

Managing malaria

Scenarios



Scenario 1: Border provinces, Cambodia

You have been made responsible for three border provinces in Cambodia; Koh Kong Province, Perah Vihear Province and Sampovloun operational district. Identify the main malaria challenges facing this region and propose a strategy that will reduce the number of cases of malaria in this region. The strategy should include a combination of three interventions and should aim to be sustainable. You will present your strategy proposal to the rest of the class, summarising your reasons for suggesting this strategy.



Key facts

- Cambodia has an estimated population of 13.6 million; approximately 2.5 million live in forested areas in which malaria is transmitted.
- Malaria is most severe in villages that are surrounded by forests.
- Over 74,000 cases of malaria are reported every year in Cambodia.
- The main malaria vectors in this region are *Anopheles dirus*, *Anopheles minimus* and *Anopheles maculates*.
- *Plasmodium falciparum* causes 80% of reported malaria cases. *Plasmodium vivax* is also present and causes a significant number of infections.
- Malaria transmission occurs mostly during the rainy season but rates of transmission can vary from one year to the next.
- In 2009, the first cases of resistance to the artemisinin based drug, artesunate were reported in patients with *Plasmodium falciparum* malaria on the Thai/Cambodia border.

Your target region: Cambodia /Thailand border

- The border provinces have a population of 225,095 people.
- Both *Plasmodium falciparum* and *Plasmodium vivax* are present in this region and both cause infection. This region has multidrug resistant *Plasmodium falciparum*.
- Malaria incidence varies between the provinces: Koh Kong Province reports annual incidence of 5.5 cases per 1,000 people; Preah Vihear Province reports 39.2 per 1,000 people; Sampovloun Operational district reports 36.4 cases per 1,000 people.
- Some of the villages are remote and in the wet season can be inaccessible by road. These villages have the highest



57.6% of Cambodia's population relies on agriculture for their livelihood. Image courtesy of Manfred Werner

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prevalence of malaria infection and have limited access to public health centres.

- Farming, forestry and mining are the main forms of employment in this area. Workers often spend several days away from their homes in the forest or in forest camps. These people are particularly at risk from malaria.
- Some villagers use bed nets but not all.

Malaria prevention methods available to you are:

- **Bed nets:** your team can be responsible for sourcing and organising the distribution of long lasting insecticide-treated bed nets in your region.
- **Vector control:** your team can be responsible for coordinating the supply and appropriate use of suitable insecticides and larvicides in this region.
- **Anti-malarial drugs:** your team can be responsible for coordinating the purchasing of anti-malarial drugs for the region.
- **Healthcare services:** your team can provide specialist health practitioners who can visit communities and train community members to become village malaria workers (VMW) who are able to diagnose and treat simple cases of malaria.
- **Education specialists:** your team can provide specialists in the design and delivery of community education programmes.
- **Environmental management specialists:** your team can provide specialists in managing different environments to prevent the establishment of mosquito breeding areas.
- **Drug resistance research specialists:** your team can provide specialists in the field of malaria research who can monitor drug resistance in the region.

Questions to consider

- Are there specific sections of the population that should be targeted more than others?
- What are the most appropriate interventions for this region?
- How will issues such as access and poverty impact on your strategy?
- How will you know if your strategy is having an impact?
- What is the mix of *Plasmodium* species in this area and will this affect the type of drugs prescribed?
- How will you communicate your strategy to the communities involved?

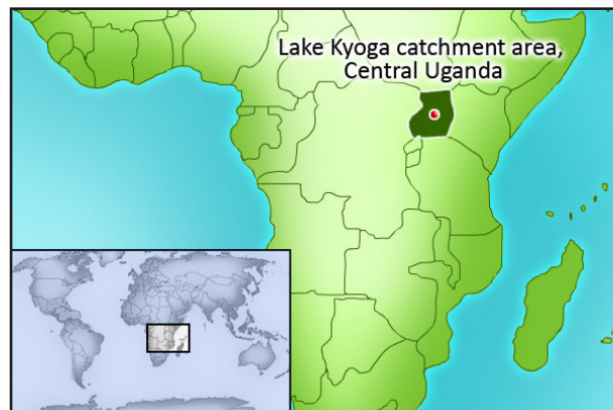
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Scenario 2: Lake Kyoga catchment area, Central Uganda

You have been made responsible for the Lake Kyoga catchment area of Central Uganda. Identify the main malaria challenges facing this region and propose a strategy that will reduce the number of cases of malaria in this region. The strategy should include a combination of three interventions and should aim to be sustainable. You will present your strategy proposal to the rest of the class, summarising your reasons for suggesting this strategy.



Key facts:

- Uganda has a population of 32 million people. Malaria is endemic in 95% of the country.
- Every year over 10 million cases of malaria are reported in Uganda, resulting in more than 43,000 deaths. Of these deaths 39,000 are in children under the age of five.
- Average life expectancy is 49 years.
- 85% of Uganda's population lives in rural areas.
- Poverty is a major problem. By the end of 2006, 31 per cent of Uganda's population lived below the poverty line of about US\$ 1 per day. The poverty line is the minimum level of income deemed necessary to have an adequate standard of living.
- The main malaria vector in this region is *Anopheles gambiae* and the main malaria parasite is *Plasmodium falciparum*.

