would cost \$2.6 billion a year up to 2007 and \$4 billion annually until 2015, levels that remain very far from current budgets.

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<sup>36</sup> WADDINGTON et al, *op. cit*

“Where malaria prospers most, human societies have prospered least,” said Sachs.<sup>37</sup> He pointed out that using 1995 figures, countries without malaria have an average GDP, adjusted for PPP, of four times that of those where the disease is widely prevalent. People in places with malaria produced \$1,526 per capita, against \$8,268 found in generally malaria-free countries. In the 25 years from 1965, nations where significant proportions of the population were infected with *P. falciparum*, average per capita GDP growth was only 0.4% a year, while it was 2.3% elsewhere. He looked at 31 African countries.<sup>38</sup>

Sachs also made some important observations on the impact that malaria has on households. One of the most interesting is that parents, not expecting all their offspring to survive into adulthood, tend to have more children, ultimately leading to lower spending on education per person. Mothers then found their work choices and job productivity hampered by having to focus on raising many children, some of which could be expected to die early in life. In trying to describe the effects of malaria on economics, Sachs sites several other areas where malaria seems to have detrimental effects, namely, education, labor mobility, physical development, trade/foreign direct investment and savings rates.<sup>39</sup> No study as convincing as this has been done for Asia. There is a need for research like this to champion the problem in the region.

In “The End of Poverty: How We Can Make It Happen in Our Lifetime”, Sachs recounts his feelings upon realizing that so little was being done about malaria. In the 2005 bestselling book (“Foreword by Bono,” as the cover trumpets the endorsement by the Irish rock star), the American economist writes: “I was shocked. I started to scour the World Bank and USAID Web sites and project descriptions. Surely we had overlooked a massive effort to help Africa fight the disease. But, no, the original calculations were correct. Malaria was not on the policy radar screen.”<sup>40</sup>

The general case for greater action on malaria in Asia is that the disease threatens a great number of people, very likely a lot more than officially estimated, and that *P. vivax* infections, which accounts for much of malaria in the region, takes an obviously dramatic though yet unstudied toll on the human and limited economic resources of countries.

More than half the people of the world live in Asia, where malaria is a real threat that is all but ignored on the international policy-making stage. Using the revised estimate of 765 million infections in the world every year,<sup>41 42</sup> could mean a conservative figure of 275

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<sup>37</sup> SACHS, J. D., and MALANEY, P., 2002. The Economic and Social Burden of Malaria,” *Nature* 415, 680-685 (7 February).

<sup>38</sup> GALLUP, J. L., and SACHS, J. D., 2001. The Economic Burden of Malaria, *American Journal of Tropical Medicine and Hygiene* 64(1,2)S, 85-96.

<sup>39</sup> SACHS and MALANEY, op. cit.

<sup>40</sup> SACHS, J. D., 2005. *The End of Poverty: How We Can make It Happen in Our Lifetime*, (Penguin), Chapter 10: “The Voiceless Dying: Africa and Disease,” 200

<sup>41</sup> SNOW et al, op. cit.

million (a high-end projection of 360 million) actual cases of malaria annually in the region. Between 1% and 6% of the population in Asia have *P. vivax*.<sup>43</sup>

Compared to the problem on other continents, the particular nature of malaria in Asia is remarkably different and requires specific approaches and solutions for prevention and control. In Asia, *P. vivax* plays a greater role (in some countries, the major role), most infections are in patients over five years old, and because of low-transmission, those who get malaria often exhibit symptoms and are therefore more likely to get treatment and medicines. Like *P. Falciparum* infections, *P.vivax* infection is associated with high fever, anaemia, rigors, headache and general malaise. In pregnancy it can lead to low birth weights, and there is emerging evidence to suggest that it contrary to popular wisdom it can occasionally result in severe disease involving the lungs and brain. One of the main features of *P. vivax* is its penchant for lodging itself in the host's liver, producing frequent relapses, something that is not a characteristic of *P. falciparum*. An infected person can have 10 to 30 episodes in a lifetime; *P. vivax* incubation periods stretch from 12 days to many months. Up to 80% of people who get it have relapses.<sup>44</sup>

Some researchers, including Ric Price, have recently been trying to get the profile of *P. vivax* on the mainstream agenda. A rough computation by his group puts the costs of treatment and lost productivity alone to be up to \$6.7 billion annually for *P. vivax*. With medication at \$0.1 per course for chloroquine and non-pharmaceutical costs of \$8.3, using the likely number of infections (106 to 313 million), the range is between \$0.9 billion to \$2.7 billion annually. With a daily wage of \$1.5 per day, the typical three days off from school or work, plus costs of getting healthcare, productivity loss “can be conservatively estimated” at from \$1.4 billion to \$4 billion annually.<sup>45</sup>

