

Malaria chemoprophylaxis, children and adults

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Description of condition and intervention

Malaria is an acute illness caused by the Plasmodium parasites that spread through the bite of infected Anopheles mosquito. It is an important public health challenge as approximately one-half of the world's population was considered at risk of malaria in 2019. High risk groups to malaria include infants, children under 5 years of age, pregnant women, and people with low immunity and with immunocompromised condition like HIV/AIDS. Provision of chemoprophylaxis for malaria in high prevalence regions and mass chemoprophylaxis are important prevention strategies that could be delivered at the community level. (Source: WHO 2021). It was accountable for 229 million cases and 409 000 deaths globally in 2019. Whereas 67% or 274 000 infants are died due to this problem. About 94% of cases and deaths are in Africa countries, from these six countries share almost the half of all deaths of this problem. The Nigeria takes 23%, Democratic Republic of Congo 11%, United republic of Tanzania 5%, Burkina Faso 4%, Mozambique 4%, and Niger 4% ((WHO), 2021).

Vector control and elimination strategies are highly effective to preventing and reducing the transmission of this public health problem. Insecticide-treated nets (ITNs) and indoor residual spraying (IRS) are the essential one. Preventive chemotherapy is a drug which can be used alone or in combination with other drugs. This includes intermittent preventive treatment of under five children, pregnant women, seasonal malaria chemoprevention (SMC) and mass drug administration (MDA). We assess the effect and cost of malaria chemoprophylaxis intervention in children and adults being analysed as part of FairChoices: DCP Analytical tool.

Malaria chemoprophylaxis, children
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International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2021	WHO guidelines for the treatment of malaria	Yes

Intervention attributes

Type of interventions

Prevention

Delivery platform

This intervention may be delivered at the community level.

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Low level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

The treated population are the children from age groups 1 to 4 years. The affected population is in the age group of 1 to 4 years.

Disease states addressed

This intervention targets to prevent malaria in the population under consideration.

Intervention effect and safety

Table 1: Effect and safety of mass chemoprophylaxis

Effect of intervention		Certainty of evidence
All-cause mortality	A meta-analysis by Meremikwu MM 2012 o intermittent treatment of malaria probably produces a small reduction in all-cause mortality consistent with the effect on severe malaria, but the trials were underpowered to reach statistical significance risk ratio=0.66 (0.31-1.39), moderate quality evidence	See appendix
Incidence Malaria chemoprophylaxis in high endemic season (p. falciparum dominant)	Intermittent preventive treatment for malaria in children living in areas with seasonal transmission had relative risk of 0.26 (0.17-0.38) for all clinical malaria episodes RR=0.26 (0.17-0.38). These estimates were based on total sample of 9321 participants in six trials. The relative risk of severe malaria episodes was 0.27 (0.10 to 0.76) based on 5964 participants from two trials. These effects remain present even where insecticide treated net (ITN) usage is high (two trials, 5964 participants)(Meremikwu MM 2012).	See appendix
Mass malaria chemoprophylaxis (p. falciparum)	vonSeidlein 2019 reported adjusted incidence rate ratio of 0.41 (0.20-0.84) over the 9 months following implementation of MDA in a randomized controlled trial. The overall impact of MDA in reducing the incidence of P. falciparum infections was highly significant.	

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Interventions	Mass malaria chemoprophylaxis in high endemic season (P.falciparum) Mass malaria chemoprophylaxis (P.falciparum)	
Cost parameters		
Treated population Mass malaria chemoprophylaxis in high endemic season (P.falciparum) Mass malaria chemoprophylaxis (P.falciparum)	Incidence of Malaria	
Gender	Male and female	
Age Mass malaria chemoprophylaxis in high endemic season (P.falciparum) Mass malaria chemoprophylaxis (P.falciparum)	1 to 4 years 0 to 99 years	
Treated fraction	Sahel	Country file indicator
Effect parameters		
Affected Population	With condition	
Affected gender	Male and female	
Affected fraction age Mass malaria chemoprophylaxis in high endemic season (P.falciparum) Mass malaria chemoprophylaxis (P.falciparum)	1 to 4 years 0 to 99 years	
Affected fraction	1	
Comparison	No intervention	
Incidence Reduction (RRR) Mass malaria chemoprophylaxis in high endemic season (P.falciparum) Mass malaria chemoprophylaxis (P.falciparum)	0.74 0.59	Meremikwu MM 2012 vonSeidlein 2019

Intervention Cost

The economic cost per child dosed provider perspective is estimated to be USD 22.53 (Year: 2015) in Ghana (Nonvignon J, Aryeetey GC, Issah S et al 2016).

The total unit cost per person-year in Sierra Leone is estimated to be USD 0.7 (Year: 2012) (MPACM 2015).

References

WHO 2021: WHO Guidelines for malaria, 13 July 2021. Geneva: World Health Organization; 2021 (WHO/UCN/GMP/2021.01Rev. 1).

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105

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MPACM 2015: Available at <https://www.who.int/malaria/mpac/mpac-sept2015-cost-data-mda.pdf>

Appendix

Literature Review for effectiveness & safety

This literature search is an example of a structured, focused review of literature and guidelines. You can choose to do one of the following literature reviews for your Evidence Brief:

Level 1: intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, meta-analysis, systematic review, clinical practice guidelines)