15TH INTERNATIONAL ROTAVIRUS SYMPOSIUM

CAPE TOWN, SOUTH AFRICA

MULTILEVEL AND SPATIAL ANALYSIS OF ROTAVIRUS VACCINE DROPOUT AMONG CHILDREN AGED 12–35 MONTHS IN MOZAMBIQUE

Edmilson Filimone, Edy Chissaque, Sheyla Cassy, Nilsa de Deus, Esperança Guimarães, Assucênio Chissaque

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Background

Burden & Impact of vaccination

Rotavirus is a **leading cause of diarrhea in children under five**, responsible for 24.4% of diarrhea-related child deaths (≈108,000 in 2021).

Mozambique introduced **Rotarix vaccine** in September 2015. By 2030, it is projected to save around 9,000 lives and over 7.8 million USD in healthcare costs.

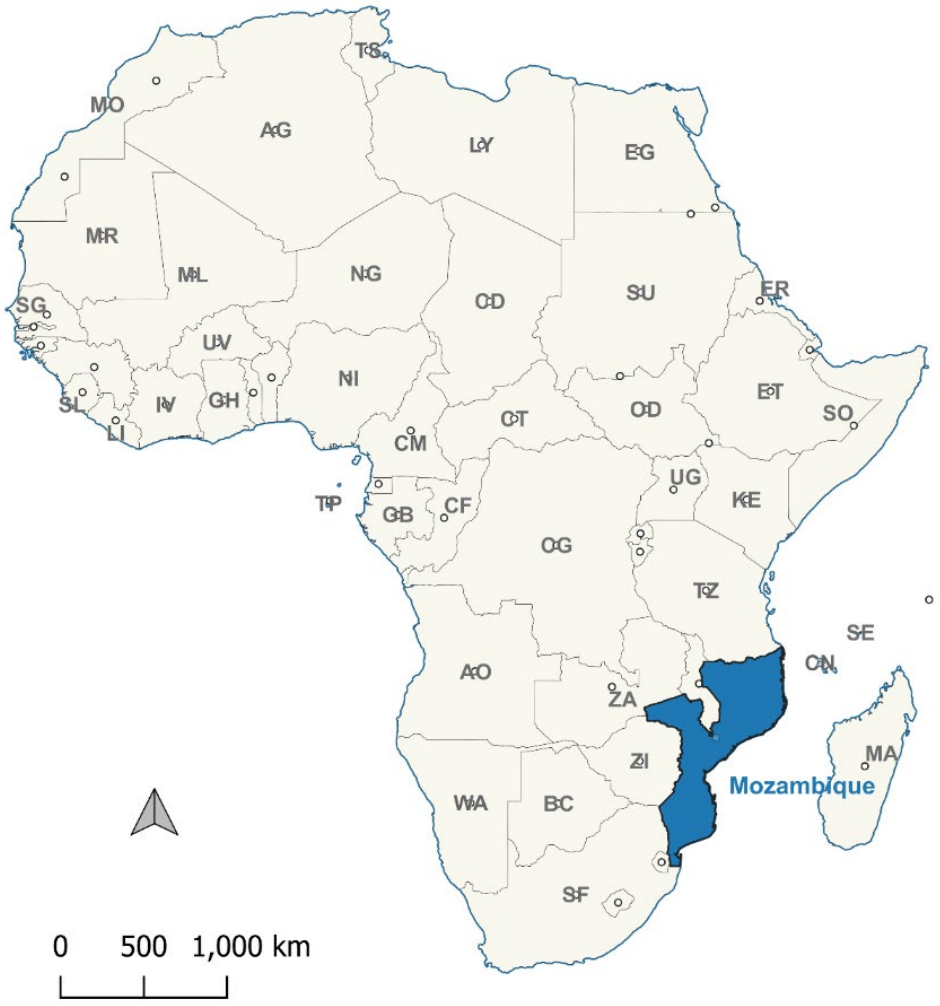
Problem

Dropout between the first and second doses remains a **barrier to achieving the 90% target coverage**. Understanding individual and community-level factors driving this dropout is essential for targeted interventions.

