



# Malaria in Latin America: A Nutritional Problem

Erin Durless

Kerry Miller

Olivia Perlmutter

# What is malaria?

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- a life-threatening parasitic disease
- characterized by fever, chills and anemia
- caused by a parasite transmitted through the bite of an infected mosquito
- together with HIV/AIDS and TB, one of the major public health challenges in the developing world

# Why is malaria a problem?

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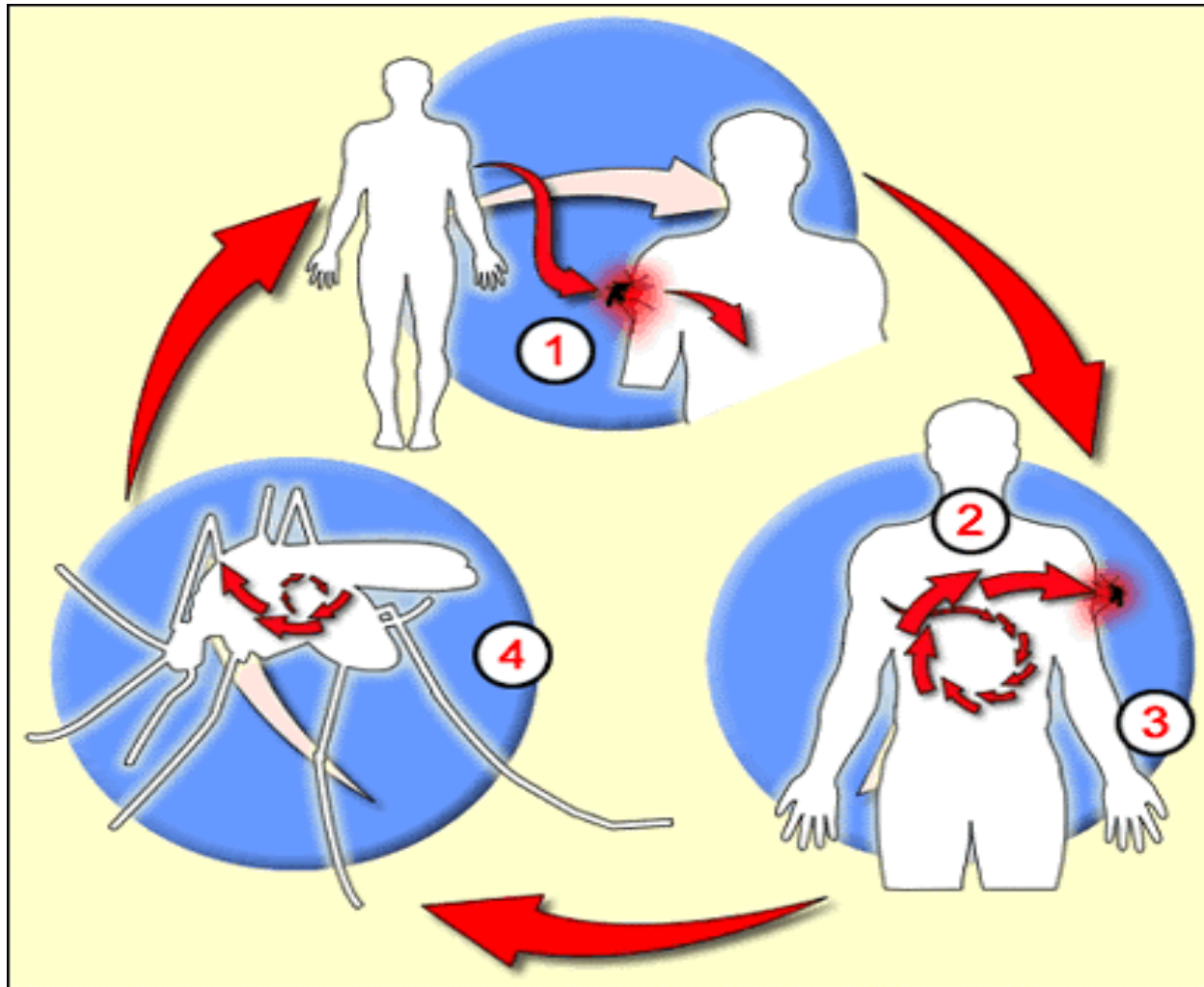
- about 40 percent of the world's population are at risk of malaria, mostly in developing countries
- in Latin America, about 40 percent of the region's 818 million people live in areas at risk of malaria transmission
- the chronic nature of malaria-related morbidity has an important impact on the social and economic activities of developing countries

