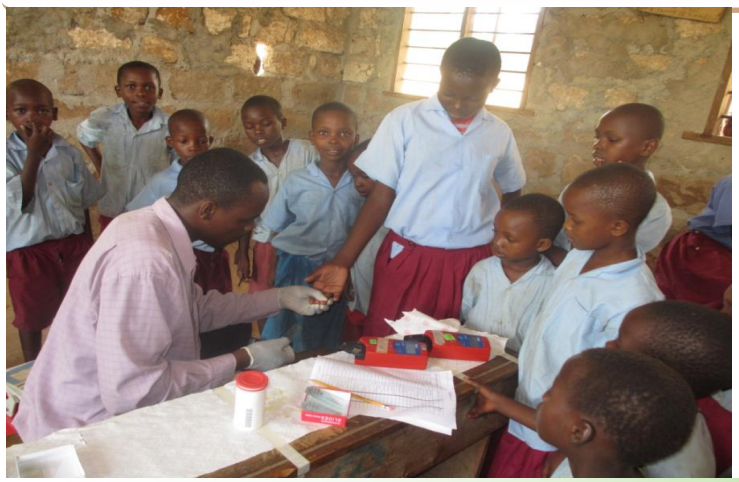
RESEARCH BRIEF



Healthy learning!

Evaluating the impact of a complex intervention of malaria control and enhanced literacy instruction on the health and education of Kenyan school children

Health and Literacy Intervention Project

Summary

Background: Improving the health of school-aged children can yield substantial benefits for cognitive development and educational achievement. However, there is limited experimental evidence on the benefits of school-based malaria control or how health interventions interact with other efforts to improve education quality. Considerable research has demonstrated that adjusting the methods teachers use to instruct reading can have a positive impact on students' successful literacy acquisition, but few large-scale evaluations of literacy programs have been conducted in Africa. This brief explains the impact of school-based malaria control and enhanced literacy instruction on the health and educational achievement of school children on the south coast of Kenya, 2010-2012.

Key findings: The malaria intervention, based on intermittent screening and treatment (IST), had no effect on health or education and was found to be complex and costly. In contrast, the teacher training and support improved children's literacy and reduced dropout, and cost US$8.29 per child. Children's literacy improved most when teachers focused instruction on letters and sounds and when children were exposed to more text in the classrooms.

Policy implications: IST should not be implemented in schools in low to moderate malaria transmission settings, but schools can serve as a screening platform for targeted community control. However, teachers should receive dedicated training to improve children's literacy development in early primary schools, and more time should be dedicated to the interaction between letters, sounds and syllables and more text should be displayed in classrooms.

Despite recent success in the expansion of educational access in African countries, concerns remain about levels of educational achievement and primary school completion. There are a variety of reasons for this, but it is increasingly recognised that poor health and nutrition affect children's cognitive functioning and, therefore, their ability to benefit from education. An important health problem faced by school-aged children is malaria, which even in its asymptomatic form can cause anaemia, cognitive impairment and attention deficits, making it significantly harder for many children to successfully complete primary education[1]. Teaching methods also influence learning. Effective techniques for developing literacy skills can have a significant impact on students' reading development.

A recently completed study, The Health and Literacy Intervention (HALI) Project, on the south coast of Kenya evaluated the effectiveness of malaria control and enhanced literacy instruction on the health and education of school children.

This evaluation, funded by 3ie, the World Bank's Spanish Impact Evaluation Fund and the Partnership for Child Development, was the first impact evaluation in Africa to measure the combined effects of a disease control and educational intervention on educational achievement.

Background

An earlier study in 2006 in Bondo District, western Kenya, where malaria transmission is high, found that school children who received the malaria drugs sulfadoxine-pyrimethamine (SP) and amodiaquine (AQ) three times a year were half as likely to be anaemic and had higher scores on tests of sustained attention[2]. However, these positive effects did not translate into an improvement in educational test scores. This may have been because the 12-month follow-up period was too short to capture the change in academic capabilities, or because of the poor quality of instruction. In 2009, the use of SP and AQ was discontinued and as an alternative the Government of Kenya identified the potential of using intermittent screening and treatment (IST) in its *Malaria-free Schools Initiative*[3].

