TDR-IDRC RESEARCH INITIATIVE ON VECTOR BORNE DISEASES IN THE CONTEXT OF CLIMATE CHANGE

FINDINGS FOR POLICY MAKERS

VBDS IN SOUTHERN AFRICA

What are the research gaps impeding control, prevention and elimination of VBDs of public health importance (malaria and schistosomiasis) in arid regions of southern Africa in the advent of climate change?

The background

Vector-borne diseases (VBDs) are prevalent in Southern Africa particularly in poor and vulnerable communities. Bionomic, socioeconomic, environmental, institutional and climatic factors are the major drivers of VBD transmission. With the effects of climate change, the distribution and prevalence of VBDs are likely to increase. This project has provided an opportunity to understand the likely impact of climate change on malaria and schistosomiasis in specific socio-ecological systems in Botswana, Zimbabwe and South Africa. The project focuses on dryland ecologies and water systems within drylands, and has been undertaken with a view to develop stakeholder-driven adaptation strategies.

About the project

This policy brief is based on the research project on *Social, environment and climate change impacts on vector-borne diseases in arid areas of southern Africa*.

This programme is implemented by TDR-WHO, with funding support from the International Development Research Centre (IDRC) and in technical collaboration with WHO's Department of Public Health and Environment (WHO-PHE), WHO's Regional Office for Africa (WHO-AFRO), and the International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.

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Main research gap

Inadequate information for developing and strengthening stakeholder-driven adaptation strategies to improve resilience and reduce vulnerability of communities to vector borne diseases in the advent of climate change.

Specific research gaps

1. Inadequate information on temporal trends of the burden of malaria and schistosomiasis.
2. Inadequate information on vulnerable community perceptions on the influence of climate change on VBDs with special focus on malaria and schistosomiasis.
3. Inadequate information on the influence of socio-economic, environmental, climatic and institutional factors on the transmission dynamics of malaria and schistosomiasis.
4. Inadequate stakeholder-driven adaptation strategies to increase resilience and reduce population health vulnerabilities due to malaria and schistosomiasis.
5. Lack of strategies to strengthen capacities among research groups and vulnerable communities to enable them to assess and mitigate population health vulnerabilities related to malaria and schistosomiasis.

Research approach

An eco-health approach emphasizing transdisciplinarity, community participation, gender equity, systems approach, sustainability, and knowledge to action was applied. Mixed methodology including descriptive, analytical, qualitative, cross-sectional, and experimental design aspects was used.

RESEARCH APPROACHES INCLUDE:

Workshops and group discussions to learn from and with community members

Modeling future impact scenarios and feeding results into National Adaptation Plans

Interviews with key informants (e.g. policy makers, traditional leaders, health personnel)

Lab and field studies of vector viability under different conditions

Determining vector variations across different climatic zones, by using GIS and remote sensing

Key findings

A. Information generated on temporal trends on the burden of malaria and schistosomiasis

1. Data from health facilities showed a decreasing trend in malaria cases in South Africa and Zimbabwe study sites.

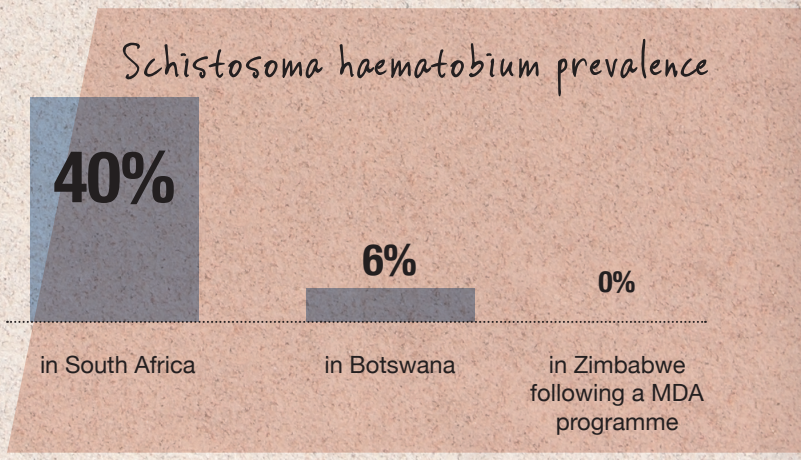
2. No correlation between climatic variables and malaria incidences in Gwanda District of Zimbabwe was observed.

