Utilizing System Dynamics to Understand the Intersection of Climate Change, Violent Conflict, and Mental Health in Mali

Presenter: Murad Khrais; Co-Practicum Student: Tim D'Aoust
Supervisor: Dr. Jura Augustinavicius

McGill University

Johns Hopkins Bloomberg School of Public Health

Background

Climate change is a far-reaching phenomenon with many direct and indirect impacts. Links to non-climate related outcomes are also becoming associated with climate change. They include the eruption or prolonging of violent conflict, migration, and a vast array of mental health and psychosocial outcomes. As such, this project employs a system dynamics approach to understand and quantify how all the 3 domains interact with each other. This approach aims to understand the complexity of interactions within and between systems by recognizing complexity, patterns, and interrelationships rather than focusing on cause and effect. For example, to address the complex problems in global health or to understand the current and potential impact of climate change.

The project within which this practicum takes place focuses particularly on Mali with the goal of informing humanitarian programming due to the co-occurrence of climate change, violent conflict, and insecurity which continues to devastate communities therein and drive mounting levels of vulnerability and risk relating to food insecurity, extreme poverty, forced internal displacement, human rights violations, and mental health.

Aims and Objectives

The Mali System Dynamics project has 3 main aims, namely:

1. **Identify factors for a system model of climate change, conflict, and mental health in Mali.**
2. **Develop a preliminary quantitative system model based on factors identified in Aim 1.**
3. **Identify local data sources that can be used to adapt and refine the model so that it can inform humanitarian programming in Mali.**

Consultation Methods

My main role in the project included the preparation of recruitment scripts and consultation guides and contacting stakeholders from local and international organizations working on environmental issues and climate change, livelihoods, peace building, migration, health, and mental health with the purpose of conducting consultations with them. For the consultation guides, the questions were ordered according to the expertise of the expert being interviewed such that the consultation would flow smoothly, while allowing us to probe for the causes, consequences of system factors in the domains of climate change, mental health, and violent conflict. The beginning portion of the consultations were designed to understand the background and expertise thereby informing the following questions and probes, as previously stated. In addition, potential data sources for developing the preliminary computational system dynamics model were investigated during the consultations. I was also trained in qualitative interviewing methods so that I could conduct the consultations. Post-consultation tasks included transcription and synthesis of the interviews, while also implementing proper data handling techniques, including but not limited to keeping confidential information off my local device.

Through consultations with climate science, social and behavioural intervention, migration and displacement, disaster mental health, and conflict and mental health experts, factors in the domains of climate change, violent conflict, and mental health were identified. Relationships and directionality between these factors were also ascertained.

Mental Health
- PTSD
- Generalized anxiety
- Substance and drug use
- Worry due to uncertainty about future

Violent Conflict
- Political conflict
- Herder-pastoralist conflict
- Ethnic conflict

Climate Change
- Increased weather variability
- Changes in seasonal climate trends
- More frequent extreme climate events

Key Preliminary Findings and Discussion

In binary terms between domains, the climate change factor of increased variability of precipitation and temperature makes it difficult for farmers to predict when to plant and harvest their crops, leading to increased worry due to uncertainty about their future and generalized anxiety. Changes in seasonal climate trends makes seasonal migration of herders unpredictable and sometimes permanent, furthering resource strain on local resources and the eruption of violence between farmers and herders due to competition over resources. Also, more frequent extreme weather events increase resource strain and the displacement of populations in search of sustenance, therefore leading to PTSD and depression from the traumatic experience of extreme weather events and the loss of social connections therein, the eruption of conflicts within pre-existing political and ethnic strains, as well as substance abuse and drug use while living in overcrowded and under-resourced displacement camps.

However, some relationships between the domains are more subtle. For example, minor effects of climate change, like more variable temperatures, act as stressors in a social, political, and institutional contexts thereby bringing them to a tipping point. However, none of these outcomes can necessarily be directly traced back to climate change as their main cause.

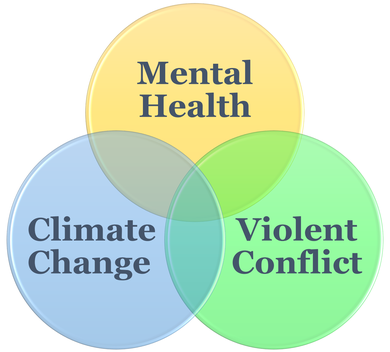

Figure 1. A conceptual diagram of the interaction between the domains of mental health, climate change, and violent conflict

Future Directions

By identifying the system factors in each domain and how they interact, next steps in the project will be facilitated. Namely, in-depth interviews will be conducted with stakeholders and local community leaders to confirm the list of factors identified via consultations and the scoping review, and to get more information on data sources and potential partners for the next steps of the project. The model-building workshops will be informed by a thorough examination of expert findings. In addition, the preliminary and final quantitative system dynamics models will be developed and validated using data sources that were identified through the consultations, scoping review, and in-depth interviews. For its broader ramifications, the findings of the consultations and subsequent development of the system dynamics model will allow for much more efficient, effective, and well-informed interventions, adapted to local settings while taking into consideration system-level factors that may allow the findings to be generalizable to all related humanitarian settings.

Acknowledgements

Dr. Jura Augustinavicius and Dr. Molly Lasater supervised and mentored for the duration of the practicum, Christine Bourey assisted in training and completion of tasks for practicum, Zhixi Chen assisted in clarifying the role of system dynamics modeling in this project