Investigate the relationship between hydro-climatic monitoring and health indicators in a context of chronic drought.

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Background

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Southwest Madagascar susceptible to climate crises:

« Hot spot » **susceptible** to a greater impacts on **nutrition**, **health** and other **environmental factors** directly or indirectly affecting populations.

Despite this, **climate monitoring** is still scarce and there is a **lack of evidence** to better understand the relationship between acute malnutrition (AM) and climate.

Patz JA. Hotspots in climate change and human health. BMJ. 9 nov 2002

Timothy A et al. Madagascar Climate Change and Health Diagnostic. Risks and Opportunities for Climate-Smart Health and Nutrition Investment. Washington, D.C.: The World Bank; 2018

Objectives

Main objective

To assess the relationship of hydro-climatic monitoring data with nutritional and morbidity indicators in the District of Betioky-Atsimo.

Secondary objectives:

1. Identify the hydro-climatic indicators that have an **association** with nutritional and morbidity indicators.

2. Explore the **baseline relationship** and significant **temporal associations**.

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Methods

Type of study
Retrospective observational study

Study population
Children aged from 6 to 59 months

Framework
• Southwest Madagascar • January 2014 to March 2019

| Data |
|---|
| • Monthly pluviometry
• Monthly piezometric index
• Monthly Leaf Area Index (LAI)
• Number of admissions to Centres for Outpatient Nutritional Rehabilitation for Severe Malnutrition (CRENAS)
• Number of screened children with acute malnutrition |

Methods

Data analysis

Assessment of the relationship between the hydro-climatic indicators and the prevalence of acute malnutrition:

1. Correlation coefficient
2. Regression model
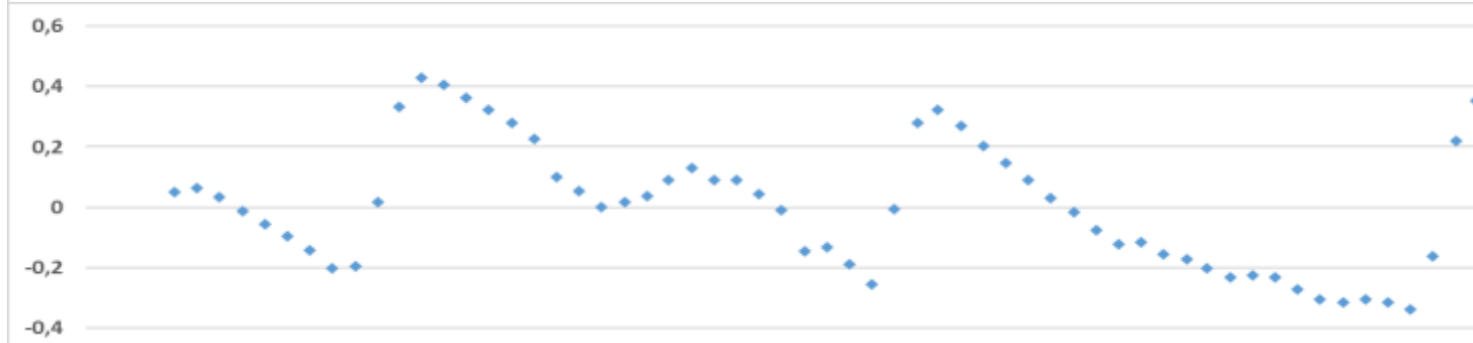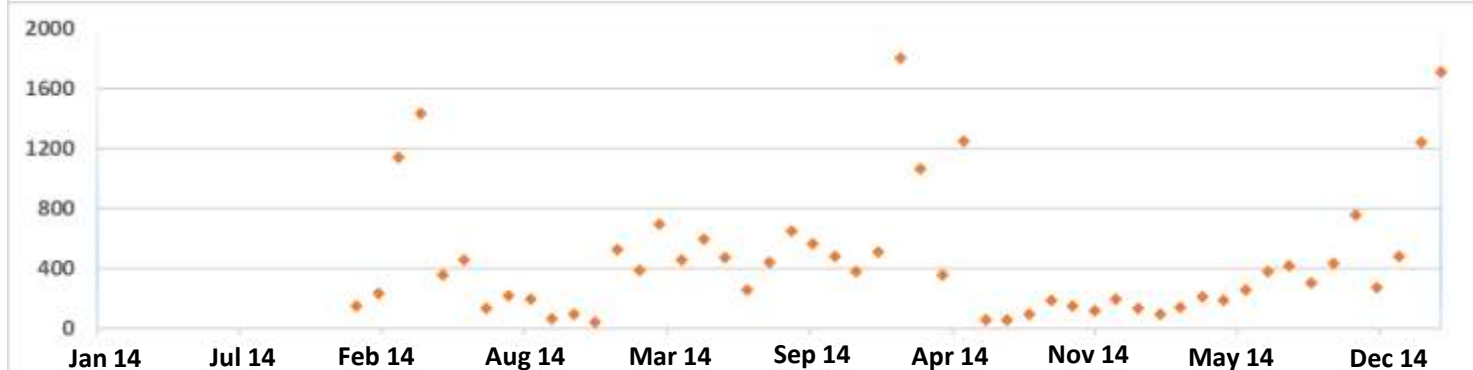3. Cross-correlation / Time Series Analyses