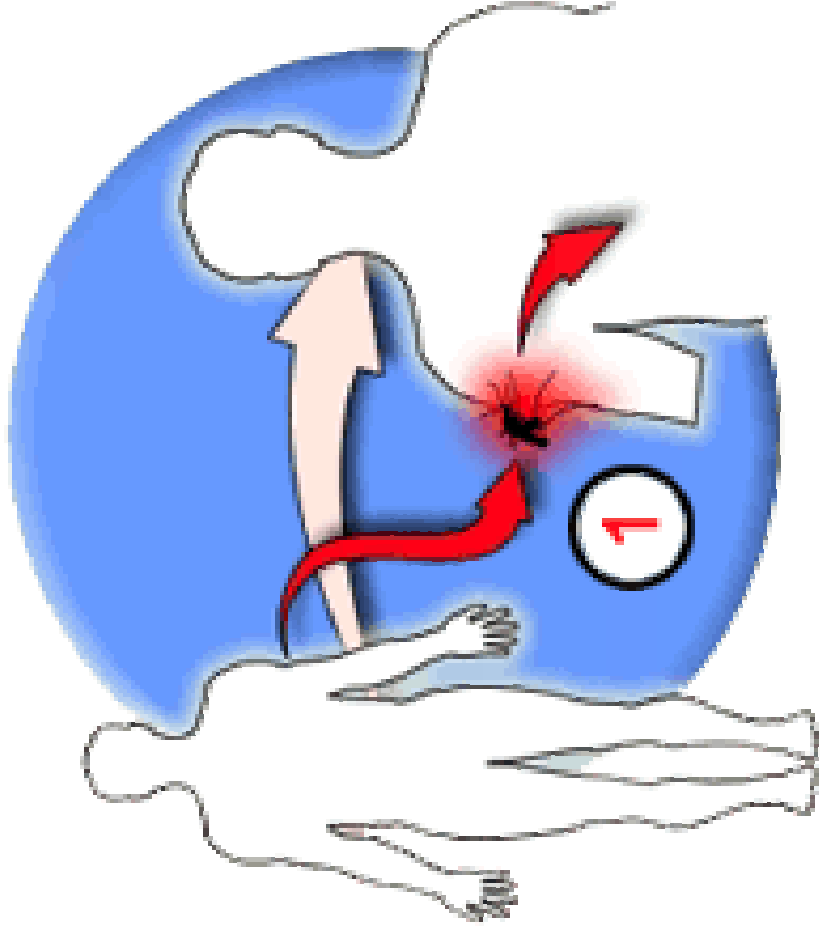
# The Four Types of Malaria

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- There are four types of malaria: *Plasmodium vivax*, *P. malariae*, *P. ovaale* and *P. falciparum*
- In Latin America as a whole, the *P. vivax* strain is the most common
- In rainforest regions in countries like Brazil, Belize and Guatemala, the more deadly *P. falciparum* strain is more prevalent

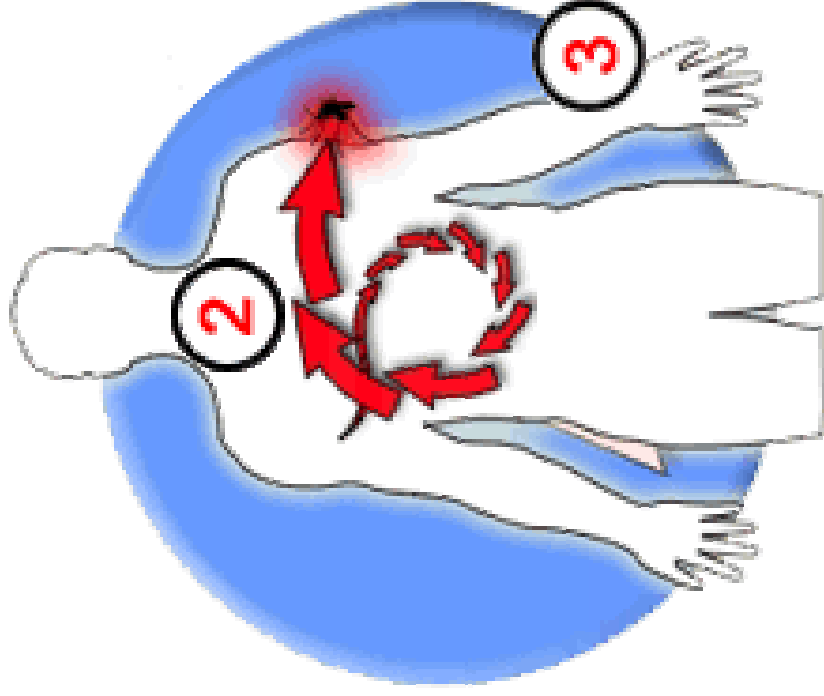
# How is malaria transmitted?