Goal

This study examines multilevel determinants of rotavirus vaccine dropout among children aged 12–35 months in Mozambique.

Methodology (1/4)



Study Design

- This is a cross-sectional analysis based on data from the nationally representative Demographic and Health Survey (DHS) conducted in **Mozambique** between July 2022 and February 2023.
- The survey employed a two stage sampling design with clusters, strata and unequal probability of selection.

The DHS Program
Demographic and Health Surveys

Methodology (2/4)

Inclusion Criteria

DHS 2022-23
Mozambique

Under 5 years children
(n = 9864)

Children aged 12–35 months
(n = 3959)

202 children who weren't alive on the day of the interview were excluded.

Children aged 12-35 months
(n = 3757)

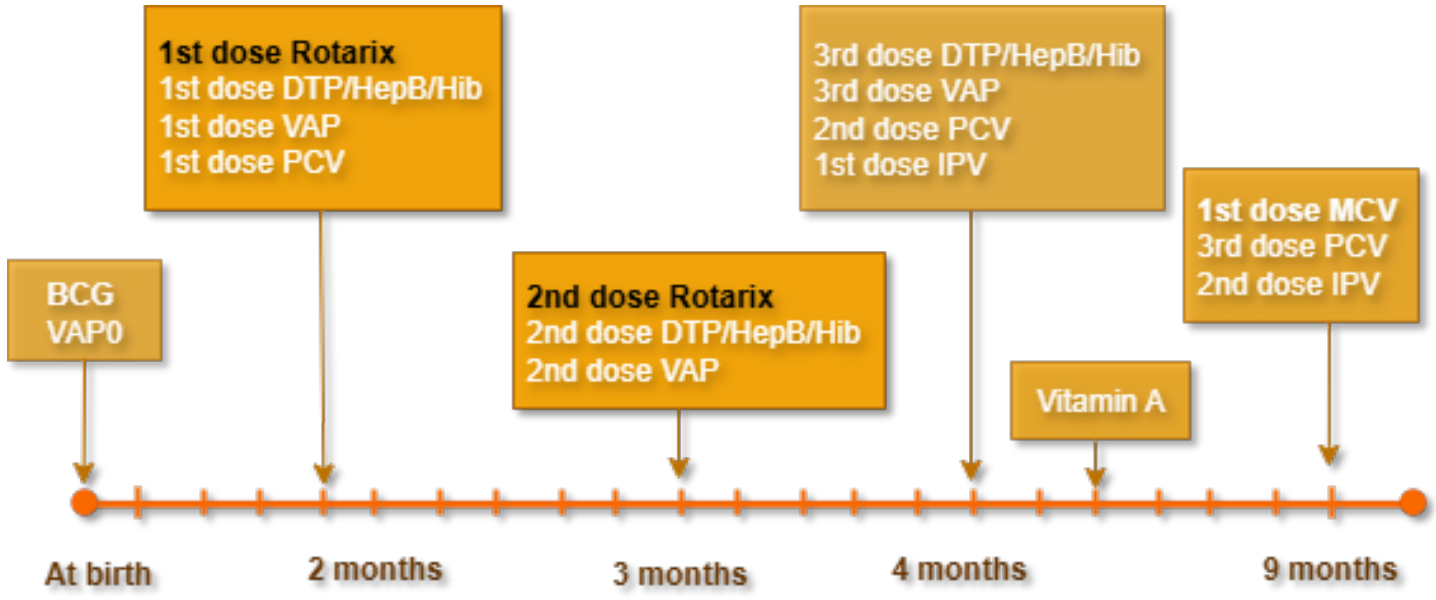
1185 zero-dose children were excluded for not having received any dose of the Rotavirus vaccine.

2572 children included in the analysis

Methodology (3/4)

Definition of the outcome

All children aged 12 to 35 months who had received the **first dose of the Rotarix vaccine** but did not receive the second dose were classified as **vaccine dropouts**.



Methodology (4/4)

1

Descriptive Statistics

- The prevalence was estimated with a 95% confidence interval.
- All the analysis accounted for the weights of the survey design.