Preliminary research for the HALI Project found that in schools on the Kenyan coast insufficient attention is given to letter-sound relationships, especially in English, and there is a lack of opportunity to interact with text to complement the strong focus on oral language skills. In addition, effective instructional techniques are encouraged in the current Kenyan curriculum, but teachers lack support to help implement them systematically and effectively[4].

Before rolling out IST, the Kenya Ministry of Public Health and Sanitation wished to obtain evidence on its benefits and cost-effectiveness. In addition, the Kenya Ministry of Education sought evidence that systematic instruction is essential for progress in early grading reading and educational achievement overall.

Teacher in coastal Kenya. Photo courtesy of Margaret Dubeck.

Impact evaluation

Between 2010 and 2012, a randomised controlled trial was conducted to assess the effectiveness of IST and enhanced literacy instruction on the health and educational achievement of school children in the coastal districts of Kwale and Msambweni in Kenya[5]. These districts have moderate levels of malaria transmission as well as a poor record of examination results.

During IST, all children in classes 1 and 5 were screened for malaria using a rapid diagnostic test once per school term and children who tested positive (with or without malaria symptoms) were treated with the antimalarial artemether-lumefantrine (Coartem).

Alongside the IST intervention, a literacy intervention was introduced to early primary teachers to help them learn more about literacy acquisition in alphabetic languages to improve their instruction[5]. Through a workshop, a partially scripted manual, and ongoing text message support, teachers were guided to deliver instruction that promotes efficient reading acquisition. Teachers learned to use the lesson plans and provide guided practice that systematically develops oral language skills, knowledge about letter-sound relationships, fluency and comprehension, and were provided with key classroom supplies.

The evaluation used a cluster-randomised design, meaning a total of 101 primary government schools were randomly assigned to one of four groups: IST; literacy intervention; IST + literacy intervention; neither intervention. The evaluation assessed the impact of IST on anaemia, *Plasmodium* malaria infection and sustained attention and the impact of the literacy intervention on a range of literacy and numeracy outcomes. Baseline health and education surveys were conducted among children in classes 1 and 5 between January and March 2010, with follow-up surveys after 12 and 24 months. Although the educational performance of students in both class 1 and 5 was assessed, only students in class 1 received the literacy intervention. An accompanying qualitative evaluation investigated the community acceptability, feasibility and cost of the interventions

What did we learn?

- **No effect of IST on health and education.** Initially, 42% of children were anaemic. Although the risk of anaemia was strongly associated with malaria infection in the 2010 baseline survey[6], IST did not reduce anaemia levels after 12 or 24 months. There was also no impact of IST on infection rates or measures of sustained attention.

- **IST is a complex intervention which requires careful community sensitization.** The qualitative evaluation showed that although IST was acceptable to the community, lack of understanding of the consequences of asymptomatic infection and the complexity of the treatment regimens may affect adherence to treatment among children who are seemingly healthy[7]. IST is also relatively costly, at US$ 6.61 per child screened[8].

- **Targeting of malaria control is important.** The distribution of malaria varied greatly between schools, with infection ranging from 0 to 75 percent (Fig. 1 & 2), and this variation may have diluted any impact of IST. However, school screenings conducted every 2 to 3 years may prove valuable in identifying high risk communities (Fig. 2) that merit targeted, intensified control[9].

Figure 1. Prevalence of *Plasmodium* infection by school for the 51 intervention schools, February-March 2010 and February-March 2012