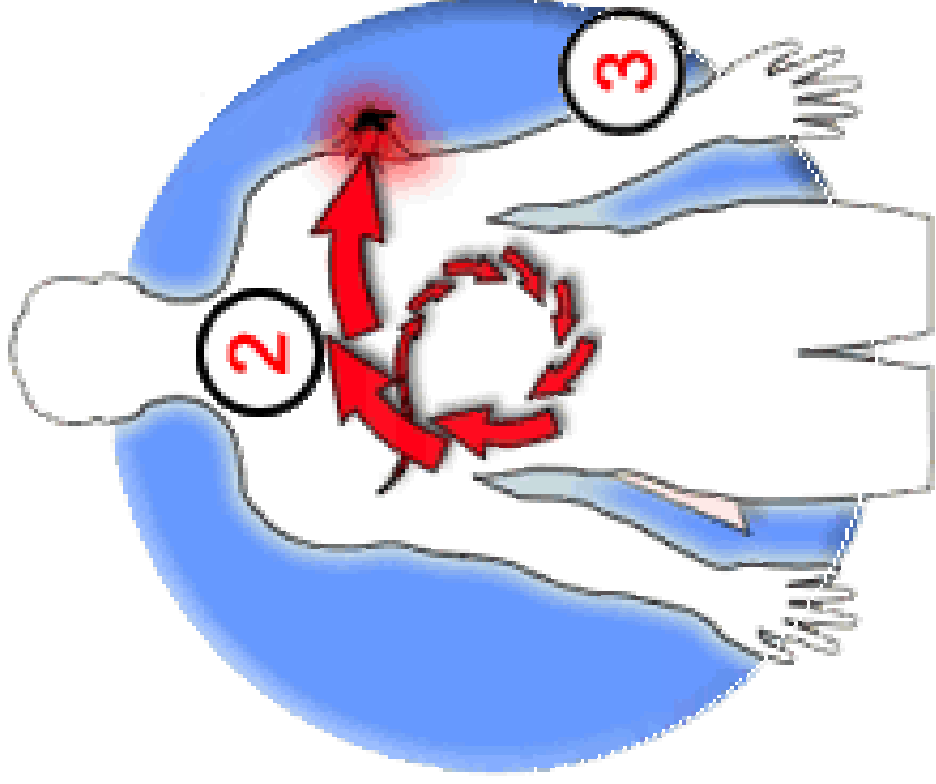
## **The plasmodium life cycle**

**A female mosquito that has already sucked up infected blood from one human, passes on a malarial infection by biting another victim.**



