



POLICY BRIEF

The Use of Intermittent Preventive Treatment for Reducing Malaria Burden in School-aged Children in Moderate and High Endemic Areas in Tanzania

Key messages

- The World Health Organization (WHO) malaria guideline 2022, recommend administration of a full treatment course of an antimalarial medicine at regular intervals to treat and prevent malaria infections in children who are old enough to attend schools (i.e., aged 5-15 years old). The strategy so called Intermittent Preventive Treatment of malaria in school aged children (SAC)- (IPTsc) strategy.
- Evidence from a review of studies in sub-Saharan Africa (SSA) showed IPTsc reduced malaria parasitaemia by 72% (pooled estimate), reduced malaria-related anaemia, improved cognitive development and improved school attendance. It is estimated that IPTsc would reduce 30%-50% of malaria cases in the community.
- In Tanga, Tanzania, an IPTsc implementation study using Dihydroartemisinin Piperquine (DP), involving 127 primary schools and over 73,000 pupils, reduced malaria prevalence by 80%, and protected clinical malaria cases by 41%.
- We recommend IPTsc strategy using DP administered at regular intervals as a complementary control strategy against *Plasmodium falciparum* malaria among SAC. The intervention has been proven to be effective, cost saving, safe, acceptable, and feasible for the prevention of malaria among SAC in areas with moderate to high malaria transmission.

Executive summary

In high-transmission settings, up to 70% of school-aged children (SAC) (aged 5-15 years) harbour malaria parasites, which is mostly asymptomatic, and it accounts for 13-50% of all school absenteeism and 61% of anaemia, leading to poor cognitive development and academic performance. There is limited or no malaria-targeted interventions for SAC and are thus contributing significantly as a reservoir to onward malaria transmission in the population.

The World Health Organization (WHO) has recently recommended administration of a full treatment course of an antimalarial medicine at regular intervals to treat and prevent malaria infections in children who are old enough to attend school (the phenomenon known as

Intermittent Preventive Treatment in school-aged children (IPTsc) in moderate and high malaria endemic areas.

This policy brief is recommending for the administration of Dihydroartemisinin Piperquine (DP) at regular intervals as a complementary control strategy against *Plasmodium falciparum* malaria among SAC (aged 5-15 years old). The intervention has been proven to be effective, cost-saving, safe, acceptable, and feasible for the prevention of malaria among SAC in areas with moderate to high malaria transmission.

Background

In high-transmission settings, up to 70% of school-aged children (SAC) (aged 5-15 years)

harbour malaria parasites, which is mostly asymptomatic, and it accounts for 13-50% of all school absenteeism and 61% of anaemia (Makenga et al., 2020, 2022a), leading to poor cognitive development and academic performance. There is limited or no malaria-targeted interventions for SAC and are thus contributing significantly as a reservoir to onward malaria transmission in the population.

Tanzania has experienced huge successes in the fight against malaria. Main interventions currently in use in the country for the control of malaria includes insecticide treated nets (ITNs), indoor residual spraying (IRS) for vector control, prompt access to diagnostic testing and treatment with effective antimalarial, and health education messaging. However, these interventions are less effective in school-aged children (SAC). (Buchwald et al., 2016; NMCP, 2020) Targeted malaria control interventions are limited to pregnant women who receive multiple doses of Sulfadoxine-Pyrimethamine (SP) as Intermittent Preventive Treatment during pregnancy (IPTp). There is also limited school bed-net programme (SNP), where children are used as vehicle of increasing accessibility to bed net in the households.

Intermittent Preventive Treatment in school aged children (IPTsc) aims to treat and prevent malaria infections in SAC. The phenomena requires the administration of a full treatment course of an antimalarial medicine at regular intervals to treat and prevent malaria infections in children who are old enough to attend school (World Health Organisation, 2022). IPTsc is based on the intermittent administration of full treatment courses of an antimalarial drug to clear both asymptomatic and symptomatic malaria infection and prevent malarial illness and its outcome (e.g., anaemia, absenteeism, cognitive impairment etc.) in SAC who are at high malarial risk (Cohee et al., 2021). Evidence on the effectiveness and feasibility of the IPTsc strategy is currently robust in most sub-Saharan African counties (Cohee et al., 2020). As of June 3rd, 2022, WHO has recommended the rollout of IPTsc in moderate to high endemic areas (World Health Organisation, 2022). The addition of IPTsc to school health policy would be highly helpful in improving the health and academic achievements of schoolchildren.

