



AFRICA HEALTH
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Malaria Control and Prevention in Democratic Republic of Congo – Policy Brief

Africa Health Organization (AHO)

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Overview of malaria

Democratic Republic of Congo

The Democratic Republic of Congo has the second highest death rate from malaria in the world accounting for 11% of total cases and deaths worldwide. It also has the highest number of cases in Central Africa accounting for 55% of cases in that region. Malaria is still endemic in the DR Congo, along with 96 other countries. Although progress has been made in reducing malaria cases and reducing malaria deaths there are still many more measures that can be taken to further reduce the burden of malaria. The millennium development goals (MDGs) have helped reduce the number of malaria deaths since the beginning of the millennia, with one of the goals being to reduce preventable childhood deaths. It is estimated around 6.2 million malaria deaths were avoided between 2000 and 2015 in sub-Saharan Africa (including the DR Congo). However, as of 2015, only 56% of children under 5 sleep under insecticide-treated bed nets. 16.5 million cases were reported in 2019 with many more likely undetected.¹

Malaria is the most severe in certain habitats and biomes. The DR Congo can be split into three area of malaria prevalence. The equatorial variant is characterised by forest and savannah biomes, presenting the most severe cases in under-5s. The tropical variant occurs in areas with high humidity and severe cases are more commonly observed in higher ages. The mountainous variant is present at altitudes over 1,000m and can result in annual outbreaks as well as an epidemic.²

The malaria parasite belongs to the plasmodium genus of unicellular eukaryotes. The 5 species known to cause malaria are *P. falciparum*, *P. malariae*, *P. ovale*, *P. vivax*

¹ <https://www.unicef.org/drcongo/en/press-releases/children-drc-risk-killer-epidemics>

² <https://www.severemalaria.org/pays/democratic-republic-of-congo>



and *P. knowlesi*. *P. falciparum* is most prevalent malaria parasite in the DR Congo and is also the most likely to be resistant to standard chloroquine treatment. Accurate identification of the parasite is important in treatment of all malaria cases, but particularly in severe ones. The *Anopheles gambiae* species of mosquito is the most common vector of the malaria parasite.³

The situation elsewhere

The DR Congo is bordered by many countries. Congo, the Central African Republic, and South Sudan borders the country to the north. Uganda, Rwanda, Burundi, and Tanzania share eastern borders with the DR Congo. Zambia is to the south-east and Angola in the south-west. There is also a 25-mile coastline connecting the country to the Atlantic Ocean. The DR Congo has the fourth highest number of borders in the world. It faces a variety of pressures from neighbouring countries, contributing to conflict and political instability in the region. Instead of conflict, collaboration with neighbouring countries is important in the fight against malaria. The EAC treaty allows free movement across borders in East Africa. This means efforts to control the disease in other countries could be undermined by cross-border movement. Although, malaria cannot be transmitted from person-to-person, movement of infected individuals puts strain on healthcare, can be transmitted through blood, including needles or by mosquitoes feeding on blood from an infected person undermining efforts to reduce malaria prevalence, also. (Fig. 1).

³ <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-016-1617-7#:~:text=All%20over%20the%20country%2C%20P,gambiae%20the%20predominant%20mosquito%20vector.>

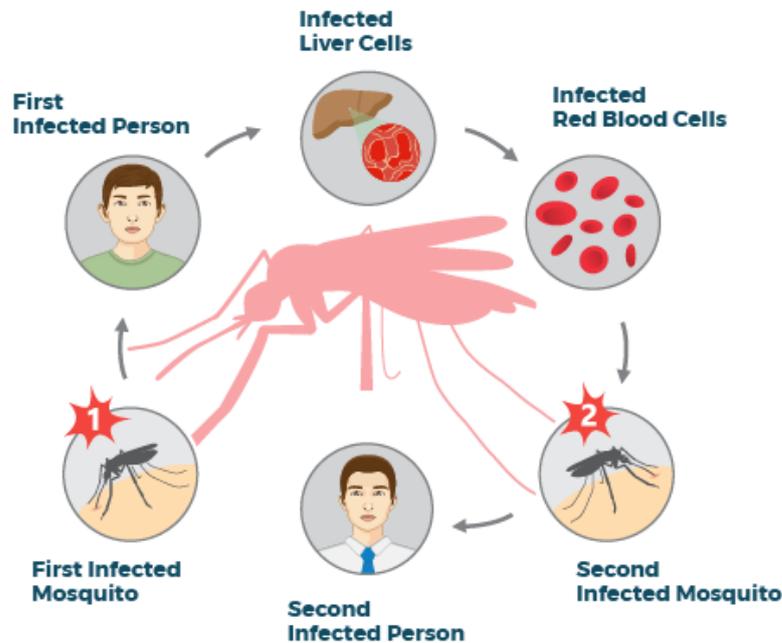


Figure 1: Mode of transmission of the malaria parasite

combating malaria. For example, Rwanda reduced its malaria burden by 430,000 cases from 2016 to 2017 and could be used as a model for DR Congo.