Price et al also convincingly illustrate the severe economic impact of *P. vivax*. Calling their report “Vivax malaria: Neglected and Not Benign,” they draw out the different ways that the disease harms societies even if it does not kill a good number. The research has been accepted for publication in a peer-reviewed journal for the fall of 2007. One of the main features of *P. vivax* is its penchant for lodging itself in the host's liver, producing frequent relapses, something that is not a characteristic of *P. falciparum*. An infected person can have 10 to 30 episodes in a lifetime; *P. vivax* incubation periods stretch from 12 days to many months. Up to 80% of people who get it have relapses.<sup>46</sup>

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<sup>42</sup> PRICE et al, *op. cit.*

<sup>43</sup> *Ibid.*

<sup>44</sup> *Ibid.*

<sup>45</sup> *Ibid.*

<sup>46</sup> *Ibid.*

Where significant parts of the population are infected with *P. vivax*, one would expect that relapses would have notable effects on household behavior and ability to save. There are also research detailing physical effects, how in some cases not enough research has been done in this area.

It would also make fascinating and useful study for a history of medicine scholar to describe and explain how *P. falciparum* has dominated academic, scientific and media attention in the last half century, since the “end of malaria” was declared in developed nations in the 1960s. Certainly, a systematic and thorough content analysis of academic articles on this subject could be enlightening. An equally interesting area for further exploration would be an evaluation of existing research on *P. vivax* in Asia since 2001, when more funding became available for malaria in general.

That malaria patients in Asia are more likely than their counterparts in Africa to get treatment presents a whole other set of challenges. In low-transmission areas, people with infections often show symptoms which include some similar to flu: body pain, chills, fever. Extreme cases include seizures and coma.

One of the true tragedies of the malaria epidemics in poor nations is not only that it is possible to avoid the disease, but that it is also very treatable. For decades, chloroquine has been a safe, easy and cheap (\$0.01 per course) medication. In the last few years, however, *P. falciparum* especially has shown resistance to the drug. In some places in Asia, like in some parts of Indonesia, it has also stopped working for *P. vivax*. One of the medications that still seems to have efficacy are those based on artemisinin, a traditional Chinese herb known as “sweet wormwood.” To allow this to continue working and to avoid the parasite developing resistance, however, it is crucial that patients take artemisinin correctly. The WHO prescribes that it be given in combination with other active ingredients. This is not consistent with the unsupervised and incorrect medication that is rampant in Asia, with possible implications for the rest of the world.

When taking a cursory look at how resources are being deployed into preventing and controlling malaria in this time of opportunity, it is not difficult to feel a powerful sense of disbelief at how, malaria in Asia—despite the new and mounting evidence – remains but a blip in the formation of international policy.

“Malaria kills more than one million a year with 90% of those deaths occurring in Africa, mostly in children under five years of age,” says the Web site of the GFATM. Funding mostly goes to HIV (57%), followed by malaria (27%) and TB (15%). Geographically, the money primarily goes to Sub-Saharan Africa (55%). The rest is shared between East

Asia/Pacific (14%), Eastern Europe (11%), Latin America/the Caribbean (11%), and South Asia and the Middle East (9%).<sup>47</sup>

One of the main international sources of financing for malaria programs and solutions, the Fund's current malaria spending worked out like this in 2006: \$1,128,412,980 was allocated for Africa and \$319,786,442, for Southeast Asia, the Pacific and South Asia. Despite the greater area of risk and more numbers threatened by malaria in the region, all of Asia Pacific is due to receive only 28% of that budgeted for Africa.<sup>48</sup> When asked on a phone call about this ratio, a GFATM spokesperson based in Geneva, said: "We respond to requests from countries. We do not prescribe policy."<sup>49</sup> She added that the fund's main job was to gather and deploy financing in support of individual national anti-malaria programs.