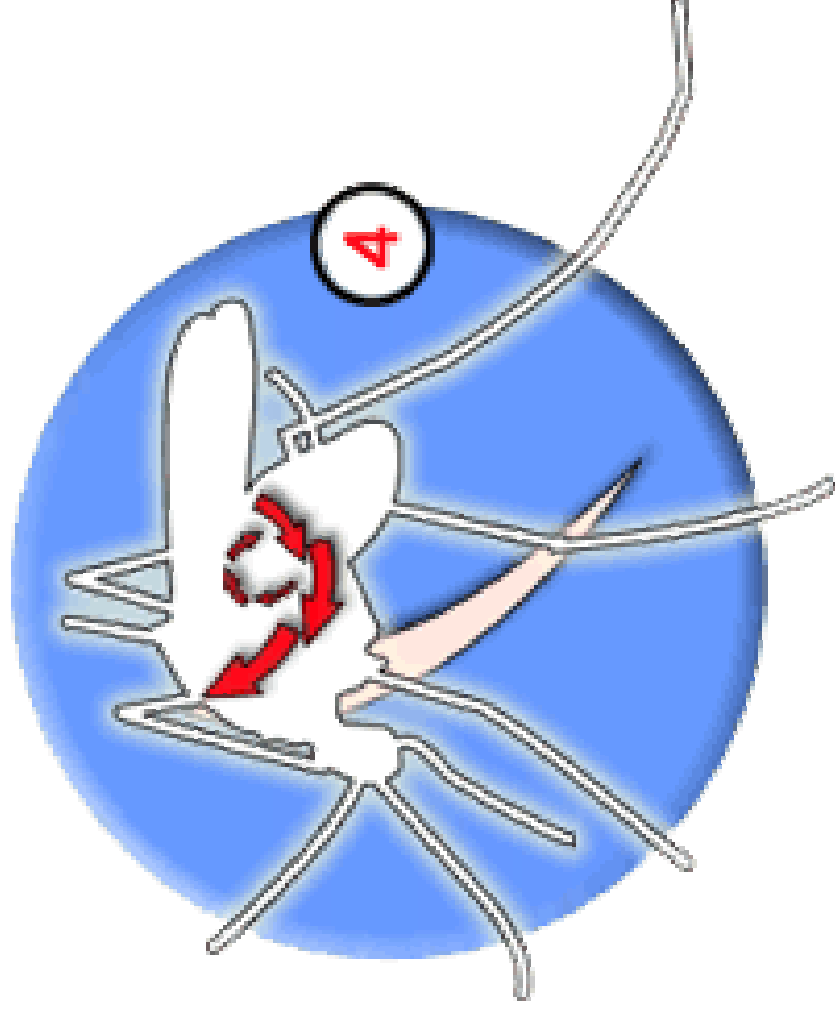
## The plasmodium life cycle

2. In the human host, the parasite multiplies rapidly. At first, this takes place in the liver (this process takes at least one week, but can be much longer), and then in the cells of the blood, which are destroyed. (This is when the characteristic malarial symptoms such as fever and shivering occur.)



## The plasmodium life cycle

3. Some of the parasites develop into sexual forms, which are then taken in by the next mosquito sucking blood.



## The plasmodium life cycle

4. In this mosquito, the sexual forms of the parasite reproduce and develop in the gut. The parasites then migrate into the mosquito's salivary gland where they develop into highly infective forms ready to be injected into a human when the mosquito next feeds – thus closing the cycle.

# Stages of Infection



- the plasmodia parasite migrates to the liver where they mature and release as another form, merozoites
- the merozoites enter the bloodstream and infect the red blood cells
- the parasites continue to multiply within the red blood cells, which then rupture, infecting more red blood cells

# What are the symptoms?

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- malaria is extremely debilitating, leading to fever, headache, vomiting, chills and other flu-like symptoms
- symptoms appear 9 to 14 days after the infectious mosquito bite
- malaria is hard to diagnose on the basis of symptoms alone (unfortunately, in developing countries, blood tests are not always available)
- in regions where malaria is endemic, people are continually re-infected, over time developing immunity—they may be carriers of the disease without displaying these symptoms