Thus, cross-border partnerships are in neighbouring countries' interests. Reducing malaria prevalence and the prevalence of other diseases in DR Congo will benefit them as well.⁴ These partnerships can help provide more effective solutions to

Rwanda achieved this reduction through their Malaria Contingency Plan, developed by the Government of Rwanda in January 2016.⁵ Interventions included:

1. A home-based management of fever for adults in communities countrywide to prevent severe malaria and reduce deaths.
2. Distribution of 6 million nets in 30 districts to have universal coverage of the population.
3. Increased access to health care with Community Based Health Insurance, this means free malaria treatment to the most vulnerable populations, provided by the government.
4. Emphasis on environmental hygiene and sanitation

⁴ <https://www.newtimes.co.rw/news/dr-congo-east-africa-seek-collaboration-malaria-fight>

⁵ <https://www.afro.who.int/news/how-can-we-overcome-malaria-threat-and-make-rwanda-free-malaria#:~:text=Rwanda%20has%20achieved%20significant%20progress,malaria%20over%20the%20past%20decade.&text=In%20January%202016%2C%20the%20Government,the%20increase%20in%20malaria%20cases>



There is huge potential for the DR Congo to collaborate with nearby countries, who have had success in the fight against malaria, to put their tried and proven measures to use.

Risk factors

Habitat

Malaria prevalence is dependent on a variety of factors. As the parasite cannot be transmitted without a female mosquito acting as a vector understanding the preferred habitat of the vector is very important. Many environmental factors are associated with the distribution and prevalence of the female *Anopheles* mosquito. Habitats that have favourable breeding conditions are associated with increased malaria transmission risk. Greater amounts of precipitation and higher temperatures are favoured breeding locations and are conducive for parasite reproduction within the mosquito.

Agriculture and urbanization can also increase the risk of malaria transmission. Highly cultivated areas are preferred over dark, forested habitats. Additionally, although urbanization may not provide the ideal habitat for mosquito reproduction, poor sanitation may attract increased breeding. This is clear to see in the capital Kinshasa, which has relatively high malaria transmission rates.⁶ This effect is important to consider as the country's population grows and more areas become urbanized without the necessary infrastructure to support proper sanitation. Conflict can also indirectly lead to favourable habitats for mosquitos. The abandonment of crops and land by people fleeing to escape regional conflicts makes for ideal habitats for mosquito breeding. If people return to an abandoned area

⁶ Messina, J.P., Taylor, S.M., Meshnick, S.R., Linke, A.M., Tshetu, A.K., Atua, B., Mwandagalirwa, K. and Emch, M., 2011. Population, behavioural and environmental drivers of malaria prevalence in the Democratic Republic of Congo. *Malaria journal*, 10(1), p.161.



without this knowledge there is a possibility of localised spikes in malaria transmission.

Healthcare

The primary health care system also plays a major role in reducing the malaria burden in the DR Congo. Unfortunately, the health care system in the DR Congo is lacking due to extreme poverty, and the instability and unrest associated with the cyclical armed conflicts the country experiences. Thus, the universal health coverage which is needed in the fight against malaria is a long way away from being realised.⁷ Public health care is unevenly distributed, with northern rural areas having the lowest number of health workers. There is little coordination in planning and management of health services or training of workers.⁸ Although there are a number of initiatives by foreign aid organizations and NGOs these are also largely uncoordinated meaning malaria treatment in the poorest or most rural areas is hard to come by.

Other diseases

Recently, the Ebola outbreak in 2018 hindered malaria prevention and control efforts. In North Kivu there was an 800% increase in malaria incidence in September 2018 compared to September the previous year. Additionally, Ebola responders reported up to 50% of people screened in Ebola centres had malaria instead due to high symptom overlap. This is damaging in two main ways; it makes it more difficult to accurately assess malaria prevalence in regions experiencing Ebola outbreaks, and individuals may be incorrectly diagnosed resulting in ineffective treatments and even higher death rates for both diseases. In response to this the World Health Organization launched a major anti-malaria campaign in the North Kivu province involving mass distribution of insecticide treated mosquito nets and mass drug

⁷ Ngatu, N.R., Kanbara, S., Renzaho, A., Wumba, R., Mbelambela, E.P., Muchanga, S.M., Muzembo, B.A., Leon-Kabamba, N., Nattadetch, C., Suzuki, T. and Oscar-Luboya, N., 2019. Environmental and sociodemographic factors associated with household malaria burden in the Congo. *Malaria journal*, 18(1), pp.1-9.