Likely more sensitive to current domestic geopolitical priorities, the funding directly out of official American and UK government aid coffers shows even more disproportion. At USAID, ("from the American People," says its slogan), the online summary of its malaria efforts focuses on the \$1.2 billion boost over five years thanks to the President's Malaria Initiative, which was launched in June 2005 by George W. Bush. The countries where USAID says it is putting its resources are all African; Uganda, Tanzania and Angola being the pilot areas.<sup>50</sup>

Until PMI, the official malaria budget had gone from \$12 million in 1998 to \$100 million in 2006.<sup>51</sup> With the new Bush infusion, the pot has gone up \$135 million in 2007, \$300 million each in 2008 and 2009, and \$500 million for 2010. No mention of the problem in Asia is made though elsewhere it is noted that in 2006, \$72 million was put aside for Africa, while there was \$3.4 million for Asia from USAID.

At the UK's Department for International Development (tagline: "leading the British Government's fight against world poverty"), the "facts and figures" on malaria are exclusively on Africa. It notes how \$12 billion a year is lost in Africa because of the disease and how GDP is reduced between 0.6% to 6% in some countries. DFID's malaria funding is primarily its contributions to international networks. It pledged 60 million pounds sterling in 1998 for malaria during the G8 summit in Birmingham, 40 million pounds to RBM between 1999 and 2004, and 140 million pounds to the Global Fund from 2005 to 2008.

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<sup>47</sup> GFATM

<sup>48</sup> Calculation based on GFATM documents

<sup>49</sup> Telephone interview with GFATM spokesperson, March 2007

<sup>50</sup> USAID [online]. Available at: [URL:http://www.fightingmalaria.gov](http://www.fightingmalaria.gov). [Accessed March 2007].

<sup>51</sup> USAID [online]. Available at: [URL:http://www.usaid.gov/our\\_work/global\\_health/id/malaria/funding/index.html](http://www.usaid.gov/our_work/global_health/id/malaria/funding/index.html). [Accessed March 2007].

## **THE ARSENAL**

With an eye towards the future, it is useful to look at what is being prepared for the malaria problems of tomorrow. Though in theory it is possible to control and prevent the disease, in all likelihood, it will always be around, if not in large proportions of the human population, then in the animal world, just waiting to cross over to people again.

In so many ways, it is amazing to look back on how far we have come, yet how much further we need to go. The parasite is believed to have existed for 10 million years.<sup>52</sup> One of the first written references to an illness that sounds like malaria is from literature from the Song Dynasty which ruled China between 960 and 1279.<sup>53</sup> In 1999, a major convention was held in Italy to celebrate a century of “modern” study of malaria.<sup>54</sup>

Once, malaria plagued parts of Europe and a greater portion of North America. The name as we know it in English, in fact, comes from the Italian, meaning “bad air.” The disease used to regularly beset the cities of Italy, especially during the hot summers. In 1623, the disease caused havoc in the Roman Catholic church. Pope Gregory XV died in July from symptoms that included headaches, a swollen spleen, alternate chills and sweating, and fever.<sup>55</sup>

As a keen example of how wide-spread and threatening malaria once was in Rome, Fammetta Rocco, in her book “The Miraculous Fever-Tree,” vividly describes the scene around the coronation of Pope Urban VIII:

“By the beginning of August, less than a month after Pope Gregory’s death, the summer epidemic of malaria was spreading all over the city. Hundreds of people lay sick in the Santo Spirito hospital, by the Vatican. On 16 August a papal avviso reported that forty of the cardinals’ attendants had died of the fever. One of the cardinals had already succumbed. On 19 August it was the turn of Cardinal Serra, one of those who had arrived just as the conclave doors were closing. Four days later Cardinal Sauli, who had been a possible candidate for the papacy, also died of the fever. By mid-September four more cardinals were dead, making a total of six, more than a tenth of those who had assembled for the conclave.

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<sup>52</sup> HILL, A., 2007. Malaria Vaccines lecture by Adrian Hill, University of Oxford, Department of Public Health, MSc in Global Public Health, Rosemary Rue Building, 30 January.

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<sup>54</sup> ITALIAN SOCIETY OF PARASITOLOGY, 1999. *The Malaria Challenge: After One Hundred Years of Malariology*, special edition of *Parassitologia*, publication of the University of Rome/Official Journal of the Italian Society of Parasitology.

<sup>55</sup> ROCCO, F., 2003. *The Miraculous Fever-Tree: Malaria, Medicine and the Cure that Changed the World*, (HarperCollins), Chapter 2: The Tree Required - Rome

“Outside the Vatican, the priests who said mass in the small churches on the lower reaches of the Tiber, and the lay members of the city’s many confraternities who worked so diligently among the poor, died in even greater numbers.