2

Spatial Analysis

- Moran's I statistic was employed to assess the pattern of distribution (spatial autocorrelation).
- Getis-Ord Gi* statistic was conducted to identify geographic hotspots and cold spots.

3

Multilevel Logistic Regression Model

- Clusters were considered as random.
- The ICC was estimated to quantify the degree of community-level clustering.
- Factors were considered associated with the outcome at a p-value < 0.05

Results (1/4)

Prevalence of rotavirus vaccine dropout in Mozambique

- The overall prevalence was **14.7% (95% CI: 12.8 – 16.8)**
- With **Cabo Delgado** and **Nampula** provinces displaying the highest prevalence.

Mozambique
14.7%

Rural Area
18.4%

Urban Area
7.8%

Southern region
5.0%

Central region
12.3%

Northern region
21.7%

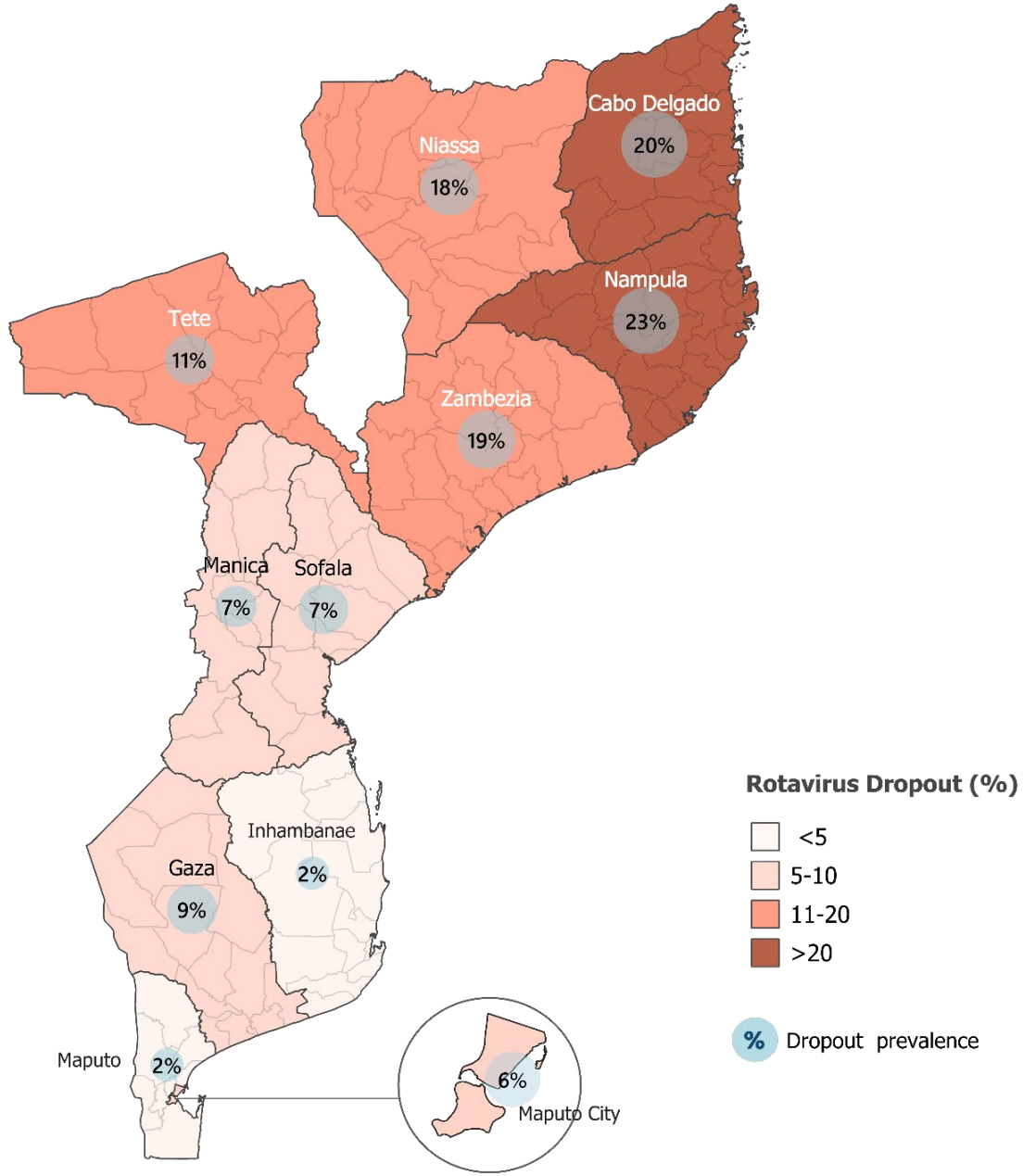


Fig 1. Map of the prevalence of rotavirus vaccine dropout

Results (2/4)

Spatial Distribution of rotavirus vaccine dropout

- Rotavirus vaccine dropout distribution in Mozambique is **clustered**

- Given the **Moran's I of 0.09** (z-score = 3.37, p< 0.01), there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