# What happens when untreated?

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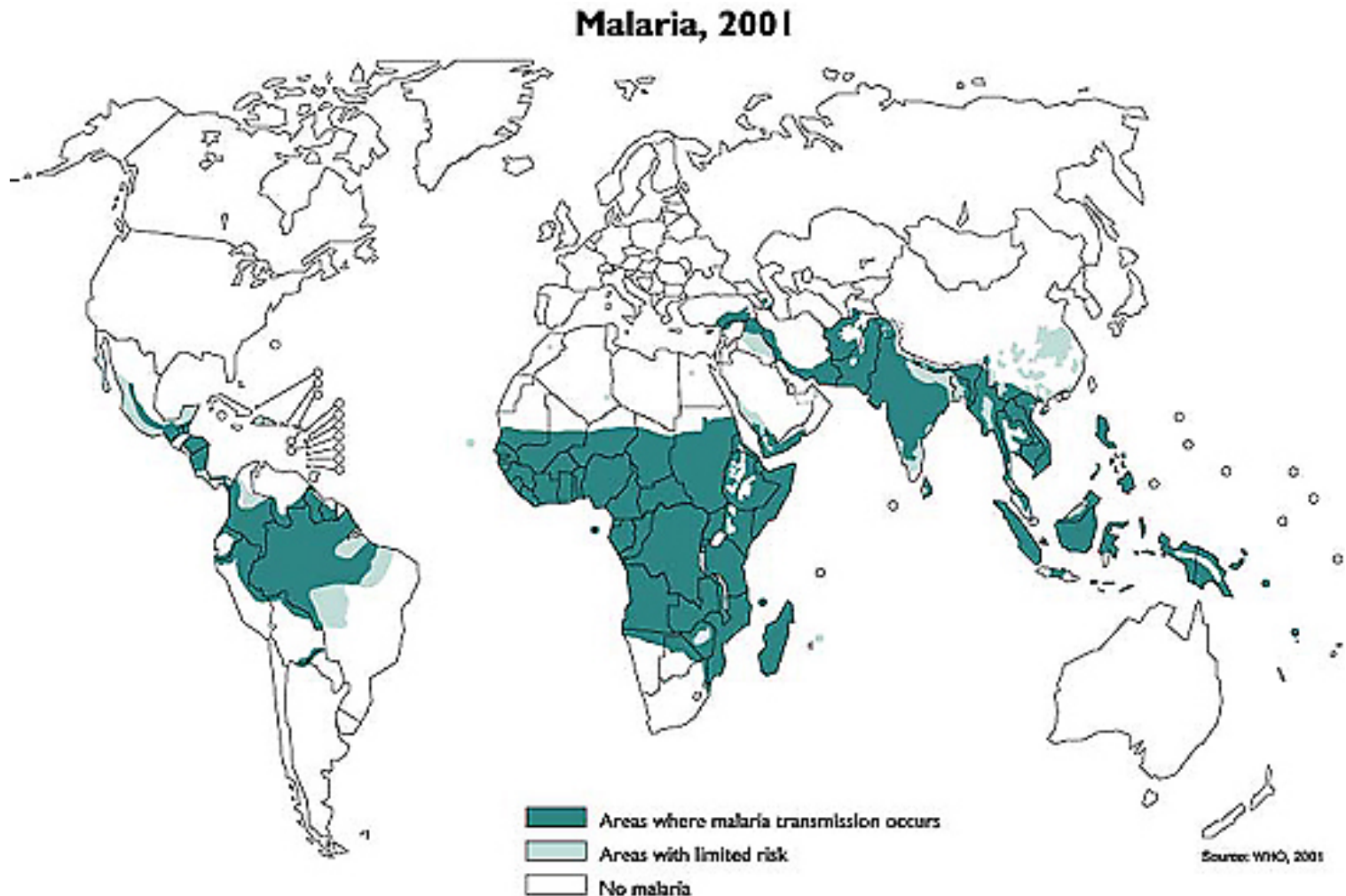
- if drugs are not available or parasites are resistant to them, the infection can become life-threatening
- malaria can kill by infecting and destroying red blood cells (anemia) and by clogging the the capillaries that carry blood to the brain (cerebral malaria) or other vital organs, leading to convulsions, coma, and eventually death

# Why is malaria a nutritional problem?



- malaria increases the chance of maternal anemia, abortion, stillbirth, prematurity, intrauterine growth retardation, and low birth weight
- low birth weight is the single greatest risk factor for death during the first month of life, and malaria has been estimated to cause 8-14% of all LBW births
- an episode of severe malaria can lead to stunting and brain damage, permanently hindering a child's growth and intellectual development