“The new Pope too could not throw off his illness. Racked with fever, alternately hot and then shivering with cold, he could feel his spleen hard and swollen by malaria. His coronation was delayed by nearly eight weeks. Even then, he had barely recovered. At the end of his coronation day Urban’s head ached. His neck was stiff, and for many weeks afterwards, one of his courtiers wrote, he could not bear the weight of the coveted papal tiara upon his head. Giulio Mancini, the senior doctor at the Santo Spirito hospital, was summoned to attend him. The new pontiff took to his bed. For nearly two months he did not leave it. Not until early in November, when the temperature had fallen and the summer fever died down, would Pope Urban be strong enough to undertake the ceremony of the possesso, when he would ride across Rome in a procession that saw him symbolically take possession of the Holy City. There were many who had feared that the new Pope would never be well enough to rise from his bed at all. But Urban would confound them all.”<sup>56</sup>

The Holy Grail in the malaria world right now would be the creation of an affordable, highly effective vaccine that will work across all kinds of malaria. After decades of scientific study into this and billions of dollars poured into the quest, no product anywhere is close to being ready for the market. One of the main reasons being the complexity of the Plasmodium organism which has some 5,000 genes. In contrast, HIV which causes AIDS, still awaits the creation of a vaccine and it only has nine genes.

The Malaria Vaccine Initiative, which receives funding from the Gates Foundation, is at the forefront of this effort. At the end of 2006, it had 10 projects, nine of which are focused on *P. falciparum*. The two that they have in the clinical trials phase are being conducted in Africa.<sup>57</sup> The single *P. vivax* solution in their portfolio is being led by an Indian biotechnology organization.

Asked about the lack of initiatives that might benefit Asia, malaria vaccine researcher Adrian Hill said: “It is harder to twist arms for something that is not killing people, just making them sick.”<sup>58</sup>

It is difficult to seriously say exactly how or when policy will swing more equitably to directly address the crisis in Asia. It is also not realistic to expect that awareness of the problem in Asia might conjure an avalanche of resources overnight. The academic research –

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<sup>56</sup> Rocco, *op. cit.* Chapter 2

<sup>57</sup> MALARIA VACCINE INITIATIVE [online]. Available on:  
[URL:http://www.malariavaccine.org/ab-current\\_projects.htm](http://www.malariavaccine.org/ab-current_projects.htm). [Accessed March 2007].

<sup>58</sup> Malaria Vaccines lecture by Adrian Hill, question and answer period

both of the hard medical science and the economics – will take years if not decades to catch up with what is already out there on Africa. Peer-reviewed articles can take years to see publication.

In the short to medium term, the only realistic options for Asia are to bank on the more inexpensive approaches. These include the use of traditional remedies. One important defense, however, is often under-rated: the smart deployment of information. Populations that understand how malaria is contracted, its consequences and what to do, are well-armed group. This does not have to do be done a great cost.

In India, one of the more popular anti-malaria campaigns have included street performances. Villagers in areas where the diseases abound, are very often poor and illiterate. Dramatizing the message becomes both entertaining and educational.<sup>59</sup> In Cambodia, these have included not only the usual promotional materials like posters, pamphlets and videos, but also comic books and at one point, there were plans to work malaria control and treatment messages into a fictional film.<sup>60</sup> One notable trait is that in many places where there are malaria problems, residents are often illiterate or are barely literate, underlining the importance of non-written methods of communication and media forms, genres on which documentation can be difficult to find.

It would be very interesting to collect various methods of dissemination used and to measure their success. To be truly representative and meaningful, this would have to include a survey conducted in the dominant local languages and dialects, in the domestic media, something much beyond the scope of this paper.

### ***MR. GORE WINS AN OSCAR: CLIMATE CHANGE AND MALARIA***

Looking much meatier than in his days as Vice President of the United States of America, Al Gore's presence at the 2007 Academy Awards marked an important watershed in the history of the climate change movement. Standing next to Leonardo DiCaprio, a strong supporter of the cause and that evening's Best Actor winner, Gore lauded Hollywood's elite for their contribution to the "mission to inspire a successful response to the climate crisis." Together they plugged the "green" and environmentally friendly aspect of the show.

Ascending the stage again as "An Inconvenient Truth," based on Gore's traveling slide show on global warming, won for Best Documentary Film, the man who lost to Bush in the 2004

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<sup>59</sup> PRAKASH, B.N., 2006. Interview, Green College, University of Oxford, October.