⁸ <https://www.who.int/workforcealliance/countries/cog/en/>



administration to treat those presenting malaria symptoms and curtail transmission of malaria among Ebola-affected populations.⁹

Current initiatives

In terms of Governmental action, the country has a National Malaria Control Strategic Plan (NSP) for 2016-2020, supported by the U.S. President's Malaria initiative (PMI). There are a number of core malaria interventions. Distribution of insecticide treated nets (ITNs), case management and intermittent preventative treatment in pregnancy (IPTp) being the primary methods. A partnership between USAID and the DRC Health Office includes supply chain management, monitoring and evaluation, integrated community case management, and social and behaviour change communication. The PMI budget for the DR Congo in 2019 was \$44 million.¹⁰

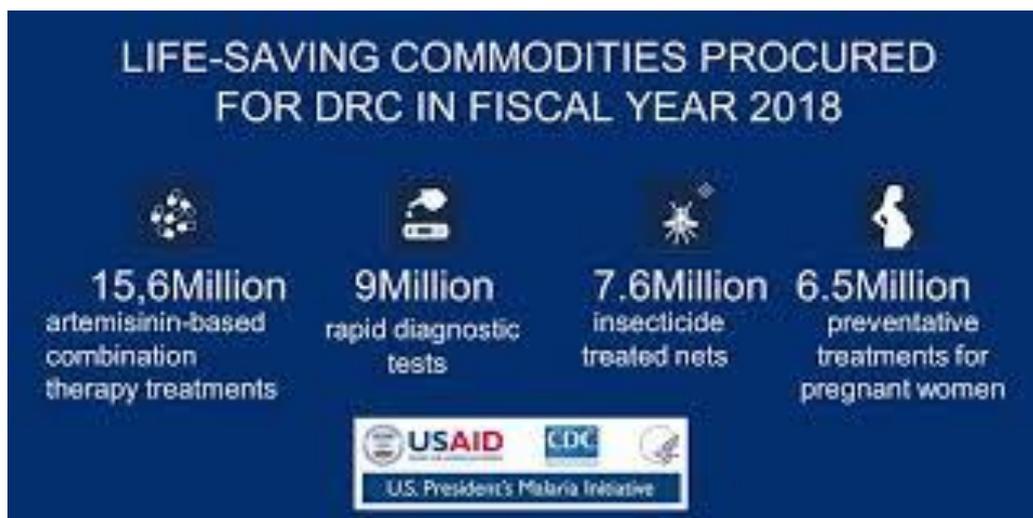


Figure 2: Malaria prevention and treatment initiatives resulting from the PMI with the Democratic Republic of the Congo

⁹ <https://www.afro.who.int/news/malaria-control-campaign-launched-democratic-republic-congo-save-lives-and-aid-ebola-response>

¹⁰ <https://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy19/fy-2019-democratic-republic-of-the-congo-abbreviated-malaria-operational-plan.pdf?sfvrsn=5>



Outside of Government, most humanitarian efforts to control and reduce malaria prevalence and mortality focus on changing human behaviours, such as the use of bed nets and accessing anti-malarial drugs. Control of the environmental factors, such as clearing breeding habitats of mosquitos are generally avoided. Cost-effectiveness and impact-analysis are important considerations in malaria endemic countries, particularly those affected by war and conflict.

Currently the recommended treatment for malaria patients is injectable artesunate, with injectable quinine as an alternative but this is being phased out for serious cases from June 2015. Artesunate is a cheaper treatment with resistance being less common than for quinine treatments. For pre-referral cases rectal artesunate is recommended. For pregnant women, the advised treatment is intravenous quinine. Artemisinin-based combination therapy (ACT) is another first-line treatment for uncomplicated malaria cases. It involves patients taking pills three times a day, and the tablets are large and bitter so there can be issues with children swallowing them.