3. Households lost a total of 153.89 Disability-Adjusted Life Years (DALYs) due to malaria in selected wards in Gwanda district, Zimbabwe.

4. Mean loss of 1.18 DALYs per malaria case was confirmed in Gwanda and 65.6% of the burden occurred in the most economically productive age group (15-45 years).

5. Surveys conducted in South Africa, Botswana and Zimbabwe showed *Schistosoma haematobium* prevalence of 40%, 6% and 0%, respectively. It must be noted that in Zimbabwe the survey was done following a national mass drug administration (MDA) programme. Prior to the MDA prevalence for Gwanda was between 10% and 50% warranting biennial treatment.

6. Health facility data showed an increasing trend of schistosomiasis in Gwanda District from 2005-2015.



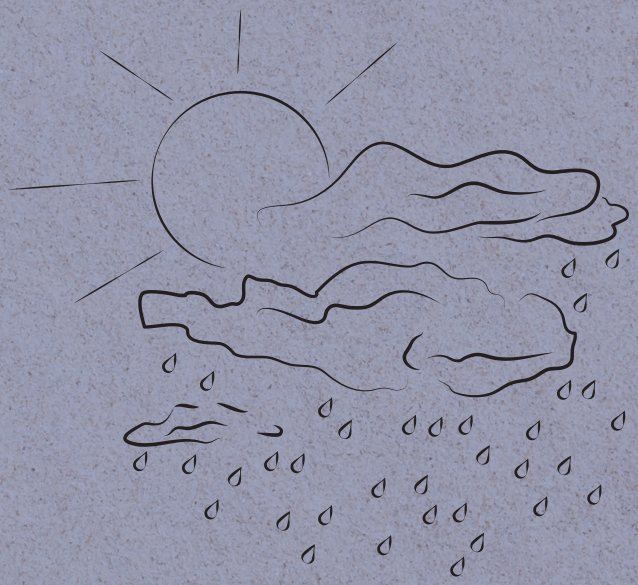
Overall results across all the study countries showed that community perceptions on the trends of malaria and schistosomiasis can be used for rapid assessment to determine if a disease is of public health importance.

B. Information generated on vulnerable community perceptions on the influence of climate change on VBDs with special focus on malaria and schistosomiasis

1. Level of community knowledge on the different aspects of schistosomiasis life cycle in Gwanda was considered as fair.

2. Communities from all study areas associated transmission of schistosomiasis with water, but had divergent perceptions on the symptoms and lifecycle of the parasite. Therefore, health education information for the study sites needs to be packaged differently.

3. Fishermen (both females and males) from the study areas were perceived to be the high-risk population, since fishing was a key source of food and income in the study areas.



C. Information generated on the influence of socio-economic, environmental, climatic and institutional factors on the transmission dynamics of malaria and schistosomiasis

1. Key drivers in the transmission of schistosomiasis were identified.
2. Family structure and gender systems impacted on decision making within the household.
3. It was perceived from the community responses that de facto female-headed households were increasing, as men migrated in search of employment outside one study site (Gwanda).
4. Chiefs and opinion leaders are key to pushing research findings from researchers.
5. A broader spectrum of stakeholders including NGOs and other government sectors is key in knowledge translation of research findings.
6. Use of societal engagement programs and learning activities (drama, presentations in schools, *Imbizo* gatherings at the community level) may be used to pass on messages on VBDs to communities.
7. Zimbabwe had a weak institutional framework to respond effectively to the prevention and control of malaria, schistosomiasis and other VBDs in the context of climate change.
8. The environmental and family structure changes have caused the reversal of gender roles, which has influenced the transmission dynamics of VBDs.