# Where is malaria a problem?



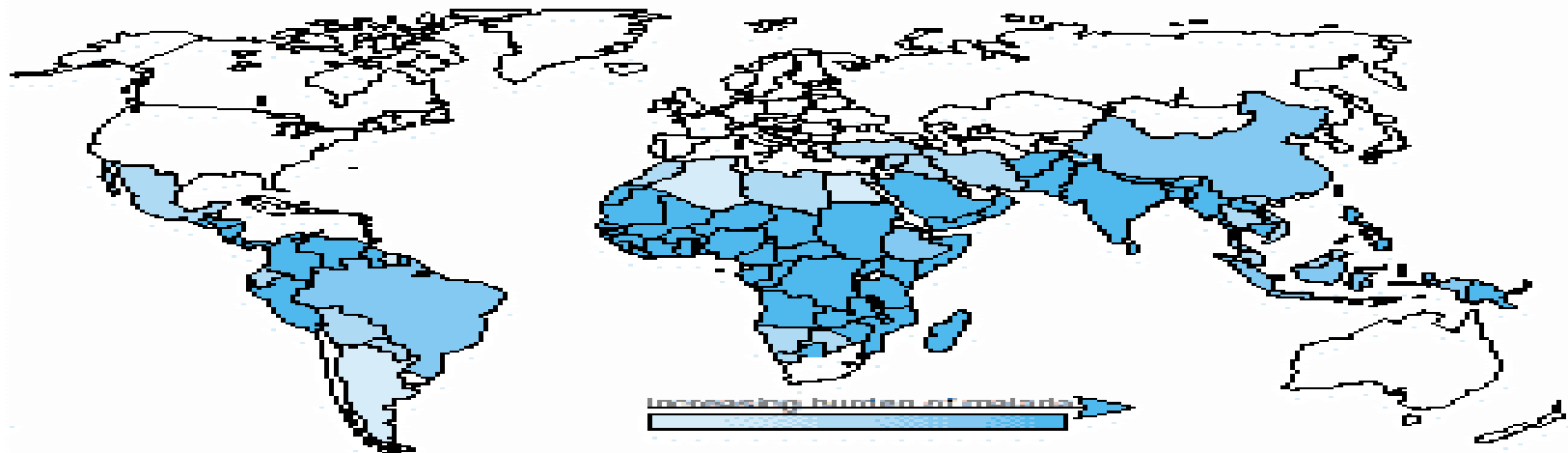
# Malaria: a disease of poverty

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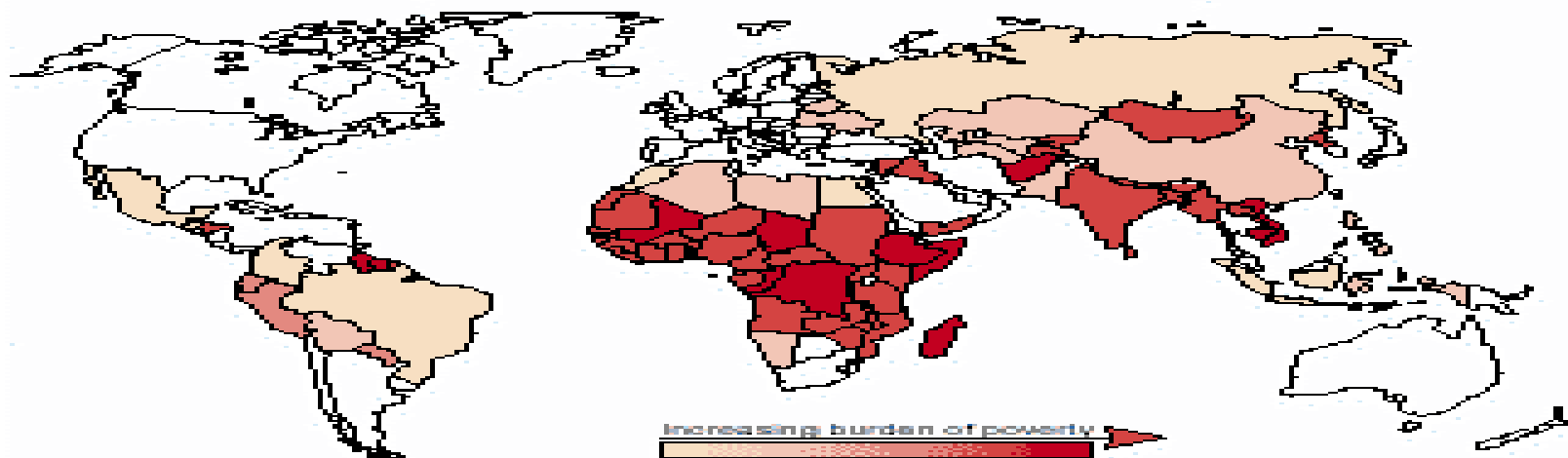
- annual economic growth in countries with high malaria transmission has historically been lower than in countries without malaria
- malaria slows a country's economic growth through loss and diverts its foreign reserves into the purchase of drugs and insecticides
- malaria depletes family resources by increasing health care expenditures, decreasing income through sickness and absenteeism and influencing the choice of work or crops
- malaria also depletes a country's human resources by hampering children's learning through missed school days and by reducing the amount families spend on education; repeated bouts of malaria also hinder a child's long-term physical and cognitive development.
- malaria discourages foreign investment and tourism, discourages the development of internal trade and adversely affects the choice of economic activities, leading to:
  - undeveloped tourist industry due to reluctance of travelers to visit malaria-endemic areas
  - undeveloped markets due to traders' unwillingness to travel to and invest in malarious areas
  - preference by individual farmers/households to plant subsistence crops rather than more labour-intensive cash crops because of malaria's impact on labour during harvest season.

