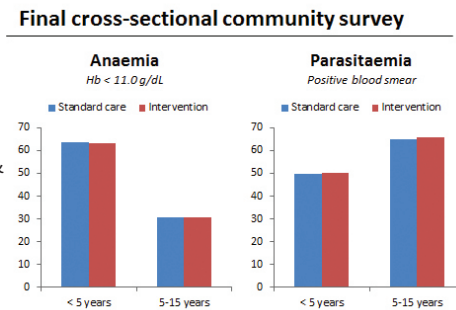


What was the impact on health outcomes of children?

We assessed health outcomes of children in cross-sectional community surveys, and in a cohort of children under five. The final cross-sectional survey was conducted in Jan-Apr 2013, (approximately 18 months after we started the intervention). We assessed 8766 children from randomly selected households in the 20 clusters, including 4393 under-fives & 4393 aged 5-15 years.

The primary outcome of the PRIME study was the prevalence of anaemia (haemoglobin < 11.0 g/dL). We found no difference in prevalence of anaemia or parasitaemia between the intervention and standard care groups.



The PRIME intervention 'didn't work'. Why?

The pathway of change broke down at two points:

- 1) at the point of changing treatment seeking practices, and
- 2) at the point of improving fever case management.

In theory, introducing RDTs in health centres will reduce 'over-prescription' of AL, improving targeting of antimalarial treatment and fever case management, thus resulting in better treatment outcomes.

However, this theory is not applicable in high transmission settings such as Tororo, where weak health systems, poverty and malaria create a cycle of poor health care.

In summary....

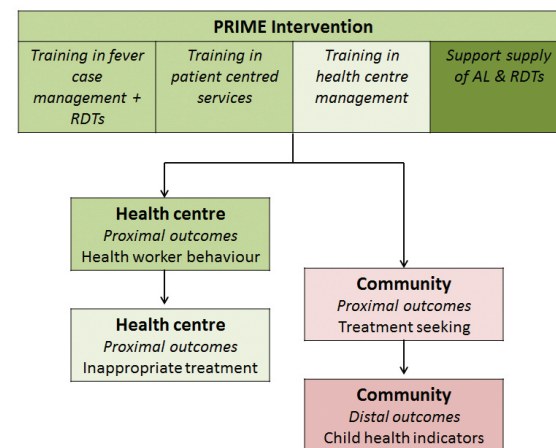
The PRIME intervention was implemented successfully, although not all health workers received the training. The intervention appeared to improve malaria case management, communication between health workers and patients, and patient satisfaction with care. But these improvements were small, and we did not see improvements in health outcomes of community children. Broader health centre changes and additional malaria prevention measures will be required in this high malaria transmission setting.

The PRIME intervention had a small positive impact (shaded green) on proximal outcomes, including health worker behaviour and appropriate treatment of malaria. However, these positive effects did not extend to the community level, where no differences were seen in health indicators between the children from intervention and standard care communities (shaded pink).

What are the policy implications?

To improve quality of health care within the public sector, infrastructure and wider systems and political issues must be addressed. Currently deployed malaria control methods, including use of insecticide treated bednets (ITNs) and treatment with ACTs (including AL) are not adequate to control malaria in Tororo. Novel approaches, such as use of chemoprevention, may be required.

Effect of the intervention



References and Resources

- Staedke SG, et al (2013). **The PRIME trial protocol: evaluating the impact of an intervention implemented in public health centres on management of malaria and health outcomes of children using a cluster-randomised design in Tororo, Uganda.** Implement Sci 8(1): 114.
- Chandler CI, et al (2013). **The PROCESS study: a protocol to evaluate the implementation, mechanisms of effect and context of an intervention to enhance public health centres in Tororo, Uganda.** Implement Sci 8(1): 113.
- Chandler CI, et al (2013). **Aspirations for quality health care in Uganda: How do we get there?** Human Resources for Health 11(1): 13.

Acknowledgements

This work was supported by the ACT Consortium through a grant from the Bill and Melinda Gates Foundation to the London School of Hygiene & Tropical Medicine. We would like to thank the Infectious Disease Research Collaboration, the Ugandan Ministry of Health, the District Health Officer & Tororo district health leadership, West Budama North & South Health Sub-districts, all participating health workers & in-charges, the LCs, community members & the research study teams.

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For full list of publications, training manuals and videos, visit www.actconsortium.org/PRIME and www.actconsortium.org/PROCESS.