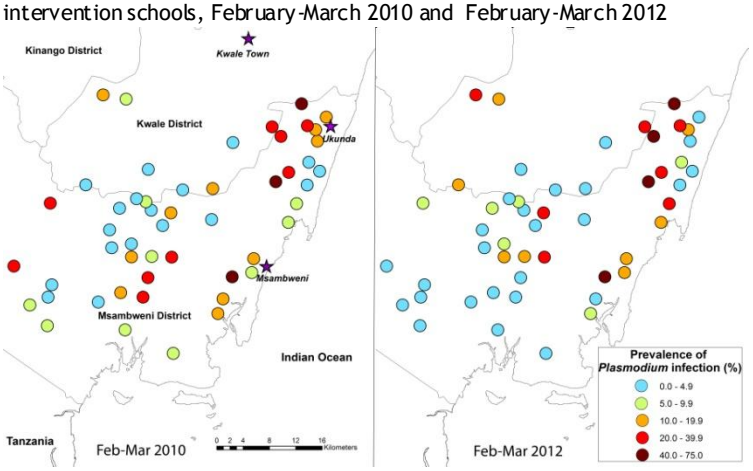
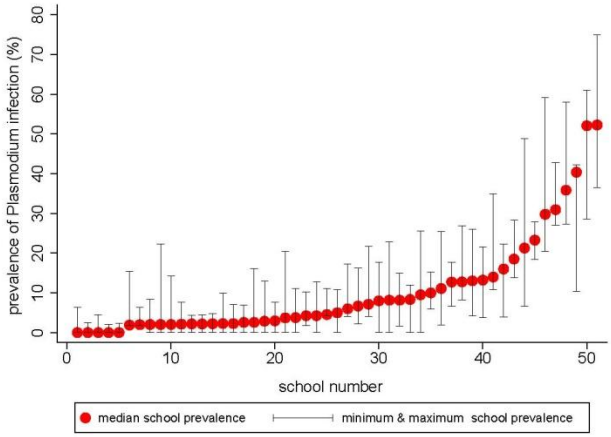


Figure 2. Average (and minimum and maximum) prevalence of *Plasmodium* infection across five screening visits

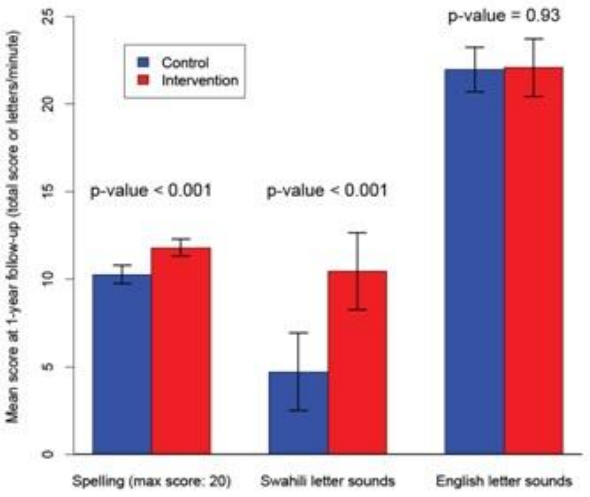


- **The teacher training and support improved children's literacy.** Children who received the literacy intervention showed significantly greater increases in scores for spelling and Swahili literacy at 12 months than children in the control group (Fig. 3). The cost of the literacy intervention was US$ 8.29 per child.

- **Children's literacy improved most when teachers focused instruction on letters and sounds.** Teachers in the literacy intervention group spent more time teaching letters and sounds and how to combine and take apart letters and sounds to read words. Students in intervention classrooms spent more time interacting with text and less time writing/copying from the blackboard. They also had more exposure to text through posters and other means. These changes were important in improving spelling.

- **The literacy intervention was associated with reduced dropout.** Only 2% of the intervention-group children in the younger classes had dropped out of school by the 24-month follow-up, compared to over 5% of the control group.

Figure 3. Change in spelling and literacy scores 12 months after literacy intervention



Policy implications

- **IST should not be implemented in low to moderate malaria transmission settings.** While infected children received treatment, they quickly became re-infected and there was no lasting impact of treatment on their health or education.

- **Schools can serve as screening platforms for targeted community control.** Screening of school children using rapid diagnostic tests provides a clear picture of the malaria situation in an area. School screenings conducted every 2-4 years can help target community-wide interventions, including localized larval control and community mass treatment, and help reduce overall transmission.

- **Literacy instruction should include systematic teaching of letter-sound correspondence and text interaction.** Focusing on the specific skills of putting letters, sounds or syllables together and breaking them apart can increase children's literacy abilities. Displaying more text in the classroom with which children can interact, such as posters, can also contribute to better literacy.

- **Text messages can be used as an effective method of support, motivation and training to teachers.** Teachers responded positively to training and were enthusiastic to apply the recently acquired teaching methods.

Collaborating partners

- KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya
- Ministry of Public Health and Sanitation, Kenya
- Ministry of Education, Kenya
- University of Nairobi, Kenya
- London School of Hygiene & Tropical Medicine, United Kingdom
- Graduate School of Education, Harvard University, United States of America
- International Initiative for Impact Evaluation (3ie)
- Spanish Impact Evaluation Fund of The World Bank
- Development Impact Evaluation Initiative (DIME)

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