

# Gustavo Guimarães de Castro Amorim

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## EDUCATION

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**University of Auckland, Auckland, New Zealand** *2010 - 2014*  
Ph.D., Statistics  
Department of Statistics  
Thesis: *Semiparametric methods for multiphase response-selective samples*  
Advisors: Chris Wild, Ph.D and Alastair Scott, Ph.D and Alan Lee, Ph.D

**Federal University of Minas Gerais, Belo Horizonte, MG, Brazil** *2008 - 2010*  
M.Sc, Statistics  
Thesis: *Wasserstein Distance: Properties and Applications*  
Advisors: Aniura Milanes Barrientos, Ph.D and Adrian Pablo Hinojosa Luna, Ph.D

**Federal University of Minas Gerais, Belo Horizonte, MG, Brazil** *2004 - 2007*  
B.Sc, Physics  
Topic: *Isotopic Dipole Moments of Water Clusters*  
Advisor: Jose Rachid Mohallem, Ph.D

## EMPLOYMENT

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**Vanderbilt University Medical Center, Nashville, TN, USA** *December 2018 - Present*  
Research Assistant Professor  
Department of Biostatistics

**Janssen Pharmaceutica, Beerse, Belgium** *August 2017 - July 2018*  
Postdoctoral Research Fellow, Statistics

**Ghent University, Ghent, Belgium** *January 2015 - July 2017*  
Postdoctoral Research Fellow, Statistics

## TEACHING ACTIVITIES

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### Introduction to Biostatistics using R

Introductory course for PhD students from Medicine,  
Universidade Eduardo Mondlane  
Maputo, Mozambique

Jun - Jul, 2021

### 3-day Workshop on Biostatistics

Introductory course for MSc and PhD students from different backgrounds,  
Universidade Eduardo Mondlane  
Maputo, Mozambique

Jun, 2019

### Statistical Topics in Food Technology

Course given for second year masters students graduating in Food Technology,  
Ghent University  
Ghent, Belgium

Aug 2016 to Dec 2017

### Graduate Assistant

Tutor for first and second year students enrolled in the University of Auckland,  
The University of Auckland  
Auckland, New Zealand

Feb 2011 to Dec 2013

### Lecturer

, Probability I, for students graduating in Computer Science and  
Introduction to Statistics, for students graduating in Mechanical Eng.  
Introduction to Statistics, for students graduating in Mathematics)  
Federal University of Minas Gerais  
Belo Horizonte, Brazil

Aug 2008 to Dec 2009

## AWARDS

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2017	Best Oral Presentation Award, IBS Channel Network Conference, Hasselt
2014	Doctoral Completion Award, University of Auckland, Department of Statistics
2011	Best Phd Talk Award, University of Auckland, Department of Statistics
2010 - 2014	Scholarship from Marsden Fund, University of Auckland
2008 - 2010	M.Sc. Scholarship from CAPES, Federal University of Minas Gerais, UFMG
2005 - 2007	Undegraduate Research Assistant from CNPq, Federal University of Minas Gerais, UFMG
2008	Summer Scholarship, Institute of Applied and Pure Mathematics, IMPA
2007	Summer Scholarship, Campinas State University, UNICAMP

## PUBLICATIONS

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### Published/Accepted:

17. Nguenha, D., Acacio, S., Murias-Closas, A., Ramanlal, N., Saavedra, B., Karajeane, E., Mudumane, B., Mambuque, E., Gomes, N., Losada, I., Oliveras, L., Naueia, E., Sterling, T., **Amorim, G.**, Moon, T., Menendez, C., Vaz, P., Lopez-Varela, E., Garcia-Basteiro, A. Prevalence and clinical characteristics of pulmonary tuberculosis among pregnant and post-partum women in Mozambique (Accepted, The International Journal of Tuberculosis and Lung Disease)
16. Vermeulen, K., De Neve, J. **Amorim, G.**, Thas, O., Vansteelandt, S. Semiparametric estimation of probabilistic index models: efficiency and bias (Accepted, Statistica Sinica) doi: 10.5705/ss.202021.0070
15. Souza, A., Arriaga, M., **Amorim, G.**, Queiroz, A., Andrade, B., Spencer, R., Guimaraes, A., Duvoni, B., Cavalcanti, S., Kritski, A., Rolla, Figueiredo, M., Turner, M., V., Sterling, T., Cordeiro-Santos, M. Determinants of losses in the latent tuberculosis infection cascade of care in Brazil (Accepted, BMJ Global Health) doi: 10.1136/bmjgh-2021-005969
14. Carlucci, J., De Schacht, C., Graves, E., González, P., Bravo, M., Yu, Z., **Amorim, G.**, Arinze, F., Silva, W., Tique, J., Alvim, M., Simone, B., Fernando A., Wester, W. Immunodeficiency Among HIV-positive Children in the Setting of Evolving Antiretroviral Therapy Initiation Policies: 6 Years of Pediatric CD4 Data from Zambézia Province, Mozambique (Accepted, Journal of Acquired Immune Deficiency Syndromes)

13. Davis, E., **Amorim, G.**, Dahn, B., Moon, T. Perceived ability to comply with national COVID-19 mitigation strategies and their impact on household finances, food security, and mental well-being of medical and pharmacy students in Liberia. *PloS one*, 16(7), p.e0254446, doi:10.1371/journal.pone.0254446
12. Lotspeich, S., Shepherd, B., **Amorim, G.**, Shaw, P., Tao, R. Efficient odds ratio estimation under two-phase sampling using error-prone data from a multi-national HIV research cohort. *Biometrics*, 2021, doi:10.1111/biom.13512
11. Patel, R., **Amorim, G.**, Jakait, B., Shepherd, B., Mocello, R., Musick, B., Bernard, C., Onono, M., Bukusi, E., Wools-Kaloustian, K., Cohen, C., Yiannoutsos, C., Pregnancies among women living with HIV using contraceptives and antiretroviral therapy in western Kenya: a retrospective, cohort study. *BMC Medicine*, 13;19(1):178, 2021, doi:10.1186/s12916-021-02043
10. †Silva, A., †**Amorim, G.**, †Melo, M., Silveira, A., Vargas, P., Moreira, A., Rocha, M., Souza, A., Arriaga, M., Araujo-Pereira, M., Figueiredo, M., Durovni, B., Lapa-e-Silva, J., Cavalcanti, S., Rolla, V., †Sterling, T., †Cordeiro-Santos, M., Andrade, B. †, †Silva, E., †Kritsk, A., and the RePORT Brazil consortium. Pre-treatment absolute neutrophil count as a predictor of antitubercular therapy outcomes: a multicenter prospective cohort study. *Frontiers in Immunology*, 2021, doi:10.3389/fimmu.2021.661934
9. **Amorim, G.**, Tao, R., Lotspeich, S., Shaw, P., Lumley, T., Shepherd, B. Two-Phase Sampling Designs for Data Validation in Settings with Covariate Measurement Error and Continuous Outcome. *Journal of the Royal Statistical Society: Series A*, 2021, doi:10.1111/rssa.12689
8. Arriaga, M., **Amorim, G.**, Queiroz, A., Rodrigues, M., Araújo-Pereira, M., Nogueira, B., Souza, A., Rocha, M., Benjamin, A., Moreira, A., de Oliveira, J., Figueiredo, M., Turner, M., Alves, K., Durovni, B., Silva, J., Kritski, A., Cavalcante, S., Rolla, V., Cordeiro-Santos, M., Timothy Sterling, T., Andrade, B., Novel Stepwise Approach to Assess Representativeness of a Large Multicenter Observational Cohort of Tuberculosis Patients: The Example of RePORT Brazil. *International Journal of Infectious Diseases*, 103:110-118, 2021, doi:10.1016/j.ijid.2020.11.140
7. Tao, R., Lotspeich, S., **Amorim, G.**, Shaw, P., Shepherd, B., Efficient semiparametric inference for two-phase studies with outcome and covariate measurement errors. *Statistics in Medicine*, 10;40(3):725-738, doi:10.1002/sim.8799
6. **Amorim G.** Semiparametric estimator for a secondary analysis with correlated outcomes. *Communications in Statistics - Theory and Methods*, 48:19, 4703-4711, 2019, doi:10.1080/03610926.2016.1146768
5. **Amorim, G.**, Scott, A. and Wild, C.. Multiphase sampling. In Borgan, Ø., Breslow, N.E., Chatterjee, N., Gail, M.H., Scott, A., Wild, C.J. (eds). (2018). *Handbook of Statistical Methods for Case-Control Studies* (pp. 219-238), CRC Press, ISBN 9780367571375
4. **Amorim G**, Thas O, Vermeulen K, Vansteelandt S, De Neve J. Small sample inference for probabilistic index models. *Computational Statistics and Data Analysis*, 121, 137-148, 2018, doi:10.1016/j.csda.2017.11.005
3. Mbah C, De Ruyck, K, De Schrijver S, De Sutter C, Schiettecatte K, Monten C, Paelinck L, De Neve W, Thierens H, **Amorim G**, Thas O, West C, Veldeman L. A new approach for modeling patient overall radiosensitivity and predicting multiple toxicity endpoints for breast cancer patients. *Acta Oncologica*, 57(5), 604-612, 2018, doi:10.1080/0284186X.2017.1417633
2. Breslow N, **Amorim G**, Pettinger MB and Rossouw, J. Using the whole cohort in the analysis of case-control data: Application to the Women's Health Initiative. *Statistics in Biosciences*, 5, 2, 232-249, 2013, doi:10.1007/s12561-013-9080-2
1. Mohallem JR, de O. Coura T, Diniz LG, **Amorim G**, Assafrão D, Heine T. Adiabatic Corrections to Density Functional Theory Energies and Wave Functions. *Journal of Physical Chemistry. A, Molecules, Spectroscopy, Kinetics, Environment, & General Theory*, 112, 8896-8901, 2008, doi:10.1021/jp800732a

