Author’s response to reviews

Title: Integrating vector control across diseases

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Author’s response to reviews: see over
Covering letter for the revised article: “Integrating vector control across diseases”

24th July 2015

Dear Mr Recchioni,

Many thanks for your email of the 21st July 2015. Below we provide a response to the point raised by the additional reviewer.

Whilst we disagree with the opinion of the reviewer, and highlight the evidence used to support our statements, we agree that there are potential risks if integrating vector control between diseases were to be implemented without being properly assessed. We have therefore edited the manuscript to reflect the debate in this area and provide suggestions for how differences of opinion could be settled by future research.

We believe that the edits we have made to the manuscript address the concerns of reviewer 2 and this additional reviewer, whilst also reflecting the contrasting views of reviewer 1 and, most importantly, the available evidence. Given the delays in the review process so far we hope that you will now be able to make an editorial decision regarding acceptance of the manuscript.

We look forward to hearing from you soon.

Yours sincerely,

Nick Golding

on behalf of all the authors
Editorial comments

“I agree with Walker’s statement. The breeding sites and even the adult ecology (fly range, resting areas...) are different according to the vector species. Using a common strategy of control would be unsuitable or even dangerous.”

We believe that this statement is inaccurate, unhelpful, and rooted in opinion rather than evidence.

The reviewer is misinformed; a common strategy can be effective against multiple vector borne diseases. For example, we discuss in the manuscript and give appropriate citations for evidence on how long-lasting insecticidal nets are effective against malaria [1], as well as other vector borne diseases including cutaneous leishmaniasis and Japanese encephalitis [2].

For other vector borne diseases the breeding sites and ecology of different vector species are undoubtedly different. Here, in terms of integrated control it may only be appropriate to share the delivery and monitoring and evaluation infrastructure. We are very clear about this throughout the manuscript. For example:

“…application of larvicides is appropriate for controlling Anopheles [32] whereas polystyrene beads may be more effective for the urban Culex vectors of lymphatic filariasis [33] and the removal or larvicidal treatment of water containers is more useful for the Aedes vectors of dengue and yellow fever [34, 36]. Nevertheless, there are many situations where Anopheles and Culex mosquitoes share the same habitat [37, 38], and control operatives could reasonably be tasked to treat or remove the distinct larval habitats of several key species in a single programme, sharing many of the costs of control.”

Figure 2 summarizes evidence to identify pairs of diseases for which shared control could be suitable and for which future research is needed. Whilst space limitations prevent us from providing full details in the main manuscript, Figure 2 is backed up by 33 published research articles - all detailed in Table S1.

“It can generate insecticide-resistant insects.”

Clearly insecticide resistance is a key issue when planning a vector control programme. The broader concept of integrated vector management (IVM) - of which cross-disease integration is a part - has as a core aim the prevention of insecticide resistance by applying multiple different interventions, including non-insecticide based tools (e.g., drainage of breeding sites) and monitoring their effectiveness. This is already discussed:

“Vector-borne disease control is hindered by dwindling financial resources as well as other challenges such as development of insecticide resistance [10]. Simultaneous deployment of multiple vector control methods can reduce disease transmission to far lower levels than those achieved using a single intervention and help slow the development of insecticide resistance thereby providing cost-effective and sustainable reductions in disease burden [11].

The simultaneous use of multiple methods is now the preferred vector control strategy and forms a cornerstone of integrated vector management - a best-practice framework for sustainable and cost effective vector control [12].”

If insecticide-based interventions were to be applied inappropriately in a cross-disease control programme – for example targeting an insufficient proportion of the vector population, or prolonged use of the same insecticidal compound - this could lead to insecticide resistance. However this is also true of single-species control programmes so this is really not a criticism of the cross-disease programme integration we discuss here.

Given the mixed views of reviewer 2, the negative views of the recent advisor and the very positive views of reviewer 1 (who considered our earlier manuscript to be: “an outstanding, invaluable and delightfully brief little piece that I recommend highly for publication”) it is clear that this is a topic for debate. However, since a deliberate programme of cross-disease integrated vector control has not yet been
attempted and evaluated, these differences of opinion would best be settled with specific research focused on this topic. We have therefore added a section in the revised manuscript to highlight this debate and to suggest field research be carried out to settle these questions, as follows:

“The likely impacts of applying control methods simultaneously against multiple vectors are a cause of debate amongst vector ecologists. However a deliberate integration programme has so far never been applied operationally or evaluated in a research context. Therefore, evaluation of programmes targeting multiple vectors and diseases should be a priority for future research in order to determine the effectiveness, cost effectiveness and feasibility of this approach.”

As we state in the manuscript, our aim with this opinion piece is to stimulate further discussion and research in this important topic in order to determine where and when cross-disease integration of control programmes might be feasible.

References

1. Lengeler C: Insecticide-treated bed nets and curtains for preventing malaria. Cochrane Database Syst Rev 2004:CD000363.