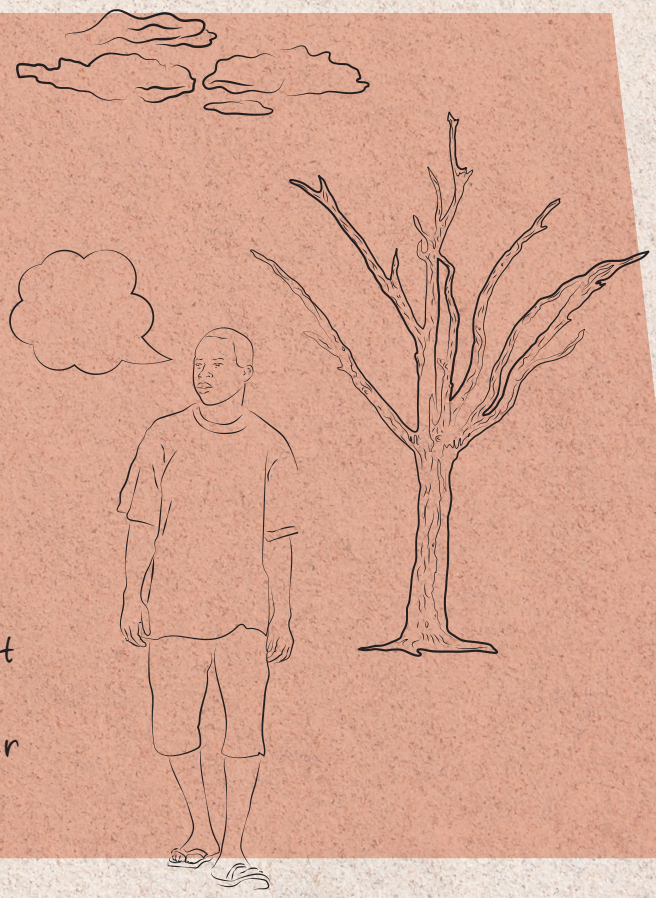
D. Information generated on stakeholder-driven adaptation strategies to reduce population health vulnerabilities due to malaria and schistosomiasis

The major finding was that communities in Zimbabwe were effectively resorting to indigenous knowledge for the control and treatment of schistosomiasis and malaria. No other clear-cut strategies were identified related to malaria and schistosomiasis. However, the following more universal strategies were identified:

1. The communities identified droughts (inter-seasonal dry periods), floods, heat waves and rainfall variability (intra-seasonal dry periods) as the four weather phenomena associated with VBD risks.
2. Poorer households, especially those that did not own livestock, were most vulnerable to climate change perturbations.
3. Households have, in the past, responded to droughts by resorting to shifting cultivation practices, replanting, use of wetlands in preference to upland fields, changing of seed varieties or crops, selling of livestock, and informal trading. These strategies influenced the transmission dynamics of both schistosomiasis and malaria.

4 NGOs have assisted the community in setting up irrigation schemes, but only a few selected community members have benefited from the initiatives. While these adaptation strategies against climate change are beneficial to the communities, they increase exposure to malaria and schistosomiasis.

5 Based on the research findings, a framework for a stakeholder adaptation strategy to reduce vulnerabilities to malaria and schistosomiasis (see Figure 1) was proposed.



The communities identified droughts (inter-seasonal dry periods), floods, heat waves and rainfall variability (intra-seasonal dry periods) as the four weather phenomena associated with VBD risks.

E. Information generated on strategies to strengthen capacities among research groups and vulnerable communities to enable them to assess and mitigate population health vulnerabilities related to malaria and schistosomiasis

1 Four Community Advisory Boards (CABs) were established in the study areas and members were trained on various aspects of the project and on research ethics in general.