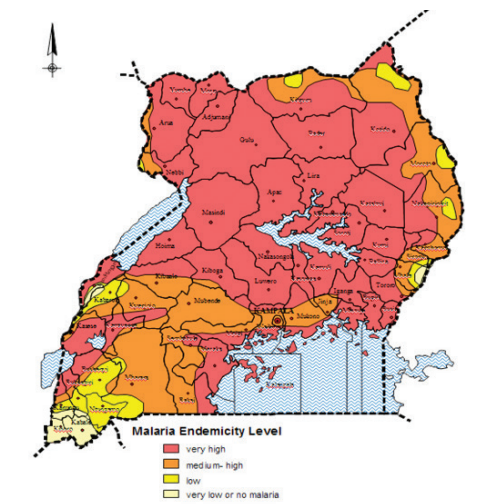
Evaluating the impact of a public health centre intervention on management of malaria and health outcomes of children in Uganda – Results from the PRIME & PROCESS studies

Why did we do this research?

Despite scale-up of malaria control interventions in Uganda, the burden of malaria remains high, and may be increasing in some areas. Health services in the public sector are inadequate, which prevents delivery of good quality care, limits appropriate fever case management and contributes to the lack of progress on malaria control.

We conducted the **PRIME** study to find out whether a multi-component intervention delivered at public health centres in Uganda could improve health outcomes of children and treatment of malaria, as compared to the current standard of care in Tororo district, Uganda.

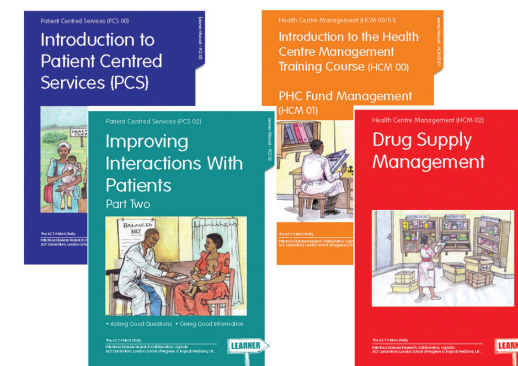
The **PRIME** study findings were supplemented by the **PROCESS** study, an evaluation of the process, context, and wider impact of the PRIME intervention. Together these studies aimed to provide evidence of the health impact of a public sector intervention in Uganda.



How did we prepare for the PRIME study?

In 2009-2010 we carried out formative research, which included a census survey, a survey of health workers, and a qualitative study. Through this research we identified barriers and aspirations for quality health care. As we evaluated the results, we aimed to identify options for the intervention that might have the greatest impact on improving quality of care and that could be feasibly implemented.

These findings were considered in the context of literature reviews on previous interventions as well as theory of behavior change and adult learning, and were discussed with stakeholders in Uganda. We then designed an intervention which aimed to attract patients to seek care and to improve the quality of care delivered at public health centres. The intervention could be sustainable by the Ministry of Health and district partners in Uganda.



What do we know about Tororo?

Tororo district, eastern Uganda, is an area with very high malaria transmission. The study area is rural with limited infrastructure and education levels. Very few households in the study area have electricity. Health centres in the study area are generally run by nurses or nursing assistants, and most are under-staffed. Infrastructure at the health centres is also limited; most lack electricity and running water. Prior to the trial, delivery of supplies to health centres in the study area, including the ACT drug artemether-lumefantrine or AL (the first-line recommended treatment for malaria in Uganda) was unpredictable.

PRIME intervention

The intervention had four components, including:

- 1) training in-charges in health centre management,
- 2) training to health workers in fever case management and use of rapid diagnostic tests (RDTs),
- 3) training health workers in patient-centred services, and
- 4) ensuring adequate supplies of artemether-lumefantrine and RDTs for malaria.