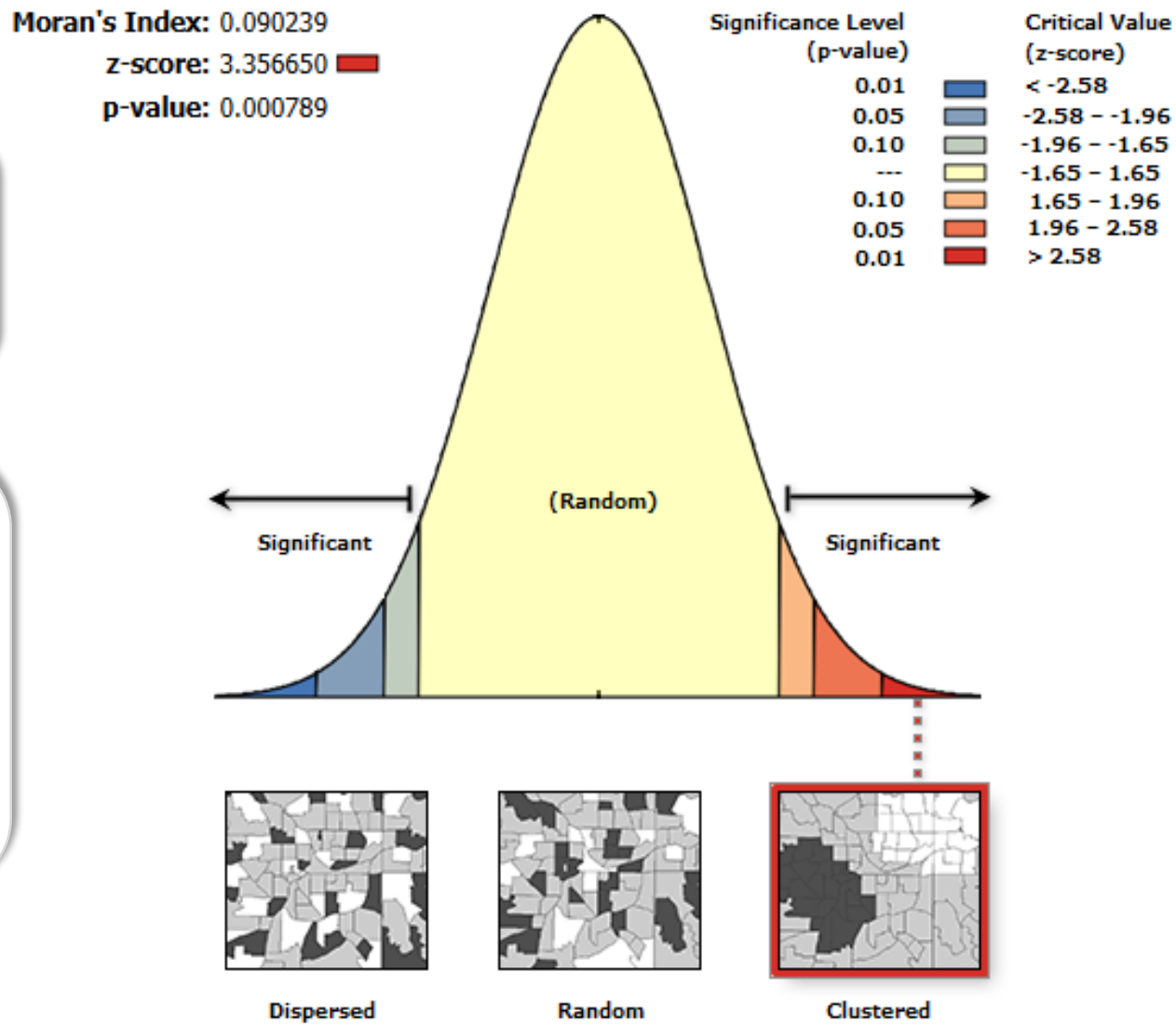


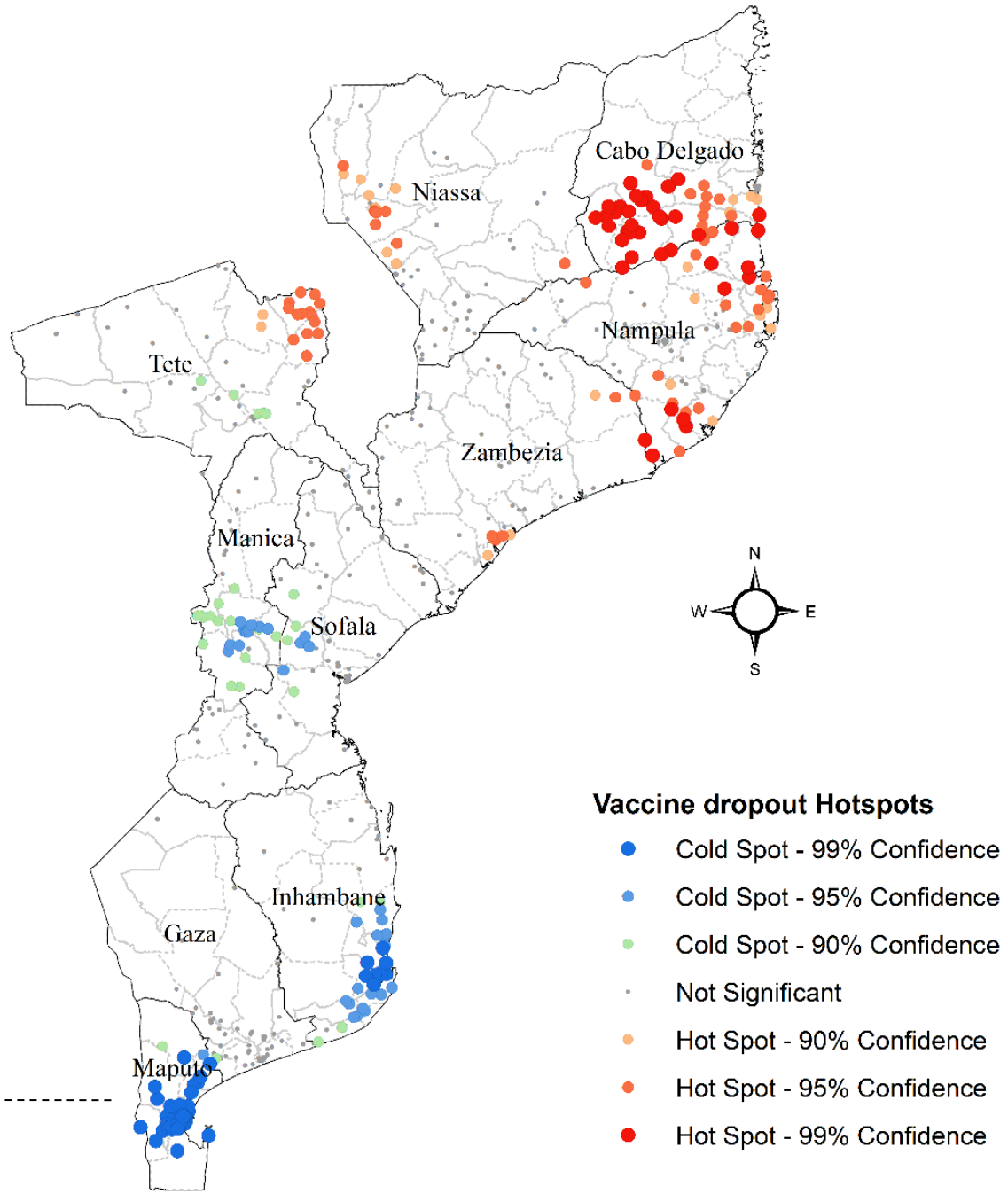
Fig 2. Moran's Index Spatial-autocorrelation test