2 Six PhD and three Master's students from the region successfully completed their degrees under the project.

3 Fifteen peer-reviewed manuscripts were accepted/published by the end of 2016, and by the end of 2017 it is anticipated that a total number of 27 publications will be in print. It is anticipated that there will be a total of 50 publications generated from the project.

4 A community-based early warning system for malaria was developed, where community members collect the data required for malaria predictions, and interpretation is done jointly with the research team.

5 Based on the research findings, a community engagement framework to strengthen capacity among research groups and vulnerable communities (see Figure 2) was proposed.

Recommendations

1. Monitoring the incidence of malaria has the potential to reveal future trends of the disease, thereby leading to improved control strategies. We therefore recommend that this be done in all endemic areas.

2. We recommend that localized DALYs using local sources of information be used to estimate burden of malaria.

3. We recommend that policy makers, in making informed decisions on health budget allocation, should use information on burden of disease.

4. We recommend that epidemiological data that is specific for local settings is used to provide guidance on how limited resources can be allocated appropriately for control and prevention of malaria.

5. Climate change is likely to have a profound effect on snail population densities and inevitably on transmission. Therefore, monitoring of the vector population in schistosomiasis endemic areas is recommended.

6. In addition to free treatment for malaria at rural health facilities, we recommend that policy makers ensure that health facilities are easily accessible to the community to reduce out of pocket spending by the poor when a household member suffers from malaria.

7. We recommend use of societal engagement programs and learning activities (drama, and presentations in schools, *Imbizo* gatherings at the community level) for knowledge translation on malaria and schistosomiasis.

8. We recommend that policy makers should take into account the existence of indigenous knowledge systems on malaria in their plans for malaria prevention and control in the district.

9. Indigenous knowledge on the treatment of malaria is widely used but the knowledge is limited to the older generation. Policy makers should ensure preservation of this knowledge.

10. Policy makers should consider testing of the efficacy of the treatment and prevention methods used by the community as this may assist in the development of malaria drugs and mosquito repellents.

11. Communities are capable of collecting and analysing data to predict the occurrence of malaria using indigenous knowledge. We recommend that this data be analysed and incorporated into the early warning system for malaria at district level.