# The Economic Burden of Malaria

**Estimate of world malaria burden**



**Estimate of world poverty**

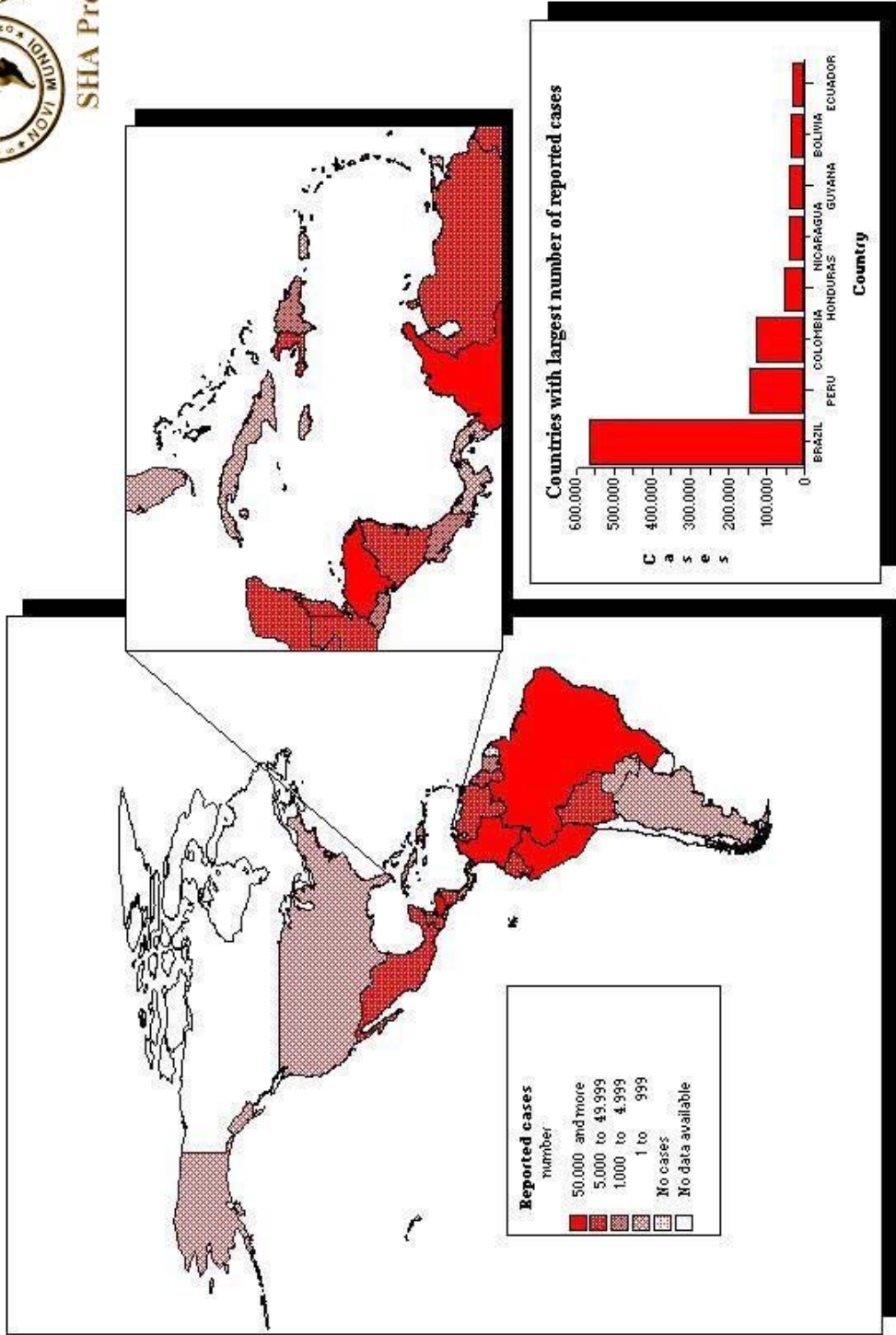


Source: RBM data/J. Sachs 1999

# MALARIA REPORTED CASES BY COUNTRIES IN THE REGION OF THE AMERICAS. 1994



SHA Program



# What factors are contributing to the spread of malaria?

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- health systems failure
- drug resistance
- population movement (migration, war)
- deteriorating sanitation
- climatic changes (global warming, El Nino)
- unplanned development activities

# Major barriers to malaria control in Latin America

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- the settlement of primitive jungle areas by people in search of economic opportunities
- the lack of health care coverage among large population groups, both in rural areas in poor outskirts around large cities

# How is malaria controlled and treated?



- malaria can be prevented by avoiding contact with mosquitoes
  - using insecticide-treated mosquito nets
  - eliminating mosquito breeding sites
  - spraying households with insecticide to repel or kill mosquitoes.
  