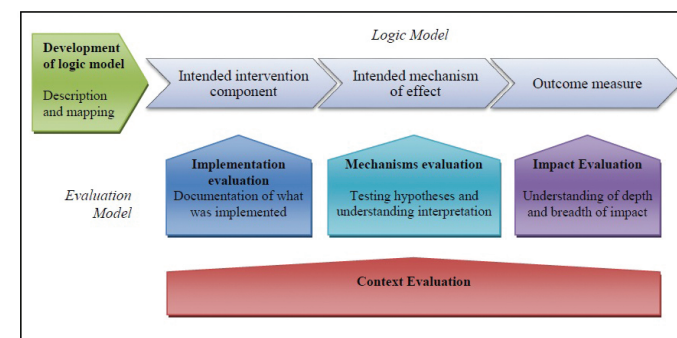
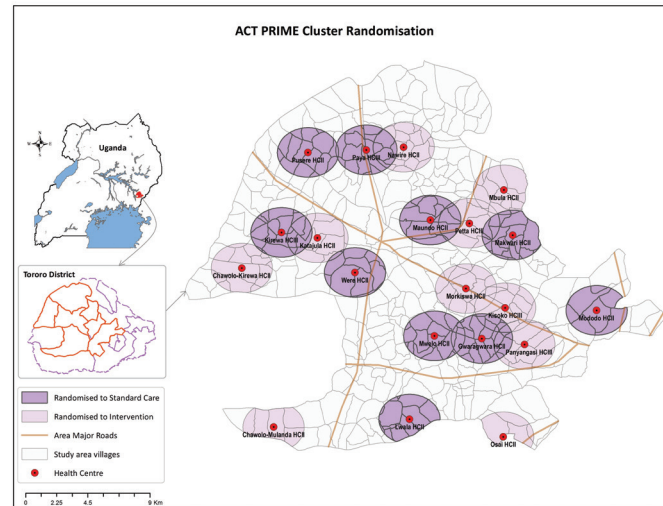
The manuals for delivering the intervention are available at www.actconsortium.org/PRIMEmanuals.

How was the PRIME study done?

The PRIME study was designed to evaluate the impact of the intervention delivered at public health centres using a cluster-randomized design in Tororo district. Twenty lower-level health centres from 7 sub-counties were randomly assigned to the intervention or to standard care.

The 10 health centres that were assigned to the intervention received the intervention package. Those assigned to standard care continued with their usual activities. Assignments were made randomly, like a lottery. The PRIME intervention took place from May 2011 to April 2013.

To evaluate the impact of the PRIME intervention, we conducted three cross-sectional community surveys, followed a cohort of children under five, and conducted patient exit interviews and monthly surveillance at the health centres.



What did we expect to happen?

We developed a logic model to set out the intended pathway of change from the PRIME intervention inputs through to the community level outcomes. This illustrated how we expected change to occur - and the conditions required to support change - at the health centres and in the communities.

We anticipated that the PRIME intervention would influence treatment seeking behaviour amongst community members living close to intervention health centres. As a result, community members would:

- be more likely to seek care at the health centre,
- receive better care for febrile illnesses when they attended the health centre, and
- have better treatment outcomes leading to reduced anaemia & parasitaemia.

How well was the PRIME intervention delivered?

Overall, the PRIME intervention was delivered well, but not all health workers attended the training. Of 52 health workers, most attended some training, but only 8 attended all sessions, and 8 attended none; 2 of 10 in-charges did not attend the training in Health Centre Management. On the whole, most of the PRIME intervention was carried out as intended and learning objectives were met.



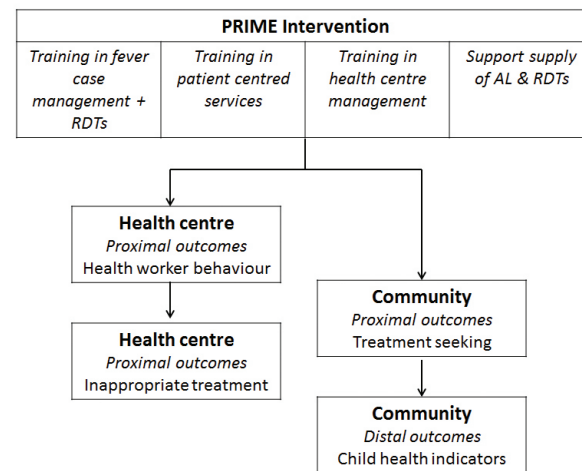
'It used to be every fever was considered to be malaria but now the test must confirm before medication is given, by RDT.'

How was the PROCESS study done?

The PROCESS study was carried out alongside PRIME to help us understand if and how the intervention worked. It included:

- an evaluation of the implementation of the intervention activities from the perspective of implementers, health workers, community members, and key stakeholders;
- a context evaluation to capture information on factors that may have affected the implementation of the intervention or outcomes;
- and an impact evaluation to assess the wider impact of the intervention beyond outcomes of the PRIME study.