Future Research identified by the Project

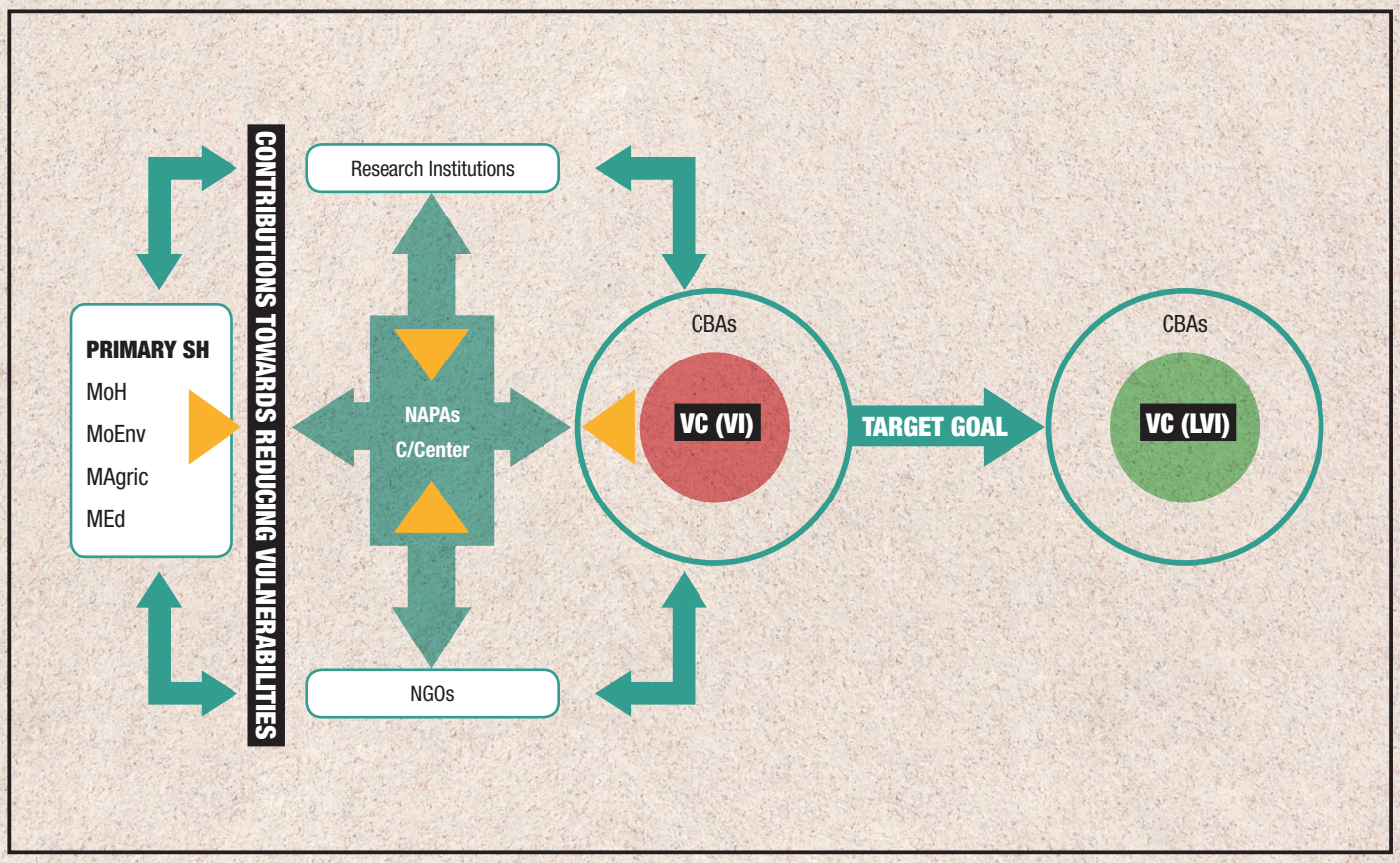
1. Designing effective community-based strategies for elimination of malaria in endemic areas where they have reached the elimination phase, and reducing the burden of schistosomiasis to a level where the public health impact is low.

2. Operational research, which involves monitoring and evaluating the level at which communities are using results from the research project to increase their adaptation and resilience to climate-induced environmental and socio-economic changes. This work has already been initiated.

3. Validation and integration of indigenous knowledge systems from communities on the treatment, prevention and control of vector-borne diseases.

A new initiative (TIBA – Tackling Infectious Disease Burden in Africa) involving 9 African countries (South Africa, Zimbabwe, Botswana, Rwanda, Ghana, Uganda, Sudan, Kenya and Tanzania) and funded by NIHR – UK has been approved for funding and will be applying some of the methodologies developed during the MABISA project.

FIGURE 1: improving efficiency in assessing and reducing population health vulnerabilities due to malaria and schistosomiasis through strengthening of the NAPAs: A case study for Zimbabwe



SH = Stakeholders, MoH = Ministry of Health and Child Care, MoNV = Ministry of Environment, MAgirc = Ministry of Agriculture, Med = Ministry of Education, VC = Vulnerable Communities, VI = Vulnerable Index, LVI = Low Vulnerable Index, CBAs = Community Based Assessments, C/Coordinating Center, NAPAs = National Adaptation Programmes of Action, NGOs = Non-Governmental Organizations

Role of NAPAs Coordination Center

1. Identifying VCs (Setting Assessment Criteria)
2. Assessing and distribution of resources according to needs for specific VCs
3. Identifying role players
4. Assessment of interventions

Role of Research Institutions

1. Innovations and applied research on adaptation strategies of vulnerable communities
2. Development of concepts and validation