Preliminary results

Cumulative rainfall (mm/month)
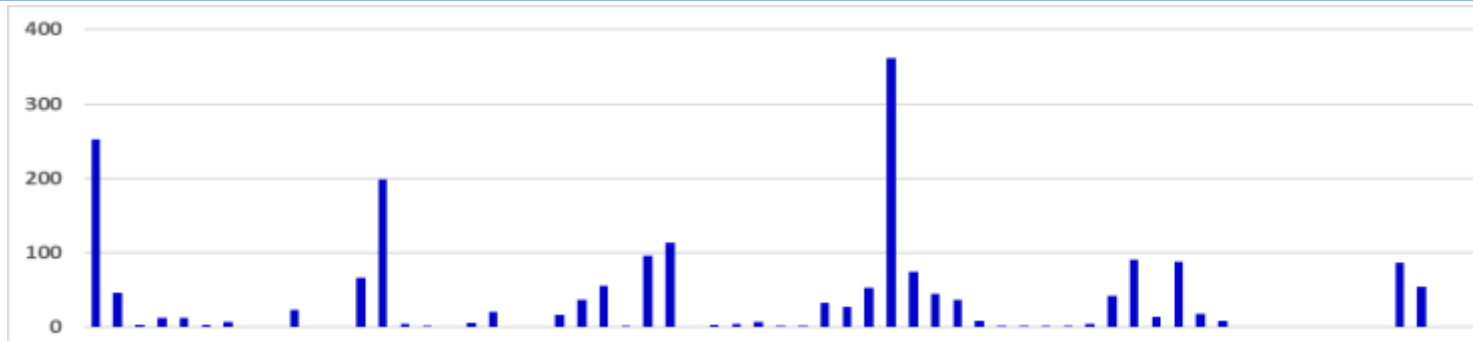
Piezometric index