The Problem

School-aged children (SAC) (aged 5-15 years) represents approximately 27% of the global population in malaria endemic settings. In moderate and high malaria transmission settings, SAC represents over 40% of the malaria related

burden and equally over 40% of the malaria reservoir that perpetuate to onward malaria transmission in the population. In these areas, up to 70% of SAC presents with asymptomatic malaria infections, which is an important risk factor for anaemia, and consequently leads to impaired psychomotor and cognitive abilities.

In Tanzania, targeted malaria control interventions are limited to pregnant women (by intermittent preventive treatment in pregnant women - IPTp) and infants (IPTi now termed as perennial malaria chemoprevention-PMC) (World Health Organisation, 2022), however, none of these interventions, specifically target SAC. With the current malaria control interventions, these children have and will become increasingly more malaria vulnerable compared to those aged less than five years and pregnant women (Chacky et al., 2018; Makenga et al., 2020). In moderate and high transmission areas, interventions targeting SAC are often left out by existing interventions, leaving this group at greater risk of infections and maintaining the transmission reservoir. Interventions targeting SAC can impact both child health and contribute to transmission reduction in moderate and high transmission settings. Complementary interventions are needed for better protection of SAC to accelerate malaria control efforts.

Policy Options

Globally, a systematic review (Cohee et al., 2020) on IPTsc intervention has also shown the strategy is effective with average reduction of malaria parasitaemia by 72%. In addition, modelling results show IPTsc reduces malaria cases by 30-50% in the general surrounding communities. In line with the WHO malaria guideline, 2022, IPTsc is recommended in areas with moderate and high malaria transmission. The ideal drug characteristics for this purpose include combination therapies with well-matched half-lives, drugs with competing resistance mechanisms from first-choice treatment drugs, or a rotation of drugs. An alternative to first choice treatment could also be used.

In Tanzania, the National Institute for Medical Research (NIMR) in collaboration with the National Malaria Control Programme (NMCP), The President's Office, Regional Administration and Local Government (PO-RALG) and the Ministry of Education (MoE) carried out IPTsc implementation research using DP, aiming at determining acceptability and feasibility of operationalisation of IPTsc in primary schools of three councils with high endemicity in Tanga Region (Handeni and Kilindi District councils, and

Handeni Town Council). The study covered 127 primary schools with over 73,000 schoolchildren. IPTsc reduced malaria parasitaemia by 80% and had a protective effect of 41% for clinical malaria. It was shown that IPTsc delivered by school teachers three times a year was cost-saving, meaning that the cost of the intervention was less than the benefit created (Makenga et al, 2022, Implementation research).

Prior to the IPTsc implementation study, a clinical trial was conducted on IPTsc using Artesunate amodiaquine (ASAQ) and DP in Muheza, Tanga. In this study, both drugs were almost equally effective (70%) on reducing of malaria parasitaemia in schoolchildren (Geofrey Makenga et al., 2020; Makenga et al., 2022b). These two studies provide evidence and options for implementation of IPTsc, in addition to other drugs tried elsewhere (Cohee et al., 2020). However, ASAQ was accompanied with adverse events not warranting for acceptability if used in IPTsc.

Following the systematic review (Cohee et al., 2020) of various IPTsc studies and also based on the implementation study done in Tanzania (Makenga et al., 2022b), the suggested drug for IPTsc use is Dihydroartemisinin Piperaquine (DP), due to its proven effectiveness and long half-life compared to other combinations (Cohee et al., 2020; Geofrey Makenga et al., 2020; Makenga et al., 2022b). This drug is listed as an alternative first choice in the malaria diagnostic, treatment and preventive therapies guideline, Tanzania (NMCP, 2020).

It was estimated Tshs 4,200/= per child, was enough to administer three rounds of IPTsc in a year. This was cost saving compared to more than Tshs 13,000/= (up to Tshs 22,600) needed for treatment of a single episode of non-severe malaria or over Tshs 68,540/= needed to treat anaemia and between Tshs 71,070/= and Tshs 183,080/= for treatment of a severe malaria case. On cost effectiveness analysis, the main drivers for the implementation cost were drug costs and the initial start-up costs covering intense training and community sensitisations (Temperley et al., 2008). However, the costs will potentially be minimised, as IPTsc becomes a well-understood routine intervention. The drug choices can be routinely reviewed following experience built on the already implemented drug choices (i.e. DP) (Makenga et al, 2022, Implementation evaluation). In addition, the government and its stakeholders (international and local partners) can look for other possibilities to fund and or contribute to the

implementation costs, especially at the beginning / introductory phase of the intervention.