Challenges

There is an emerging trend of chloroquine resistance in *P. falciparum*.¹¹

The drop in effectiveness has led to the treatment being withdrawn from many national programs including those in the DRC. The distribution of the mutation inferring resistance is unequal, with 1.5% in some regions, to 89.5% in Katana. Therefore, is it difficult to determine the effectiveness of certain anti-malarial drugs where resistance is suspected but not fully confirmed. Here, information from neighbouring countries can be used to advise on action to take in the DR Congo in situations such as these where primary research may be lacking.

¹¹ Sidhu, A.B.S., Verdier-Pinard, D. and Fidock, D.A., 2002. Chloroquine resistance in Plasmodium falciparum malaria parasites conferred by pfcr1 mutations. *Science*, 298(5591), pp.210-213.



As the previous section showed there are a variety of treatment options for malaria cases. This poses another challenge as inappropriate use of drugs can hinder efforts to reduce malaria morbidity and mortality. In one study a little over 50% of public health facilities used National Malaria Control Programme recommended drugs. 32% of cases received the anti-malarial drug quinine, which as mentioned has been phased-out due to decreased effectiveness. 3.1 drugs per patient were prescribed on average, including vitamins, anaemia drugs, and blood transfusions.¹² However, just under half the cases indicated concomitant medication which undermines treatment effectiveness and can harm the patient.

Policy recommendation

As in Rwanda, to reduce malaria effectively and significantly in DR Congo, there must be a comprehensive understanding of the pattern and transmission of malaria in all regions of the DR Congo. External funding will be required to sustain efforts to control malaria and provide the necessary interventions such as universal provision of bed nets and free treatment for the most vulnerable communities. There must be an effective and comprehensive research agenda to aid planning and decision making at all levels. With a focus on developing a long-term plan for procurement and supply of long-lasting insecticide nets (LLINs) to ensure a continuous supply and replacement for communities.

From Figure 3, indoor residual spraying (IRS) and LLINs should be the focus of efforts to reduce the malaria burden in the DR Congo. They are the most cost-effective methods and although they have little effect on overall parasite prevalence and do not protect from outdoor transmission, they can assist greatly

¹² Ntamabyaliro, N.Y., Burri, C., Nzolo, D.B., Engo, A.B., Lula, Y.N., Mampunza, S.M., Nsibu, C.N., Mesia, G.K., Kayembe, J.M.N., Likwela, J.L. and Kintaudi, L.M., 2018. Drug use in the management of uncomplicated malaria in public health facilities in the Democratic Republic of the Congo. *Malaria journal*, 17(1), pp.1-8.



in protecting the most vulnerable groups. Monitoring programmes are also an important part of understanding mosquito populations, and they can be used in conjunction with behavioural ecology to better understand the spread of the disease. However, changing human behaviour should be the focus of malaria initiatives, rather than a focus on environmental factors associated with the vector which can be large-scale, costly operations, with the potential for unintended consequences such as habitat destruction and upsetting of food webs.