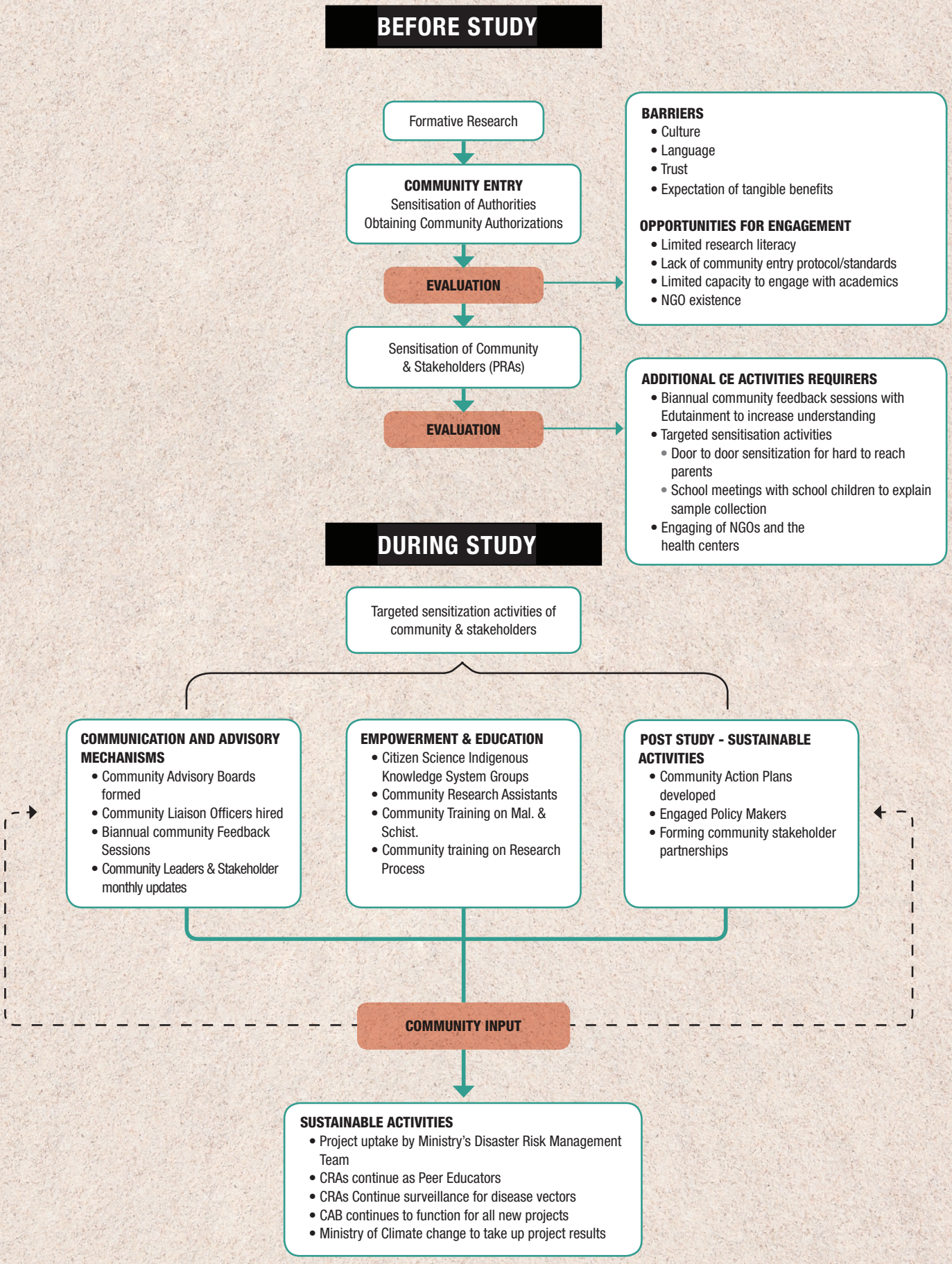
Role of NGOs

1. Provision of specific needs (infrastructure, equipment, training, awareness)

LVI = Low Vulnerability Index

VI = Vulnerability Index

FIGURE 2: Mabisa Community Engagement Process



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