Your target region: Lake Kyoga

- Lake Kyoga is a large wetland area covering over 1,000 km² and covering 21 districts in central Uganda.
- Agriculture and fisheries are the major industries for this area. Paddy rice and vegetable production has expanded over and above the growth of traditional crops such as sesame (simsim), millet, beans, maize and groundnuts.
- Heavy rains can often lead to flooding in this catchment area.
- Areas around Lake Kyoga have some of the highest recorded malaria transmission rates in Africa. On average one person can receive more than 1,500 infectious bites per year.
- Malaria accounts for approximately 30-50% of outpatient care, 15-20% of admissions and 9-14% of inpatient deaths.



A Ugandan family.
Image courtesy of Bonnie Gillespie,
Voices of a Malaria free future

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Malaria prevention methods available to you are:

- **Bed nets:** your team can be responsible for sourcing and organising the distribution of long lasting insecticide-treated bed nets in your region.
- **Vector control:** your team can be responsible for coordinating the supply and appropriate use of suitable insecticides and larvicides in this region.
- **Environmental management specialists:** your team can provide specialists in managing different environments to prevent the establishment of mosquito breeding areas.
- **Anti-malarial drugs:** your team can be responsible for coordinating the procurement of anti-malarial drugs for the region.
- **Healthcare services:** your team can provide specialist health practitioners who can visit communities and train community members to become village malaria workers (VMW) who are able to diagnose and treat simple cases of malaria.
- **Education specialists:** your team can provide specialists in the design and delivery of community education programmes.
- **Fishery specialists:** your team can provide specialists to set up sustainable fisheries for larvivorous fish. They can train community members in how to manage and maintain community fisheries.

Questions to consider

- Are there specific sections of the population that should be targeted more than others?
- What are the most appropriate interventions for this region?
- How will issues such as access and poverty impact on your strategy?
- How will you know if your strategy is having an impact?
- What is the mix of *Plasmodium* species in this area and will this affect the type of drugs prescribed?
- How will you communicate your strategy to the communities involved?

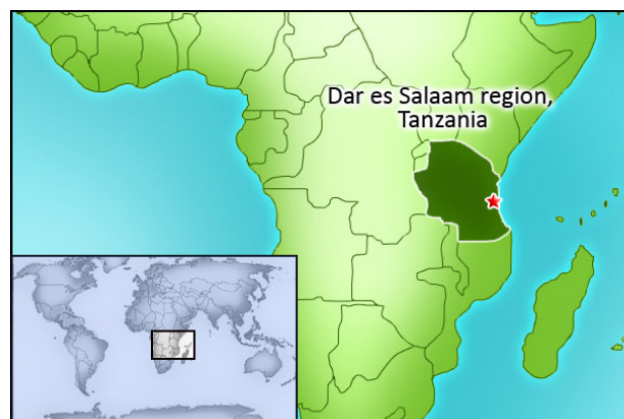
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Scenario 3: Dar es Salaam region, Tanzania

You have been made responsible for three municipalities within the Dar es Salaam region of Tanzania. Identify the main malaria challenges facing this region and propose a strategy that will reduce the number of cases of malaria in this region. The strategy should include a combination of three interventions and should aim to be sustainable. You will present your strategy proposal to the rest of the class, summarising your reasons for suggesting this strategy.



Key facts:

- Tanzania has a population of 37.4 million people. 90% of this population is at risk from malaria.
- Every year over 14 million cases of malaria are reported in Tanzania, resulting in more than 120,000 deaths. Of these deaths 70,000 are in children under the age of five.
- Average life expectancy is 55 years.
- Poverty is a major problem. It is estimated that 36% of the population live below the poverty line (the minimum level of income required to provide an adequate standard of living).
- The main malaria vector in this region is *Anopheles gambiae* and the main malaria parasite is *Plasmodium falciparum*.

Your target region: Dar es Salaam

- Dar es Salaam is the capital city of Tanzania. It has a population of 2.5 million and is the third fastest growing city in Africa.
- There has been rapid urban growth in this region which has resulted in a lack of access to sanitation, precarious housing, overcrowding and inefficient waste collection.
- There are a number of unplanned settlements, known as squatter settlements or shanty towns, that have been created in many parts of the city. These settlements are not regarded as legitimate residences and the residents therefore receive little support from the government. This can include limited access to public health care and no public transport links.
- 80% of the population lives in unplanned settlements.
- Dar es Salaam has a large network of drains within the city and surrounding areas. However these can become blocked with debris where there is overcrowding and poor rubbish collection services.
- Annual rainfall is approximately 1,100 millimetres (43 inches). In a normal year there are two distinct rainy seasons: "the long rains" fall during April and May and "the short rains" fall during October and November.