Pathways of effect



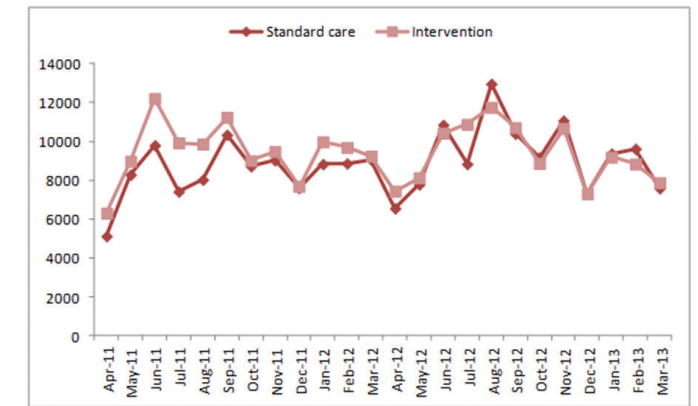
Did treatment seeking behaviour change?

The PRIME intervention successfully targeted some areas of quality health care that were important to community members. The community was aware of the intervention at the health centres, and was happy with ACTs & RDTs. We also saw positive improvements in patient centered services in some intervention health centres.

However, these improvements were insufficient to prompt systematic changes in treatment seeking behaviour. The intervention was limited compared with demands on health centres, which had further needs of improvement. Patients also sought care at numerous non-governmental sources. Consequently, **the intervention made little difference to treatment seeking overall.**

Given that a variety of care options are available (public, private, NGO), community members appeared to position themselves for opportunities to attain the most convenient and least expensive care.

No difference in total monthly attendance over time



What was the impact on health workers and health centres?

The PRIME supply of AL & RDTs successfully 'filled the gap' between government supply and patient demand, particularly for RDTs. Small improvements were seen in fever case management, which were attributed to RDTs as well as training & supervision. However, the effect was not as strong as in lower malaria transmission areas, because many patients with fever needed antimalarial treatment anyway.

Small improvements were also seen in the way health workers interacted with patients. A larger change may have been possible if health workers were less overworked and if change was being taken on more widely in the health system hierarchy and politics.

The health centre management training failed to address the changing dynamics at health centres. Training in financial management could not be routinely implemented due to the unstable supply of health centre funds. The change in the National Medical Stores (NMS) supply management system (from a 'Pull' to a 'Push' system) made the supply management system training less relevant. The frequent supervision visits made by the study to collect data from registers seemed to have a greater impact on information management than the training workshop on this topic.

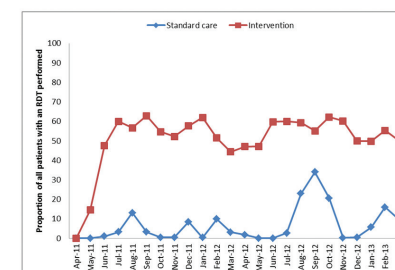
Important issues at health centres were not addressed by the PRIME intervention, including staffing shortages and poor infrastructure (lack of clean water), payment of staff salaries and delivery of health centre funds.

Did the PRIME intervention improve treatment of malaria?

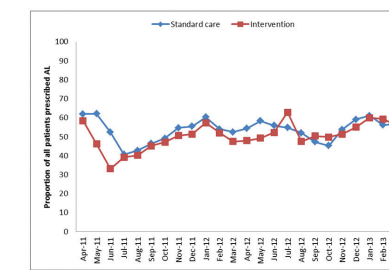
Overall, use of RDTs was much higher in patients attending intervention health centres (52% intervention vs 7% standard care). RDTs were provided to all health centres by the NMS during the study period and were used in standard care health centres.

However, rapid diagnostic testing appeared to have little impact on the use of AL, with approximately half of all patients receiving a prescription for AL in both groups (50% intervention vs 53% standard care).

Use of RDTs in all patients, by month

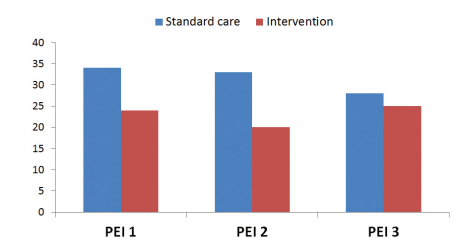


Prescription of AL in all patients, by month



Patient exit interviews

Inappropriate treatment of malaria



Results of the patient exit interviews suggest that management of febrile illnesses was better in the intervention health centres. However, the difference was small and not significant.