<sup>60</sup> SESHU BABU, V.V.R. *Behavior Change Communications Strategies for Malaria Control in Cambodia* (Preliminary Draft Paper), GTZ



presidential elections thanked his wife and family, just like any tuxedo-wearing Oscar winner. Gore at the Academy Awards was what they in show business call “a moment.” It was the coming out party of climate change as the cause *du jour*, and just in case there was any doubt, confirmation of the prominence of the global warming, above all other issues right now, in the zeitgeist. In the public discussion of climate change, the question of what effect this will have on disease often turns to a conversation about malaria.

Joe Smith, climate change expert at the Open University in the UK, said: “[Disease] is certainly an important dimension in understanding adaptation issues around climate change.” To him, if anything, the new legitimacy that global warming has gained in policy-making could have a real impact on malaria. He says: “Now that there is political consensus about climate change internationally, in looking at adaptation issues, this makes us take public health more seriously, for example, with mosquito-borne diseases like malaria.”<sup>61</sup> The greater awareness of the global warming issue and the link that is being made to malaria, presents an opportunity for those interested in raising the profile of the challenges of fighting the disease in Asia.

The Intergovernmental Panel on Climate Change scientific meeting in Paris the first week of February this year noted at least two items relevant to malaria. One is that 11 of the last 12 years (1995 to 2006) “rank among the 12 warmest years in the instrumental record of the global surface temperature” since 1850.<sup>62</sup> Another is that: “Widespread changes in extreme temperatures have been observed over the last 50 years. Cold days, cold nights and frost have become less frequent, while hot days, hot nights, and heat waves have become more frequent.” The IPCC has also said that by 2100, temperatures could rise between 1.4 degrees to 5.8 degrees centigrade, heat wave frequency between 25% to 31%.<sup>63</sup>

Weather changes are expected to have consequences for the delicate world of the mosquito, the wily disease-carrier that the famed American malariologist Andrew Spielman called “our most persistent and deadly foe” in the title of his popular book on the history of the insect.<sup>64</sup> The 3,500 known species react to these variables, with a likely impact on the diseases that

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<sup>61</sup> Telephone interview, March 2007

<sup>62</sup> ALLEY, R., BERNTSEN, T., BINDOFF, N. L., CHEN, Z., CHIDTHAISONG, A., FRIEDLINGSTEIN, P., GREGORY, J., HEGERL, G., HEIMANN, M., HEWITSON, B., HOSKINS, B., JOOS, F., JOUZEL, J., KATTSOV, V., LOHMANN, U., MANNING, M., MATSUNO, T., MOLINA, M., NICHOLLS, N., OVERPECK, J., QIN, D., RAGA, G., RAMASWAMY, V., REN, J., RUSTICUCCI, M., SOLOMON, S., SOMERVILLE, R., STOCKER, T. F., STOTT, P., STOUFFLER, R. J., WHETTTON, P., WOOD, R. A. and WRATT, D., 2007. *Summary for Policymakers at the 10th Session of Working Group I of the IPCC*, Paris, February, 5.

<sup>63</sup> ALLEY et al, *op. cit.*, 8.

<sup>64</sup> SPIELMAN, A., and D’ANTONIO, M., 2001. *Mosquito: A Natural History of Our Most Persistent and Deadly Foe*, (Hyperion).

they transmit. Adaptation could very logically result in new patterns of behavior for *Anopheles* mosquitoes.

The forecast of generally warmer weather is expected to also have a profound effect on malaria. The disease currently causes up to three million deaths annually, most of it in impoverished sub-Saharan Africa. Researchers have found that a half degree centigrade rise in temperature can mean a 30% to 100% rise in abundance of *Anopheles*.<sup>65</sup>

*Anopheles* is generally sensitive to temperature as well as humidity, rainfall and altitude. In addition, the prevalence of the disease is also contingent on human and animal population movements, the state of the public health system, changes in land use and pesticide resistance. Malaria was wiped out from most of Europe and the U.S. in the 1960s after vigorous public health and insecticide campaigns. The efforts were also helped by cooler temperatures in temperate regions.

In an altered ecosystem, countries that already have severe malaria problems and weak health systems are most likely to suffer the most. Cambodia, where the disease is responsible for 16% of hospital deaths, recently reported a 22% rise in malaria cases which the government attributes to the monsoon,<sup>66</sup> and to the popular understanding, a link with global warming has been made. While the science on this continues to be debated, the new popular interest in climate change and disease should be seen as an opportunity to raise the profile of malaria in Asia.