Recommended Policy Options

This policy brief is recommending addition of IPTsc using DP as a complementary control strategy against *Plasmodium falciparum* malaria among SAC (aged 5-15 years old). The intervention has been proven to be effective, cost saving, safe, acceptable, and feasible for the prevention of malaria among SAC in areas with moderate to high malaria transmission with collateral advantages in the health systems and the whole population. Schoolteachers have been successfully involved in the delivery of annual routine MDA to control NTDs and STH including schistosomiasis among schoolchildren. This proves the potential usefulness of schoolteachers in delivering IPTsc as they have played an important role in disease prevention and control programs, with high possibility of integration.

IPTsc delivery schedule to mimic malaria seasonality in the targeted communities, three times a year in areas with bimodal rainfall seasons, and twice a year in areas with a single unimodal rainfall season. Nevertheless, continuous monitoring of drug safety, malaria prevalence trend, and an assessment of markers of drug resistance should accompany the delivery of IPTsc strategy.

IPTsc is operationally feasible to implement through schoolteachers and has the potential for integration with other school health programmes (such as the neglected disease control (NTD)'s routine mass drug administration (MDA), eye/ear screening, menstrual hygiene, adolescent vaccination, etc.).

Schoolteachers have been involved in the delivery of bed nets that has successfully improved accessibility to the community for bed net delivery. They are also involved in delivering annual routine NTD's Mass Drug Administration (MDA) to control soil-transmitted helminths (STH) including schistosomiasis among schoolchildren. Building on these experiences, they can be involved in delivering the IPTsc strategy.

Implementation consideration

Given the effective school enrolment reaching almost 100% in Tanzania, schools remain the most appropriate platform for meeting SAC. However, for equity reasons, eligible children who are not enrolled at schools and some may not even be at homes then social welfare department can be involved on accessing children residing in orphanage homes and away from home, known

as street children. This will therefore need a collaboration with community health workers (CHWs), who would help teachers find those who missed a dose or missed school on dosing day including for reaching out street children or those in orphanage homes.

When implementing IPTsc, the ministry of health (MoH) should work in collaboration with PO-RALG and MoE. The MoH would act as the policy provider and supervise the process including Tanzania Medicine and Medical Devices Authority (TMDA), while the PO-RALG will be the implementers collaborating with MoE for curriculum and schedule issues. Integration with other ongoing school health programmes can be easier if is done by the same implementer.

Since IPTsc would result into almost 50% reduction in malaria cases in the communities, it is recommended that, funding for procurement and distribution of drugs (e.g., DP) should come from the central government budget for essential medicines and integrated in supply chain management system. Also, the drug choices can be routinely reviewed following experience built on the already implemented drug choices (i.e. DP)(Makenga, et al, 2022, Implementation evaluation).

For safety monitoring, the TMDA should be involved in collection and evaluation of adverse drug reactions (ADR) using their ADR reporting system. Thus, TMDA should be engaged from the commencement of IPTsc for team training and supervision.

There are other programmes that run through schools: the school MDA for helminthic control has been widely practiced in African schools(MoHCDDEC, 2017), they are mostly delivered by school teachers. These teachers can be trained to deliver IPTsc as was done in Tanga Region(Makenga, et al, 2022, Implementation

research). Incentive payment should be made equally to all teachers involved, covering all dosing (dispensing) days (e.g., 3 days for DP single dose, but requiring a week to cover those who would miss in any day).

On community engagement, some members may not attend briefing meetings, thus parents committee meetings should be conducted inviting village leaders and key opinion leaders to help propel information in every gathering that they may hold internally. In addition, political and administrative leaders should be engaged from the very beginning to the operation of IPTsc for sensitisation and administrative support. Issues like school food donation from parents/guardians should as well be addressed on every meeting as a message encompassing successful IPTsc administration in their respective schools.

Competing Interest

All authors declare no conflict of interest.

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About the Institutions

National Institute for Medical Research

The National Institute for Medical Research is a public health research institution established by the Act of Parliament No. 23 of 1979 with the mandate to carry out, co-ordinate, monitor and control health research in the United Republic of Tanzania

National Malaria Control Programme

The National Malaria Control Programme is a programme under the Ministry of Health (MoH) responsible for malaria control in the country.