Inadequate waste collection is a major issue in the city.
Image courtesy of Loranchet, Wikimedia commons

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Malaria prevention methods available to you are:

- **Bed nets:** your team can be responsible for sourcing and organising the distribution of long lasting insecticide-treated bed nets in your region.
- **Vector control:** your team can be responsible for coordinating the supply and appropriate use of suitable insecticides and larvicides in this region.
- **Anti-malarial drugs:** your team can be responsible for coordinating the procurement of anti-malarial drugs for the region.
- **Healthcare services:** your team can provide specialist health practitioners who can visit communities and train community members to become village malaria workers (VMW) who are able to diagnose and treat simple cases of malaria.
- **Environmental management specialists:** your team can provide specialists in managing different environments to prevent the establishment of mosquito breeding areas.
- **Education specialists:** your team can provide specialists in the design and delivery of community education programmes.
- **Fishery specialists:** your team can provide specialists to set up sustainable fisheries for larvivorous fish. They can train community members in how to manage and maintain community fisheries.
- **Drug resistance research specialists:** your team can provide specialists in the field of malaria research who can monitor drug resistance in the region.

Questions to consider

- Are there specific sections of the population that should be targeted more than others?
- What are the most appropriate interventions for this region?
- How will issues such as access and poverty impact on your strategy?
- How will you know if your strategy is having an impact?
- What is the mix of *Plasmodium* species in this area and will this affect the type of drugs prescribed?
- How will you communicate your strategy to the communities involved?

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Scenario 4: Amazonas, Brazil

You have been made responsible for the Amazonas State, in Northwest Brazil. Identify the main malaria challenges facing this region and propose a strategy that will reduce the number of cases of malaria in this region. The strategy should include a combination of three interventions and should aim to be sustainable. You will present your strategy proposal to the rest of the class, summarising your reasons for suggesting this strategy.



Key facts:

- Brazil has an estimated population of 191 million.
- Malaria is still a major health problem in Brazil with approximately 306,000 cases reported every year. Almost all (99.8%) of these cases are restricted to the Amazon region.
- A targeted eradication programme in the 1960s completely eliminated *Anopheles gambiae* and significantly reduced malaria transmission in Brazil. However it was unable to stop the spread of malaria in the Amazon Basin.
- *Anopheles darlingi* is the main mosquito vector and is present in 80% of the country. This mosquito is exophagic (feeds outdoors) and feeds in the early evening.
- In Brazil, malaria is caused by three species of *Plasmodium*: *Plasmodium vivax* (83.7% of cases), *Plasmodium falciparum* (16.3% of cases) and *Plasmodium malariae* (a very small proportion of cases).



Rural dwelling.

Image courtesy of Julian Rayner,
Wellcome Trust Sanger Institute

Your target region: Amazonas

- Amazonas is the largest state by area in Brazil covering over 900,000 km². It has a population of 3.5 million people and has one of the highest incidences of malaria transmission in Brazil.
- Over 90% of Amazonas is covered in rainforest. This includes areas which are permanently flooded or regularly flooded during the wet season.
- The capital, Manaus, is the largest city in the north with a population of 1.7 million people. In 2009, a total of 19,698 cases of malaria were reported here. Over 90% of these cases were caused by *Plasmodium vivax*.
- Manaus receives migrants from all over Brazil and other countries and has over 19,000 malaria cases

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per year, much more than other cities in Brazil.

- There are many new settlements being established in the outskirts of Manaus and in other parts of the state in the rainforest.
- Amazonas' economy was once reliant almost entirely upon rubber. Today it has wide and varied industries, including the farming of cassava, oranges and other agricultural products.
- Deforestation for logging, cattle ranching, agriculture and unofficial settlements is common.
- Fish farming used to be carried out using tanks in backyards of homes or on the outskirts of towns including Manaus. This industry has now been largely abandoned leaving the remnants of fisheries in many places.

Malaria prevention methods available to you are:

- **Bed nets:** your team can be responsible for sourcing and organising the distribution of long lasting insecticide-treated bed nets in your region.
- **Insect repellents:** your team can be responsible for sourcing and distributing suitable insect repellents (chemical or natural).
- **Vector control:** your team can be responsible for coordinating the supply and appropriate use of suitable insecticides and larvicides in this region.
- **Fishery specialists:** your team can provide specialists to set up sustainable fisheries for larvivorous fish. They can train community members in how to manage and maintain community fisheries.
- **Anti-malarial drugs:** your team can be responsible for coordinating the procurement of anti-malarial drugs for the region.
- **Healthcare services:** your team can provide specialist health practitioners who can visit communities and train community members to become Village Malaria Workers (VMW) who are able to diagnose and treat simple cases of malaria.
- **Education specialists:** your team can provide specialists in the design and delivery of community education programmes.
- **Environmental management specialists:** your team can provide specialists in managing different environments to prevent the establishment of mosquito breeding areas.

Questions to consider

- Are there specific sections of the population that should be targeted more than others?
- What are the most appropriate interventions for this region?
- How will issues such as access and poverty impact on your strategy?
- How will you know if your strategy is having an impact?
- What is the mix of *Plasmodium* species in this area and will this affect the type of drugs prescribed?
- How will you communicate your strategy to the communities involved?