Results (3/4)

Hot spots and Cold spots of rotavirus vaccine dropout

- With 95% confidence level significant **hot spot** where observed in the **northern regions** and in Central regions of Mozambique

- **Cold spots** where observed in the **southern** and central regions of the country.



Maputo Capital City

Fig 3. Map of hot and cold spots of rotavirus vaccine dropout

Results (4/4)

Factors associated with rotavirus vaccine dropout

Intraclass Correlation Coefficient

ICC = 67.9%

Risk Factors

Live in rural areas

Protector Factors

Possess health card, had ANC, live near the health facility and belongs to provinces of Maputo and Inhambane

Characteristics	AOR	95% CI
Province		
Maputo City	1	
Maputo	0.09	0.01–0.97
Inhambane	0.07	0.01–0.60
Area of Residence		
Urban	1	
Rural	4.0	1.78–9.02
Antenatal Care (ANC)		
None	1	
1 to 3	0.19	0.06–0.59
≥ 4	0.15	0.05–0.45
Health card possession		
No	1	
Yes	0.43	0.22–0.85
Distance to health facility		
Problem	1	
No problem	0.46	0.25–0.82

Table 1. Factors associated with rotavirus vaccine dropout

Conclusions & Recommendations

- **Rotavirus vaccine dropout** among 12-35 children in Mozambique remain high (14.7%) with strong community-level clustering.
- As the geographic distance increase from the capital city Maputo, the dropout rate tends to increase.
- The phenomena is heavily **shaped by contextual factors** such as area of residence and other latent factors.
- Strengthening **antenatal care services**, improving **health card utilization**, addressing **rural healthcare accessibility**, and expand the National Diarrheal Surveillance in geographically identified hot-spot regions are essential for reducing dropout rates, achieving equitable immunization coverage and improve child health.

References

- Wahl, B., & Pitzer, V. E. (2024). Expanded Programme on Immunization at 50 years: Its legacy and future. *The Lancet*, *403*(10441), 2265–2267. https://doi.org/10.1016/S0140-6736(24)00982-6
- Black RE, Perin J, Yeung D, Rajeev T, Miller J, Elwood SE, Platts-Mills JA. Estimated global and regional causes of deaths from diarrhoea in children younger than 5 years during 2000-21: a systematic review and Bayesian multinomial analysis. Lancet Glob Health. 2024 Jun;12(6):e919-e928. doi: 10.1016/S2214-109X(24)00078-0. Epub 2024 Apr 20. PMID: 38648812; PMCID: PMC11099298.
- Cassocera, M., Chissaque, A., Martins, M. R. O., & Deus, N. D. (2020). 40 years of immunization in Mozambique: A narrative review of literature, accomplishments, and perspectives. *Cadernos de Saúde Pública*, *36*(suppl 2), e00038320. https://doi.org/10.1590/0102-311x00038320
- Skrondal, A. e Rabe-Hesketh, S. (2004). *Generalized latent variable modeling: Multilevel, longitudinal, and structural equation models*. Chapman & Hall/CRC.
- Elkasabi, M., Ren, R., & Pullum, T. W. (2020). *Multilevel Modeling Using DHS Surveys: A Framework to Approximate Level-Weights*. ICF.
- Instituto Nacional de Estatística (INE) e ICF. (2024). Inquérito Demográfico e de Saúde em Moçambique 2022–23. INE e ICF

Thank You!

E-mail: filimone.edmilson@gmail.com