Dynamic Drivers of Disease in Africa

*Integrating our understandings of zoonoses, ecosystems and wellbeing*

Integration of participatory research

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Our conceptual framework
Our rationale for integration of participatory work

- Models can provide characterisations and predictions to advance knowledge and evidence for policy but often they are constructed by single disciplines representing a selective view of the world.

- Researchers can be influenced by perspective and the political and funding arena and, often not considering views of those actually living with the disease.

- Infectious diseases need to be studied using a multidisciplinary perspective, including involving local people to potentially improve model selection and accuracy.
Aims of our work

- Explain the benefits to using participatory approaches to improve model design and facilitating multidisciplinary research in this area - overcoming disciplinary hurdles

- Proposing practical examples of effective integration

- Models can create tangible information from uncertainty which leads them to be given an authority which may be unjustified in a decision-making or policy context.

- This work aims to make models and their predictions more useful for decision-making and policy formulation and include information such as predicted behavior change.
Participatory work in action
The benefits of participatory research

1. Removal of ignorance
2. Confirmation
3. Removal of irrelevance
4. Addition of knowledge
5. Removal of error

Acknowledgement: Pete Atkinson
Application of this to our case studies

Participatory research as a tool to:

1. Structure a model: population-based mathematical modelling
2. Structure a model: geographically explicit ABM (previous presentation)
3. Select the most relevant parameters of the system
4. Identify the most relevant regime of the system
5. Mathematical modelling as a tool to better structure participatory research
6. Diversity of modelling approaches challenge the conclusions of other types of modelling
1. A tool to structure a model: population-based mathematical modelling

*Examples from Sierra Leone*

- Provide information on patterns of mobility - increasing model accuracy
- Provide new data on seasonal activities - allowing the inclusion of a periodically varying rate of contact with humans
- Interpreting the reliability of hospital data e.g. seasonal hospital attendance
Examples from Kenya

RVF Agent Based Model (Bett et al.)

- Modelling Exposure
- Livelihood activities by gender
- Proportional piling on livestock species kept
- Model Input of relative proportion of hosts
- Resource maps for a village
- Modelling Risk in Spatial Models

Acknowledgement: Gianni Lo Iacono
Conditions for endemicity

Immigration of infected animals in RVF free site

Frequency of such movements

Can the site become endemic?

Acknowledgment: Gianni Lo Iacono
2. As a tool to structure a model: geographically explicit ABM

As described in the previous presentation
3. A tool to select the most relevant parameters of the system

Economic factors
Bushmeat culture
Hunting Bats

Patterns in Bats Mortality Rate

Acknowledgement: Gianni Lo Iacono
4. A tool to identify the most relevant regime of the system

Participatory modelling can assist in determining whether or not a system has reached equilibrium, identifying the possible causes leading to a disruption of the equilibrium, and it can direct the mathematical approach towards the relevant regime, that is, transient regime rather than equilibrium.

For example:
• In Ghana, changing farming and hunting patterns and varying pesticide use, information gathered from participatory research, shows that the environment is changing and not in equilibrium.

• In Sierra Leone land use change affects rodent habitats, affecting population size and where they live.
5. Mathematical modelling as a tool to better structure participatory research

Using the results from other modelling can help provide new questions and sources of investigation for participatory research.

For example:

- Mathematical modelling found that human transmission has a relatively high impact due to the presence of living virus in urine. Therefore participatory research could focus on new areas such as hygiene and potential contact points.

- Focus on movement to inform ABM could lead participatory research to focus on the politics of who moves where and when.
6. Diversity of modelling approaches challenges the conclusions of other types of modelling

Reality is too complex to model in full and no model can capture everything. Different models highlight different issues and are based on different assumptions, world views and sources of information, leading to different conclusions about disease risk and the appropriate actions and policy decisions to take (Leach and Scoones 2013).

Interdisciplinary working can address these issues, embracing multiple sources of evidence. This can lead to an enriched interpretation of research findings, integrating perspectives from those coming from different disciplinary outlooks, and wider-ranging translation of research. This also means that there is more opportunity for wider dissemination and that the integrated models will be more useful in practice and policy.
Conclusion

- This paper shows that reality is too complex to be modelled by one modelling approach from one discipline.
- The use of the One Health approach, working together to embrace multiple sources of evidence, can provide more realistic models to assist with policy decisions that reduce disease and benefit local people.
- Participatory research, in particular, can help to explain who gets sick, where and why as well as provide explanations for health seeking behaviour.
- Participatory research can help illuminate new areas. It is not about challenging other approaches, but helping provide new ways of thinking and alternative methods.
- There is lots we don’t know and participatory research can augment standard modelling and help us move interdisciplinary science forward, adding nuance and complexity to already useful areas of enquiry.
- However, there are, of course, challenges to integrating models and data, due to researchers’ different perspectives on approaches.
Thank you

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