

# • Global health challenges and solutions: what can sustainability science bring to the table?

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## Background

Half of the world's population has no access to essential healthcare services, and the majority of infant deaths in Sub-Saharan Africa are caused by illnesses - diarrhoea, malaria, pneumonia - for which cheap, effective treatments are available. For example, oral rehydration therapies for children with diarrhoea can prevent death in 90% of cases, but only 4 in 10 children have access to these products. So why are these well-known, effective treatments not working? One major problem is that these seemingly simple solutions actually require complex systems of care provision whose component elements - trained health-care professionals, infrastructure, equipment and stocks of medicines - must all be present at the point of treatment in order for them to be effective. Sustainability science, which promotes integrative approaches, represents an excellent opportunity to identify and engage with these key global health challenges, working closely with governmental partners and civil society.

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### Further reading

Kruk M. E. *et al.*, 2016 – Transforming Global Health by Improving the Science of Scale-Up. *PLOS Biology*, 14 (3): e1002360. <https://doi.org/10.1371/journal.pbio.1002360>

### **Challenges of scale: improving the monitoring and control of infectious diseases at the local level**

In the 2000s, the Millennium Development Goals provided impetus to the development of “vertical” health programmes designed to control or eradicate specific diseases such as malaria, tuberculosis and HIV/AIDS, contributing to significant reductions in the rates of mortality and morbidity associated with these conditions. In the meantime, significant progress was achieved in the modelling of these diseases at the national and international levels, made possible by the great quantity of public data available and advances in analytical methods. Our understanding of control policies and their implementation was thus enhanced. For example, modelling methods now allow us to identify the most high-risk zones, to predict future trends, and to simulate the impact of different interventions on the incidence and mortality rates associated with these diseases. Nonetheless, there is still a sizeable gap between our collective analytical capacities and their actual application to solving problems on the ground in areas suffering from extreme poverty and high death rates. In reality, the public health authorities responsible for disease control within a given health district are not always equipped with the information they need to adapt national programmes to their local context. In order to ensure that the latest modelling techniques lead to interventions which are effective on a local scale, we need to see closer cooperation between governmental actors and civil society (health ministries, NGOs etc.), working to adapt

methods of data gathering and analysis to very precise spatial parameters, ensuring their operational pertinence, while using the results of scientific research to develop decision-making tools.

### **Methodological challenges: evaluating interventions aimed at strengthening healthcare systems**

In spite of the importance of such vertical programmes for tackling certain diseases, it is of utmost importance that we also invest in primary healthcare systems with sector-specific (or horizontal) approaches such as health systems strengthening (HSS), aimed at reinforcing all of the pillars which uphold healthcare systems (human resources, infrastructure, inputs and materials) at all levels (from local communities to national structures), and universal health coverage (UHC), designed to ensure access to quality healthcare for all. The WHO estimates that, in order to attain the health-related SDGs, almost three-quarters of all the extra investment needed in low and middle-income countries in the period 2015-2030 must be allocated to HSR, UHC and other horizontal approaches - equivalent to 300 billion US dollars every year. This amounts to a paradigm shift, since these approaches require us to rethink the evaluation methods we use to inform the allocation of funds and ensure effective implementation at both national and international levels. The gold standard of impact assessments is the randomised controlled trial (RCT), which has been enormously popular in recent decades as a means of evaluating new vertical interventions before they



**A path typical of those used by people in the Ifanadiana district (south-east Madagascar) to reach health centres. In this mountainous region, where the road network is limited, three quarters of the population must walk for more than an hour to reach their nearest health centre.**

are scaled up. Horizontal interventions such as HSR, on the other hand, are more complex by their very nature, requiring specific contextual adaptations and reshaping healthcare systems at multiple levels, with cross-cutting benefits for the population. With this in mind, establishing solid systems of data collection and analysis (e.g. prospective and quasi-experimental observational methods), operating in parallel with the myriad HSR pilot projects currently running in developing nations, offers a major opportunity to conduct rigorous research at reduced cost, providing proof of their impact in a diverse array of real contexts. Such is the goal of the *Ifanadiana Health Outcomes and Prosperity longitudinal Evaluation* (Ihope) programme, operated since 2014 by NGO Pivot in the south-east of Madagascar, in partnership with the IRD, Harvard University and the

National Statistics Institute. The study has already yielded solid evidence of the benefits that HSR approaches can have for rural populations.

### **Challenges of data availability: optimising geographical access to healthcare in Madagascar**

Our research under the aegis of the Ihope cohort study has demonstrated that, in spite of the substantial progress made by the HSR pilot project established by the Public Health Ministry and Pivot in Ifanadiana, the availability of healthcare in hospitals and medical centres - even when that care is of a high standard, and free of charge - does not necessarily mean that care is accessible, especially if patients must walk for several hours to reach it. These

findings have inspired us to develop innovative approaches to reinforcing local community health programmes. These approaches rely upon having people within the community who are qualified to provide certain basic care services, one of the principal methods of expanding the geographical accessibility of healthcare. As community health programmes occupy an increasingly prominent place within national health systems, there is a growing groundswell of interest in how to optimise these initiatives. For example, the WHO recommends optimising the target population and workload of community health providers, with reference to the local context and the size of the population falling within their remit. Geographical optimisation is already common practice in many sectors (e.g. Postal deliveries), using algorithms which are more than 50 years old. Unfortunately, the lack of publicly available, high resolution mapping data (of buildings, footpaths etc.) for rural parts of low and middle-income countries represents an obstacle to

the use of such tools in community health programmes. With a view to creating decision-making tools for local stakeholders, we conducted a participatory mapping campaign using *OpenStreetMap* in collaboration with the *Humanitarian OpenStreetMap Team (HOT)*, succeeding in mapping over 100,000 buildings and 20,000 km of footpaths in the Ifanadiana district. Using these data, we have been able to integrate geographical optimisation algorithms and: 1) calculate distances, journey times and optimal routes to healthcare services for all households in the district; 2) identify optimal locations for future community hubs and health centres; and 3) determine the necessary resources and optimal itineraries for door-to-door community health services. Scaled up, this approach could have applications beyond the field of healthcare, allowing for the geographical optimisation of other interventions (e.g. educational initiatives) aimed at boosting the sustainable development of rural populations.

## KEY POINTS

**Integrative, multidisciplinary and solution-oriented approaches, of the kind championed by sustainability science, can help us to identify and tackle key global health challenges. These challenges are dependent on context and include, among other things: the disparity between the scale on which research operates and the scale on which operational actors need support with their interventions; the mismatch between blue ribbon research methodologies and the methods best suited to producing new results in key domains; and the inability to make effective use of existing decision-making tools due to a lack of essential data and information.**

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