## **CONCLUSION**

Anyone who has seen the what the disease is doing in Asia cannot doubt that this issue needs to become a greater priority both by local authorities and international organizations. Right now, how this change can happen presents a major but not insurmountable challenge.

First, there is definitely a need for greater numbers of scholars and scientists (and activists of this variety) to produce more research and data detailing the characteristics and toll of the disease in Asia. This kind of serious and methodical study, after all, plays a very big role among policy makers, funding organizations and the medical community.

One possible explanation for this lack of material is that many countries in the region have principally used their own funds to pay for their malaria programs, rather than rely on the

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<sup>65</sup> PASCUAL, M., AHUMADA, J.A., CHAVES, L.F., RODO, X., BOUMA, M., 2006. Malaria resurgence in the East African highlands: Temperature trends revisited, *Proceedings of the National Academy of Sciences*.

<sup>66</sup> Heavy Rains Seen as Increasing Cambodian Malaria Cases, *Deutsche Presse-Agentur*, 4 February 2007

help of external organizations or foreign donor assistance. This results in an environment where there may not be so much urgency and incentive to communicate through established international forums like academic journals and conferences. In contrast, malaria solutions in Africa receive plenty of support from Western agencies, creating an interest in the developed world for information on the situation on that continent.

Second, the case has to be clearly made that malaria in Asia is an economic issue. Rising prosperity and a trajectory to a better material life remains an incredibly powerful theme in so much of the region. At a time when populations are being lifted out of poverty and there is general can-do attitude, malaria should not be the kind of terrible scourge that it still is to some segments of these societies, and should not contribute to the widening gap of the have and have-not within Asia. If anything, the presence of pockets of malaria represents a dormant threat that could endanger thriving cities close by.

Furthermore, it also remains a serious moral issue that millions in Asia should still have to suffer from an easily treatable and preventable disease. The suggestion has been made that with economic growth in the region, there is more reason for some places not to report or further investigate their malaria problems. This can happen consciously or not, with the undercurrent of fear that such knowledge might discourage tourism or foreign investment. This would be very short-sighted.

Finally, the fight has to be taken to the people. Risk communication strategy has to be part of any modern public health campaign. It is about getting the issue the attention in the popular media, both local and international. It is also about knowing priorities and communicating a clear message. In this case, the two-sentence pitch could be: “There is a festering malaria crisis in Asia that has been systemically ignored for too long. Tens of millions of people should not be suffering the way the way that they do and it is holding back economic growth.”

While the man on the street may not invent the vaccine to end all malaria vaccine dreams, or be personally responsible for throwing billions of dollars towards wiping the disease off the face of the earth, making public support of this issue a priority will go a long way. If ordinary citizens feel that more should be done about malaria in Asia and let their governments know, policy will have to change more rapidly if officials want to get re-elected. At the front lines of the battle, the common man is often the most crucial player – how he or she adapts to prevention or treatment, be it in Ruili or Rawalpindi or Rwanda.

### ***ETC: EPILOGUE***

One of the primary features that the author wishes this paper would have had more of: a greater amount of material resulting from actual field work. A feature of both the best academic writing and journalism is often the inclusion of uniquely original information emerging from comprehensive new study; going out to see the places where the drama takes place, to talk to people first-hand, experience the issues, personally check the facts. In

reporting, this process has proven again and again to yield insights, questions and, sometimes, data yet untold, unexplained, unexplored, and difficult to imagine from thousands of miles away and even from the most rarefied of great scholarly libraries.

For the purposes of this project, the constraints are self-evident.

1. Even at a time like this when unprecedented amounts of funding and attention have been directed to the efforts to fight malaria globally, the glaring truth is that the problem in Asia and its dimensions remain untold and unquantified. Just so much of the fundamental data – economic impact, scientific study on solutions, -- remain missing even when compared to the faulty information on the problem in Africa.
2. From a practical point of view, it is also necessary to point out that this paper was conceived and produced over two short fellowship terms, and without the kind of standard reporting budget usually associated with an endeavor like this when writing for a high-circulation, mainstream international publications.

There are two important reasons to officially own up to the shortcomings of this paper. First is to recognize that there are areas of further inquiry that need to be pursued on the topic. Second, it is an acknowledgment of the wealth of story ideas that have emerged as a result of this research process, one that has included discussion with experts, attendance at seminars and lectures, reflection and, of course, much reading both of contemporary media and academic material. When time, editor interest and resources allow, hopefully these stories can be told.

## **ACKNOWLEDGEMENT**

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