†: These authors contributed equally to the work

#### Under review:

1. Lotspeich, S., **Amorim, G.**, Shaw, P., Tao, R., Shepherd, B. Optimal Multi-Wave Validation of Secondary Use Data with Outcome and Exposure Misclassification (Under review, **Biostatistics**)
2. **Amorim, G.**, Tao, R., Lotspeich, S., Shaw, P., Lumley, T., Patel, R., Shepherd, B. Three-phase generalized raking and multiple imputation estimators to address error-prone data (Under review, **Biometrics**)

3. Carlucci, J., Yu, Z., González, P., Bravo, M., **Amorim, G.**, Cugara, C., Guambe, H., Mucanhenga, J., Silva, W., Tique, J., Alvim, M., Graves, E., De Schacht, C., Wester, W. The Effect of a Mentor Mothers Program on Prevention of Mother-To-Child Transmission of HIV Outcomes in Zambézia Province, Mozambique (Under review, **Journal of the International AIDS Society**)

#### To be submitted:

1. Rivera, C., **Amorim, G.**. Calibration for conditional maximum likelihood: Software and applications
2. De Schacht, C., Van Rompaey, S., Melo, M., Naftal, A., Audet, C., Bilhete, F., **Amorim, G.**, Wester, W. Effect of Community Adherence Support Groups on retention to care and HIV viral suppression among patients receiving ART services in Zambézia province, Mozambique: a cohort study from 2012-2018
3. De Schacht, C., **Amorim, G.**, Calvo, L., Paulo, P., Ntasis, E., Van Rompaey, S., Matsimbe, J., Martinho, S., Graves, E., Esmael, R., Alvim, M., Kassim, H., Carlos, I., Wester, W., Audet, C. Assessing Patient Satisfaction at Health Care Facilities in Zambézia Province, Mozambique
4. **Amorim, G.**, Scott, A., Wild, C. Adjusted Conditional Maximum Likelihood for continuous outcome under a two-phase response-selective design
5. Stalter, R., **Amorim, G.**, Mocello, A., Jakait, B., Shepherd, B., Musick, B., Bernard, C., Onono, M., Bukusi, E., Wools-Kaloustian, K., Cohen, C., Yiannoutsos, C., Patel, R., behalf of the Implant/Efavirenz Study Group and the East Africa IeDEA regional consortium, Contraceptive implant duration use is not associated with incident pregnancies among women living with HIV using implants and various antiretroviral therapy regimens in Western Kenya: A retrospective longitudinal analysis