- malaria can be treated with antimalarial drugs, but in many areas the parasites have developed resistance to the most widely available and low-cost drugs

# The problem of resistance

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- the growth of drug-resistant malaria means that anti-malarial drugs are rapidly losing effectiveness
- often, though, victims and health care providers do not know if the malaria they are confronting is drug-resistant or not

# Combating resistance

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- experience shows that when two or more drugs are used in combination, resistance can be delayed
- BUT... these drugs are expensive
- there is still an urgent need for new, affordable anti-malarial drugs
- the search for a malaria vaccine continues, but no results yet...

# Prevention of low birth weight

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- malaria is both the most common and the most preventable infectious cause of low birth weight (compared to infections like syphilis and HIV/AIDS)
- targeted interventions could use anti-malarial drugs, tetanus toxoid, nutritional supplements, and evaluation of complications that could adversely affect pregnancy outcome

# Roll Back Malaria

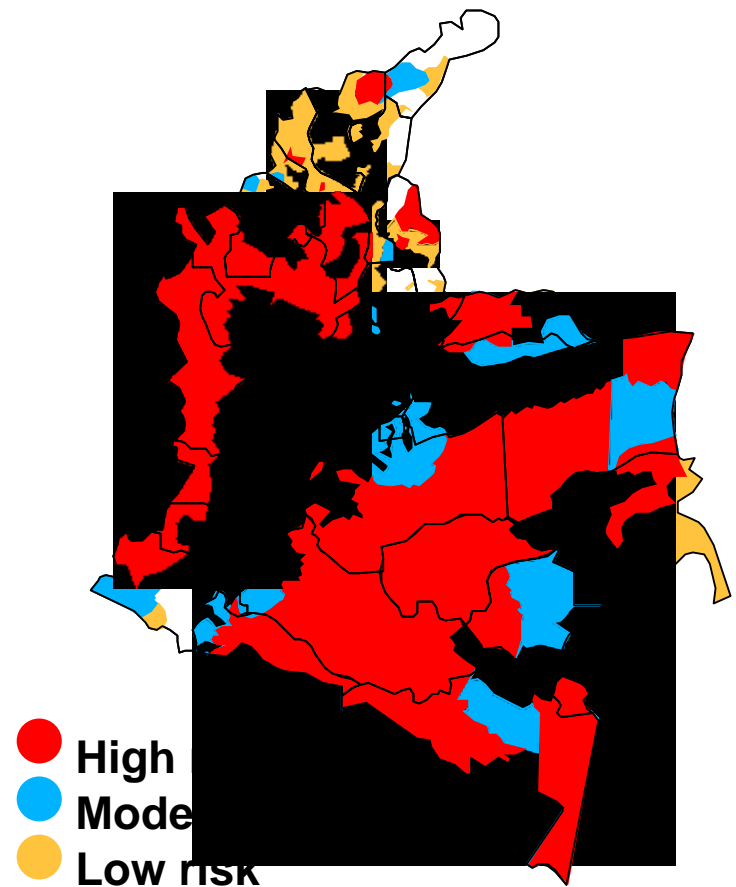
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- Roll Back Malaria, a global partnership between WHO, UNDP, UNICEF, and the World Bank, is promoting four main strategies to pursue its goal of halving the world's burden of malaria by 2010
  - **Prompt access to treatment**
  - **Insecticide-treated mosquito nets**
  - **Prevention and control of malaria in pregnant women**
  - **Malaria epidemic and emergency response**

# Case Study: Columbia

- 206,195 diagnosed cases in 2001, a 91.6% increase from the 107,616 reported in 2000
- in addition, cases of *P. falciparum* (the most deadly type of malaria) increased by 60% from 2000 to 2001



# Colombia: malaria control programs



- control measures applied in different areas
  - physical and chemical control
  - community participation, treatment
  - bednets
- barriers to control
  - sociopolitical factors
  - armed conflicts
  - migration and displacement
  - lack of health services
  - illegal crops

# Wake up! It's fun group time!

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- You are on an advisory board of Roll Back Malaria looking at how to address the problems of implementing a centralized malaria control program in Colombia
- Looking at major issues on either a national, state, or district level, describe the biggest problems and possible solutions to prevent the transmission of malaria