

PROJECT 2020: IMPROVING THE EARLY WARNING SYSTEM IN MADAGASCAR



Study of the relationship between hydro-climatic data and nutritional and health status in order to improve the early warning system (EWS) in southern Madagascar

Contact person:

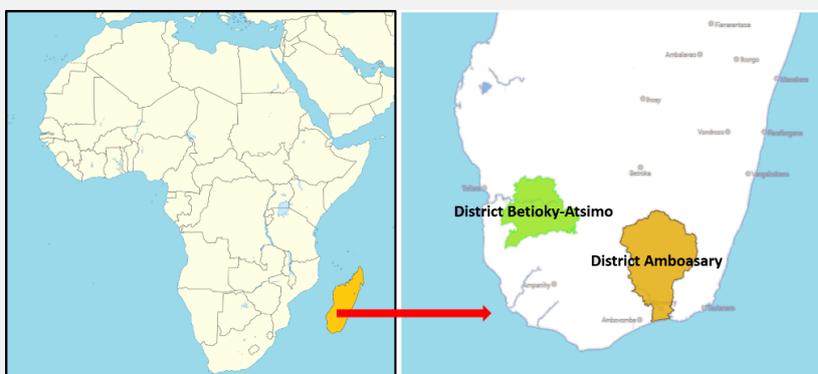
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Existing donors:

ACF Foundation for Research, SIWA Foundation, OFDA, SIDA

Intervention areas:

- ✓ Atsimo-Andrefana Region, District of Betioky-Atsimo, Madagascar
- ✓ Anosy Region, District of Amboasary, Madagascar



Objectives

- **Main objective:** To study the relationship between hydro-climatic indicators and data on the nutritional and health status¹ of children under 5 years of age, in order to better anticipate increases in the number of cases of Global Acute Malnutrition (GAM) and other diseases linked to malnutrition and environmental factors.
- The results of this study will help improve the humanitarian assistance of ACF² and its partners in the southern region of Madagascar.

Context of the project

Madagascar is among the countries with the highest rates of GAM in the world, leading to increased risks of morbidity and mortality among children. Since 2006, nutritional deficiencies remain one of the main causes of death among children under 5 years of age. The country is also one of the most vulnerable to natural disasters, being its southern region a "hot-spot" of climate change.

Malnutrition is strongly influenced by the environmental situation, particularly by the rainfall trends, which can lead to a consequent increase in food insecurity.

Water availability is one of the multiple factors associated with malnutrition and other diseases; therefore, the environmental situation, particularly rainfall trends, play a major role in GAM and morbidity through its effects on water sources, food security and livelihoods, and the distribution of vector-borne diseases.

¹ Data on cases of diarrhoea, acute respiratory infections and malaria in children under 5 years of age.

² ACF : Action Contre la Faim

Implementation of the project



This project is the continuity of a study carried out by ACF France in 2014 in collaboration with hydrogeology experts from the University of Avignon, on the exploitation of water resources in the Betioky-Atsimo district. This preliminary study made possible to finance the installation of several piezometric sensors measuring the pressure of liquids and a meteorological station in the south-western region of Madagascar, which are essential for collecting rainfall, and piezometric³ and leaf area indexes⁴.

Methods

The project is structured around three main axes: **1) Research:** study of the relationship between nutritional, health and hydro-climatic data; **2) Coordination** of operational sectors and actors involved in data management and in the articulation of the crisis response; **3) Operationalization** of the results.

Research axis: Retrospective study of the relationship between hydro-climatic data and nutritional and health data of children from 6 to 59 months of age.

The framework of the study is comprised from January 2014 to December 2019 and is based on data obtained from the hydro-climatic observatory, SMART⁵ nutritional and anthropometric surveys conducted by ACF and UNICEF, the Madagascar Health Information System, the results of mass screening for malnutrition, and records of admissions to CRENAS (Centres for Outpatient Nutritional Rehabilitation for Severe Malnutrition).

Associations between variables are being explored with the following statistical approaches:

- a) Cross-correlation functions used to test the hypothesis of delayed impacts of hydro-climatic indicators on GAM and health outcomes in order to identify the lags providing the maximum correlation.
- b) A time series analysis based on an ARIMA model will be carried out to build the forecasting model.

Once the model is built, we will carry out the evaluation of the representativeness of the hydro-climatic data and the upgrading of the system to automate the collection and transmission of data.

Expected outcomes

Operationalization of the system:

- ✓ Ultimately, the project will pilot an automatic and on-line data collection system.
- ✓ Based on the analyses, the system aims to provide early warnings of changes in the occurrence of GAM and other diseases, as well as on the climatic situation to anticipate climate crisis in southern Madagascar.

Based on the project ACF aims to:

- ✓ Ensure the implementation of a reliable system that can be used in real time and that is cost-effective compared to existing systems.
- ✓ Enabling stakeholders and government to have real-time access to online data to support decision-making.
- ✓ Increasing the involvement of beneficiaries and information sharing within the population.
- ✓ Develop the necessary skills of local actors and beneficiaries to operate the system and have the logistical capacity to integrate these alerts into crisis response planning.
 - Building research capacity at the local level through partnership with local universities.
 - Offer technical support to improve the resilience of all stakeholders, including beneficiaries, to face nutritional, health and climate crises.

Status of the project

- ✓ The equipment was purchased between January and March 2020.
- ✓ The analysis of the collected data is ongoing. A time series analysis of hydro-climatic indicators and nutrition and health data will be carried out to understand the structure and the underlying causes of malnutrition related to climate crises or water use patterns.
- ✓ **Next steps:** Upgrading of surveillance stations; capacity building for the management and processing of nutrition and health data; organization of workshops for stakeholders; follow-up visit for system maintenance.

³ The piezometric index evaluates the quantitative state of a phreatic zone and its fluctuations.

⁴ The Leaf Area Index (LAI) is defined as the total one-sided area of photosynthetic tissue per unit ground surface area.

⁵ SMART: *Standardized Monitoring and Assessment of Relief and Transitions*.