Author’s response to reviews

Title: The cost of uncomplicated childhood fevers to Kenyan households: implications for reaching international access

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Responses and Revisions based on Dr. Killen's Review:

Thank you very much for your additional comments and questions regarding our paper.

We took the reviewers comments and suggestions very seriously in our revision based on our understanding of the comments. While we completed our revision and response to the reviewers based on our understanding of the comments and suggestions, it seems that we misunderstood two or your comments (his points 1.1 and 2.2). Based on your additional feedback, I think we now understand better the issues you raised. We have tried to revise our paper and we try to provide additional explanation in this letter to show that we are attempted to respond in a constructive fashion.

Let's begin with item 1.1, which we think continues to be an issue based on a misunderstanding of the focus and perspective of this paper. First, let's be clear on what we are doing:

1. We complete our analysis from the perspective of rural households in Africa, who typically have to decide how to manage illnesses and fevers in their children before they know the actually cause of the fever (if they ever do).
2. We do not assume that all fevers are caused by malaria or that antimalarials 'resolve' all fevers.
3. Because of our household perspective, we develop a model of the costs to households of fever management.
4. We are NOT presenting a model of costs-to-providers (in this case Governments).
5. We are NOT presenting a health impact model allowing for the causes of fever or attempting to measure costs per illness averted and so on.
6. Understanding the costs to households is important to define the cost burden on households from fever management and the implications for the future as Kenya pursues national targets for prompt treatment of fevers with ACTs provided only through government health facilities.
7. Because Kenya has a policy to pay the costs of ACTs at government health care facilities, households themselves will not pay additional ACT-related costs if they receive treatment at a government health facility.

In the end, our paper shows clearly the costs households actually bear based on their actual behavior to manage a child with fever. Our paper also shows how such costs would be expected to change under the current child health policy that all fevers should be treated promptly AS IF they were malaria.

For the first part of the paper, we are simply using data that exists to show, on average, how much households paid (in cash and time) for managing their child's fever (whatever the cause). Some large fraction resolved at home without any medicines (branch 3), another large fraction resolved at home with some medicines (branch 1), although these medicines were not necessarily antimalarials, and the rest were taken to a HCF.

We therefore already have in our model a large percentage of fevers that are not malaria (they resolved at home without medicines or had medicines but not antimalarials). Since ACTS are not even part of the discussion or analysis for the first part of our paper, the cost of ACTs does not come into the analysis at this point in the paper. Similarly, this analysis and model does not need to know the percentage of fevers that
were "truly" malaria because our focus is on costs of fevers regardless of cause.

In the second part of the paper, when we consider the impacts for households if they changed their treatment seeking behavior and delivered more kids to a HCF, we have assumed that the government will pay the cost of ACT (as is policy) so the costs to households if they take their kids to a HCF remain the same (on average per fever) as existed in the 'real' data.

With a clear understanding of the analysis and focus of this paper, we hope it is now clear that we have not "overestimated" or somehow inappropriately analyzed the primary questions addressed in this paper. We have not over or underestimated costs changes (savings or increases) to households because our analysis is from the perspective of the household. We thought we made this point clear in our revision, and we note that reviewer 3 was satisfied with these clarifications.

We know that Kenya is clearly going to pay much more for ACTs than SP, which has prompted substantial research on evaluating opportunities for revising clinical and diagnostic practices for malaria case management acknowledging the differential risks associated with malaria in young children versus adult. A recent paper by Zurovac, D., Larson, B.A., Akhwale, W. and R.W. Snow, "The financial and clinical implications of adult malaria diagnosis using microscopy in Kenya", Tropical Medicine and International Health, 11(1185-1194), shows that Kenya can save substantial amounts of money with basic revisions in clinical practice for adults. Research on the quality of rapid-diagnostic tests under field conditions is also underway. While the results of such research could have substantial impacts on the way malaria in adults and older children is diagnosed and treated, Kenya will continue to pursue the internationally recommended policy of prompt treatment of all fevers in children under 5 at a health care facility with AL.

With respect to fever resolution times, the pattern of resolution observed in our data basically will not change with ACTs assuming the same pattern of treatment seeking behavior (only 32% were taken to a HCF, 87% of these were treated with an antimalarial). So, 27.8% of all fevers were treated at a HCF with an antimalarial (but on average after 3.1 days at home with a fever). If 40% of these fevers treated at a HCF were true malaria (11.1% of fevers), fever clearance times would only be reduced by approximately 4-9 hours when AL used instead of SP (see, e.g., Koram et al., Comparative efficacy of antimalarial drugs including ACTs in the treatment of uncomplicated malaria among children under 5 years in Ghana. Acta Trop 2005, 95: 194-203; and van Vugt et al., Randomized comparison of artemether-benflumetol and artesunate-mefloquine in treatment of multidrug-resistant falciparum malaria. Antimicrob Agents Chemother 1998, 42: 135-139). Even if we can change behavior so that more kids are delivered to a HCF sooner (our options analyzed), since most of them are not malaria, their pattern of fever resolution should continue to follow the same patterns as already in our data.

In sum, the sections of our paper focused on ACT policy change scenarios examine the costs of getting a child with a fever into the health system where ACTs will be restricted for use. This is the international benchmark and whether ACTs target parasitaemic children or not, the costs to households in terms of money and time will remain the same for getting their child to HCF completely independent of whether ACT is more efficacious than SP or whether we could diagnose those with true malaria. This is an important conclusion of the analysis and our manuscript presents the empirical supporting data from carefully undertaken field investigations. We feel as do all three reviewers that these results must be conveyed to a wider audience.

We have revised our presentation, primarily on pages 2 and 3 in the section titled "definitions and approach", to convey and clarify the focus of this paper. As part of these revisions, we included additional references on the percentage of fevers that are malaria (as recommended under item 2.2 in your second set of comments). We included additional references on opportunity costs (Goodman et al. 2006; Kachur et al., 2006) on page 15.

In closing, we have tried to understand and respond in a constructive manner to your questions and comments. We hope our above clarifications show that our approach is appropriate for the focus of this paper and that we have not misrepresented anything in our analysis. We think our analysis provides a major improvement in our understanding of what it costs rural communities to manage a common problem of fever in young children and how international efforts to target these febrile children with ACTs will impact on their costs for getting their children to clinic.

Thank you again for your assistance and input into this manuscript.