## PRESENTATIONS

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#### Invited

- ENAR, Nashville, TN, USA, April 2020  
*Two-Phase Sampling Designs for Data Validation in Settings with Covariate Measurement Error and Continuous Outcome*
- INS, Maputo, Mozambique, July 2019  
*An introduction to Propensity Score methods*
- Vanderbilt University Medical Center, Nashville, TN, USA, May 2018  
*Probabilistic index models*
- Erasmus Medical Center, Rotterdam, Netherlands, December 2016  
*An introduction to Probabilistic index models: efficiency and bias*
- Ghent University, Ghent, Belgium, May 2015  
*Semiparametric methods for multiphase response-selective samples*
- Federal University of Minas Gerais, Belo Horizonte, Brazil, February 2014  
*Semiparametric Methods for Regression Under Two-Phase Sampling*
- Federal University of Rio Grande do Norte, Natal, Brazil, February 2014  
*Semiparametric Methods for Regression Under Two-Phase Sampling*

#### Contributed

- JSM, Virtual, August 2021  
*Three-phase generalized raking and multiple imputation estimators to address error-prone routinely collected data*
- ENAR, Philadelphia, PA, USA, April 2019  
*Two-Phase Sampling Designs for Data Validation in Settings with Covariate Measurement Error and Continuous Outcome*
- Workshop on Semiparametric Statistics, Gent, Belgium, Dec 2017  
*Small sample inference for probabilistic index models*
- IBS Channel Network Conference, Hasselt, Belgium, April 2017  
*Small sample inference for probabilistic index models*

- International Biometric Conference, Victoria, BC, Canada July 2016  
*Small sample inference for probabilistic index models*
- ISNPS Meeting, Graz, Austria July 2015  
*Probabilistic index models: efficiency and bias*
- New Zealand Statistical Association, Hamilton, New Zealand August 2013  
*Semiparametric methods for multiphase response-selective samples*
- Joint Statistical Meeting, San Diego, CA, USA August 2012  
*Semiparametric Methods for Regression Under Two-Phase Sampling*
- New Zealand Statistical Association, Auckland, New Zealand August 2011  
*Semiparametric Methods for Regression Under Two-Phase Sampling*

## ACTIVE GRANTS

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NU2GGH01943-03 (Wester, PI)

President's Emergency Plan for AIDS Relief (PEPFAR)

AVANTE: TOWARDS EPIDEMIC CONTROL.

The five-year grant, entitled "Avante Zambézia" ("Move Forward Zambézia" in the local language) was awarded by the Centers for Disease Control and Prevention (CDC), funded by the President's Emergency Plan for AIDS Relief (PEPFAR). The goal is to provide targeted technical assistance to expand HIV care, treatment and prevention services to more people, while helping the Mozambican Ministry of Health implement high-quality, accessible and sustainable HIV services within a strengthened health system.