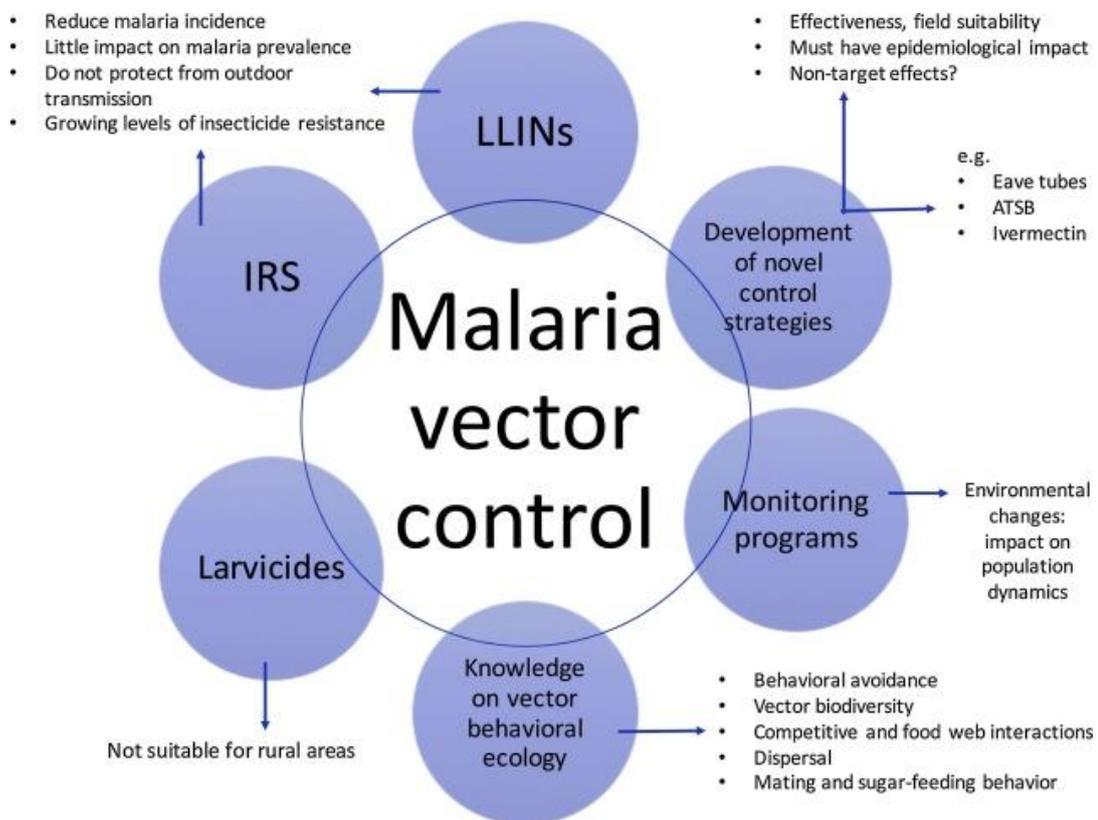


Figure 3: Typical methods for controlling the range and transmission of the malaria parasite and Anopheles vector

Accounting for all the considerations mentioned in this report, the following recommendations can be made:



- A focus on prevention of cases rather than treatment, given the country's infrastructure and health care capabilities.
- The most at-risk groups are under-5s and pregnant women. This is where attention should be focused, while building capacity for widespread roll out of preventative measures.
- Distribution of long-lasting insecticide treated nets to all households, with a focus on regions where the malaria parasite is most prevalent. Specifically, Nord Ubangi, Bas Uele, Haut Uele, Ituri, Maniema, Lualaba, Kasai Central, Tanganyika and Lomami. With the necessary supply chains and management required to ensure replacements when required.

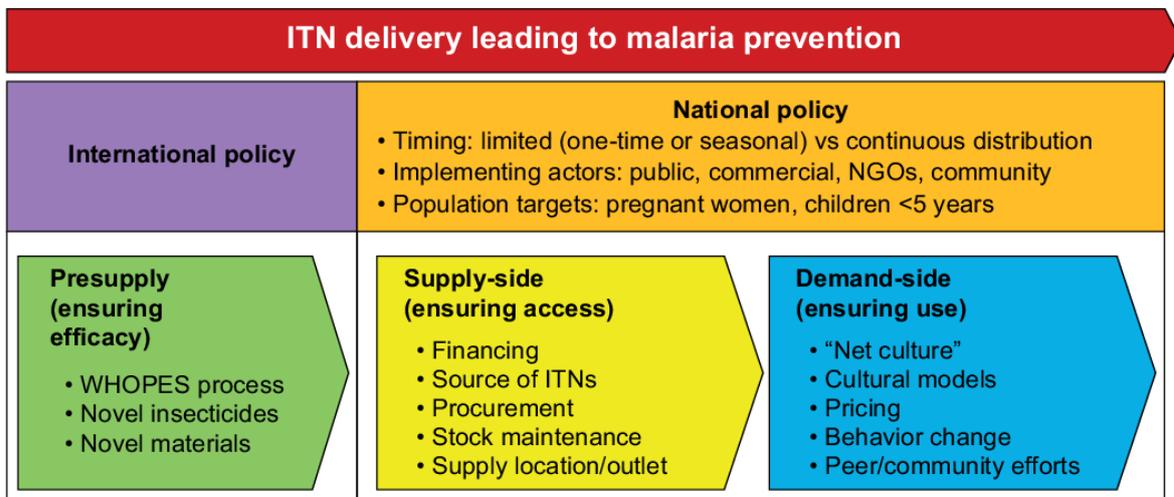


Figure 4: Supply and management of ITN supply to households in DR Congo

- More widespread indoor residual insecticide spraying
- Community education on symptoms and treatment of the disease, including administration of anti-malaria treatment to young children.
- Coordinated research nationwide to understand the prevalence and spread of the disease, including possible areas of future interest, such as those subjected to increased agricultural pressure.
- Further investigation into malaria drug-resistance, and alternative cost-effective options if resistance to anti-malaria drugs is conclusive.
- A standard anti-malaria treatment regime, with clear training and guidelines for health workers. Avoiding unnecessary and ineffective medication.



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