Number of monthly admissions in CRENAS

CRENAS: Centre for Outpatient Nutritional Rehabilitation for Severe Malnutrition
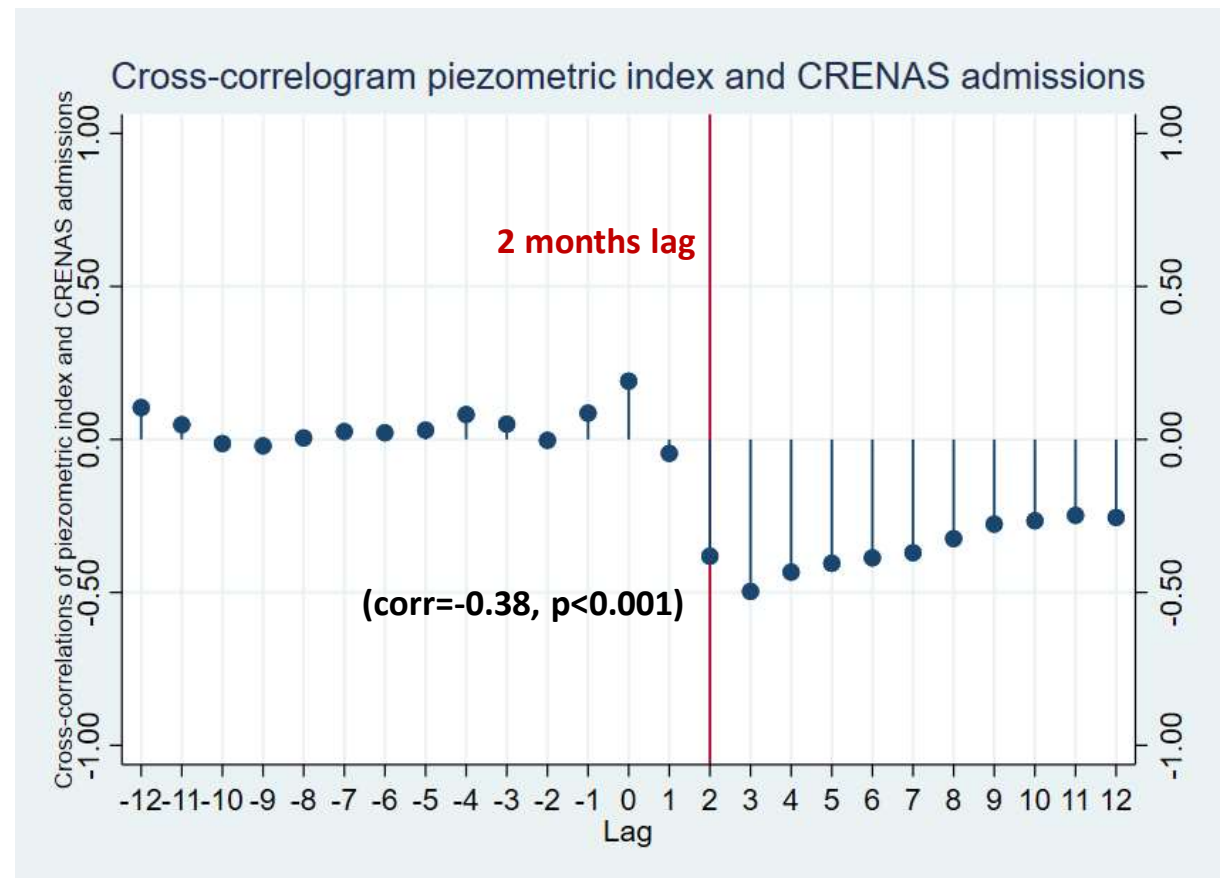
Preliminary results

Cross-correlation function

Cross-correlograms of the total admissions to CRENAS and the explanatory hydro-climatic variables. Lags are expressed in months.

Piezometric index & CRENAS admissions

Discussion

- To our knowledge, this is the first study that aims to assess and characterize the **impacts of climate change on undernutrition** in Madagascar.

- Our preliminary results are consistent with previous evidence of lagged impacts of climate on health indicators. However, the **state of evidence** on climate and undernutrition is still **scarce**[1-5].

- Addressing Groundwater Resilience under Climate Change: **improve forecasting** describing the lag between low rainfall/recharge and its impacts on nutrition and health

1. Kinyoki DK, Berkley JA, Moloney GM, Kandala N-B, Noor AM. Predictors of the risk of malnutrition among children under the age of 5 years in Somalia. Public Health Nutrition. 2015.
2. Schwinger C, Lunde TM, Andersen P, Kismul H, Van den Broeck J. Seasonal and spatial factors related to longitudinal patterns of child growth in Bwamanda, DR Congo. Earth Perspectives. 2014.
3. Phalkey RK, Aranda-Jan C, Marx S, Höfle B, Sauerborn R. Systematic review of current efforts to quantify the impacts of climate change on undernutrition. Proc Natl Acad Sci USA. 2015.
4. Kinyoki DK, Berkley JA, Moloney GM, Kandala N-B, Noor AM. Predictors of the risk of malnutrition among children under the age of 5 years in Somalia. Public Health Nutrition. 2015.
5. Jankowska MM, Lopez-Carr D, Funk C, Husak GJ, Chafe ZA. Climate change and human health: Spatial modeling of water availability, malnutrition, and livelihoods in Mali, Africa. Applied Geography. 2012

Conclusion

- It exists a **negative association** between hydro-climatic indicators and acute malnutrittion prevalence in the District of Betioky-Atsimo.

- Based on available data, a **lagged impact** of the hydro-climatic indicators on acute malnutrition has been identified.

- Preliminary results are consistent with previous studies assessing the associations of environmental indicators with health and nutritional status.

- More data and further analyses are needed.

Thank you!

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