Role: Biostatistician

Projects:

- Assessing Patient Satisfaction at Health Care Facilities in Zambézia Province, Mozambique: This study aimed to assess patient satisfaction among adults receiving HIV services in Zambézia Province, Mozambique, as well as understand patient satisfaction's relationship with time spent in the health facility, and its association with 6-month and 12-month retention.
- Impact of COVID-19 epidemic on clinical outcomes and service delivery among people living with HIV and health care workers in Mozambique: The overall purpose of the study is to investigate: (1) the dynamics of COVID-19 infection among people living with HIV and health care workers; (2) the provision of HIV and HIV/TB care and treatment services at health facilities, within the scope of COVID-19 or in the context of COVID-19 and; (3) the perceptions of COVID-19 and access to care among people living with HIV and health care workers.
- Evaluation of the impact of lay counselor-led intensified HIV risk screening on the coverage and yield (i.e. identification of new positives) of HIV test services as well as ART initiation and retention in care among persons testing HIV positive via this novel approach: The primary objective of the evaluation is to evaluate using a pre-post study design, the effect of lay counselors' counselor-led intensified HIV risk screening (within an emergency room and outpatient clinic setting) on the coverage and yield (i.e. identification of new positives) of HIV test services as well as ART initiation and retention in care among persons testing HIV-positive via this novel approach.
- Favorable Impact of Community Adherence Groups on retention in care and viral suppression rates among HIV-positive, ART-treated adults in Zambézia province, Mozambique: The primary objective was to evaluate the effect of CAG participation on 6-month and 12-month retention and adherence (measured by viral suppression) among patients eligible for CAG participation. The study secondarily aimed to compare sociodemographic characteristics, retention-in-care rates, viral suppression rates, and factors associated with viral suppression, between patients who enrolled in CAG versus those who did not but were eligible to do so.
- Positive Effects of Intensified Preventive Calls/Home Visits on Early Retention Among Adults Newly Initiated on Antiretroviral Therapy in Zambézia Province, Mozambique: The purpose of this evaluation was to assess if the package of intensified interventions had a favorable impact on early retention of adults recently initiated on ART in selected health facilities. The primary objective was to assess the effect of the strengthening of support phone calls and preventive home visits on the early retention.

R01AI131771-03 (Shepherd, PI)

NIAID

Statistical methods for correlated outcome and covariate errors in studies of HIV/AIDS

This project will create novel statistical methods for estimation to reduce or eliminate bias caused by correlated errors in failure-time outcomes and associated covariates. The developed methods will use information on the structure of the measurement error, gained by data validation or audit subsets, to adjust estimation and correct for errors that remain in the unvalidated data. The project will develop and examine extensions of regression calibration, corrected scores, and multiple imputation methods, augmented with raking techniques to address these correlated errors. The project will also develop efficient data validation and audit sampling designs that use adaptive, multi-wave sampling in order to target successive validation and audit subsets towards informative subgroups of patients.

Role: Biostatistician

Projects:

- Treat-all Era incidence of Kaposi's sarcoma among HIV infected adults in East Africa and Latin America: In this study we will determine the incidence of Kaposi's sarcoma among all HIV patients registered at sentinel sites in IeDEA East Africa and CCASAnet sites in Latin America between January 1 2010 to database closure.
- Timing and type of test for bacteriologically confirmed TB and association with TB/HIV treatment outcomes: Determine the association between bacteriological confirmation of TB, including the timing of the test and the type of test used, and TB treatment outcomes among TB/HIV patients in Latin America and East Africa.
- Validating incident pregnancies among women living with HIV using contraceptives and antiretroviral therapy in western Kenya: a retrospective, cohort study: The objective was to validate initial findings of reduced contraceptive effectiveness of implants with concomitant efavirenz-containing antiretroviral (ART) use, we conducted this analysis with a larger cohort and a 3-phase sampling scheme to include data from routine electronic medical records (EMR), manual chart review, and telephone interview with women coefficient for a target variable.

5U01AI069923-16 (McGowan, PI)

NIH/NIAID

Caribbean, Central and South America Network for HIV epidemiology (CCASAnet)

The major goals of this project are to create a shared database of HIV epidemiology data from six countries in the Caribbean, Central, and South America perform analyses of data to answer questions that cannot be answered by any single site, and develop novel analytical, informatic, and biostatistical methods for such pooled data.

Role: Biostatistician

- Pre-treatment absolute neutrophil count as a predictor of antitubercular therapy outcomes: a multicenter prospective cohort study: The objective was to assess whether neutrophil counts can serve as a predictor of adverse treatment outcomes.
- Tuberculosis pre- and post-partum among pregnant women living in an area with high prevalence of HIV and tuberculosis: A study to estimate the prevalence of TB among pregnant women attending their first prenatal consultation, and puerperal women (seen 1 month postpartum), as well as describe the characteristics of TB cases among these women, and their birth outcomes.
- Representativeness of a Large Multicenter Observational Cohort of Tuberculosis Patients: The Example of RePORT Brazil: We evaluated the representativeness of RePORT-Brazil by comparing epidemiological variables and operational indicators with those in the SINAN dataset. In addition, clinical and epidemiologic determinants of unfavorable TB treatment outcomes were also compared between the two cohorts.
- Determinants of losses in the latent tuberculosis infection cascade of care in Brazil: a prospective multicenter cohort study: The current study aimed to evaluate the Tuberculosis preventive therapy care cascade in a Brazilian cohort of contacts of patients with confirmed TB, and identify factors associated with losses at each phase of the cascade.

5R01AI120790-04 (Sterling, PI)

NIAID

Predictors of treatment toxicity, failure, and relapse in HIV-related tuberculosis

We will characterize the relationship between human genetic SNPs, TB and HIV drug levels, and three key TB treatment outcomes: drug discontinuation due to toxicity (Aim 1), two- month sputum culture-positivity, as well as TB treatment failure and relapse (Aim 2).

Role: Biostatistician

2D43TW009745-07 (Moon/Sidat, PI)

FIC

UEM Partnerships for Research in Implementation Science Mozambique (PRISM)

The University Eduardo Mondlane (UEM) and the Vanderbilt Institute for Global Health (VIGH) in partnership with Federal University of São Paulo (UNIFESP) propose to train a new generation of Mozambican researchers with a focus on HIV/AIDS implementation science, taking full advantage of the our extramurally-funded research program in Mozambique. PRISM will assist UEM to capacitate both current and future faculty to teach and conduct HIV-focused implementation science research.

Role: Biostatistician

1G11TW011529-01 (Moon/Sidat, PIs)

FIC

UEM-Vanderbilt Academic Partnership for Enhancements in Research (APER)

This application is designed to be complimentary to our recent successful renewal application in response to PAR-19-283 titled Partnership for Research in Implementation Science Mozambique (PRISM), proposing to a) expand on existing efforts to capacitate a UEM Faculty of Medicine Grants Administration Office in both pre- and post-award management; and b) create a Biostatistics “Core” within UEM’s Implementation Science Unit to provide biostatistics support to faculty and students in the conduct of their research.

Role: Biostatistician

U2RTW011248 (Moon, Schieffelin, PIs)

FIC/NIAID/NIH

Partnership for Research in Emerging Viral Infections-Sierra Leone (PREVSL)

Role: Biostatistician

## PROFESSIONAL ACTIVITIES

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### Vanderbilt University Medical Center

- Member of Comprehensive Exam Committee 2021

### Member of examination committee

- **Ph.D. thesis:**

- Karl Mertens, Marginal Structural and Structural Nested Models for Causal Inference in Hospital Epidemiology, Ghent University, 2016

- **M.Sc. thesis:**

- Natalia Kacperek, Is a high occupancy rate associated with driver test outcomes?, Ghent University, 2016
- Roel Vandersmissen, Baseline covariate adjustment in randomized follow-up studies, Ghent University, 2015

### Reviewer

- Biometrics
- BMC Medicine
- The International Journal of Tuberculosis and Lung Disease
- PLOS ONE
- International Journal of Environmental Research and Public Health

## Conference sessions

- Chair: Recent Developments in Semiparametric Transformation Models, ENAR, Nashville, TN, 2020

## SOFTWARE

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- Joris Meys, Jan De Neve, Nick Sabbe, and **Gustavo Amorim**. pim: Fit Probabilistic Index Models, 2017.  
URL <https://CRAN.R-project.org/package=pim>. R package version 2.0.1.