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## Research Interest

Bayesian methods, Causal inference, Nonparametric regression, Variable and model selection, Longitudinal Data Analysis, and modelling complex time-to-event data.

## Experience

- 2017– Present: **Research Associate**, Center for Epidemiology Versus Arthritis (formerly Arthritis Research UK Centre for epidemiology), University of Manchester, Manchester, UK (Versus Arthritis funded project).
  - Duties:
    - Developing robust statistical analysis plans that address the study objectives, including scalable solutions to analysis challenges posed by the type and structure of the data.
    - Providing expert statistical advice for ongoing projects in the centre
    - Contribute to the planning and delivery of ad hoc lectures, seminars, workshops and short courses.
    - Contribute to the development of the centre's funding proposals
- 2016 – 2017: **Assistant Professor of Statistics**, Jimma University, Jimma, Ethiopia
  - Duties:
    - Lead Lecturer for Principles of statistical inference course and co-lecture Survival analysis course for graduate students in Biostatistics
    - Supervision of student thesis both at undergraduate and graduate level (5 MSc student thesis supervision completed)
- 2011 – 2015: **Lecturer**, Jimma University, Jimma, Ethiopia
  - Duties:
    - Teaching and supervision of undergraduate student thesis
- 2008 – 2011: **Graduate Assistant**, Jimma University, Jimma, Ethiopia

## Education

- 2021: **PhD in Statistics**, Hasselt University, Belgium
  - Thesis: Analysis of infectious disease data: A Flexible Bayesian Statistical Modeling Approach ([belaybirlieyimer.pdf \(ibiostat.be\)](#)).
  - Supervisor: Prof. Dr Ziv Shkedy
- 2011: **MSc in Biostatistics** (Graduate with distinction), Jimma University, Jimma, Ethiopia
  - Thesis: Modeling time-to-first malaria infection among children under the age of 10: comparison of Cox and frailty models
  - Supervisors: Prof. Dr Yehenew Getachew and Dr Wondwossen Kassahun
- 2008: **BSc in Applied Statistics** (Graduate with distinction), Hawassa University, Ethiopia

## Research contributions summary

- Total number of peer reviewed publications: 25;

- Developed and published 3 open-source software tools (More than 9,000 downloads since publications)
- H-Index: 14; total of 551 citations (Google Scholar).

## Grants

Funding body	Title	Amount (£)	Start date	Duration (months)	Role
University of Manchester	Risk stratification of patients with multi-morbidity at risk of COVID-19 associated adverse outcomes in Greater Manchester	£14,000	April 2022	6	Co-applicant
FOREUM Foundation for Research in Rheumatology	Trends and factors associated with prescription opioid utilization, dependence and deaths in patients with musculoskeletal conditions	200,000 euro	2020	3 years	Co-applicant
VLIR-UOS	Statistics for development: capacity building in statistics at higher education in Ethiopia.	119, 869 euro	January 2018	3 year	Co-applicant
VLIR-UOS	Statistics for development: capacity building in statistics at higher education in Ethiopia.	58, 476 euro	April 2016	1 year	Co-applicant
RStudio, Pbc.	Travel grant: rstudio::conf(2022), annual RStudio conference, Washington, USA	\$1500 plus conference registration	July 2022		Applicant

## Past and Current Projects

- Assembling the Data Jigsaw: Powering Robust Research on the Causes, Determinants and Outcomes of MSK Disease ([Centre for Epidemiology | Assembling the Data Jigsaw - Centre for Epidemiology \(manchester.ac.uk\)](https://www.cfe.manchester.ac.uk/research/projects/))
- Cloudy with a chance of pain: a smartphone-based study to investigate the association between pain and the weather (<https://www.cloudywithachanceofpain.com/>)
  - Contribute to the development of a statistical analysis plan, data preparation, and analysis.
  - One first-author paper and Co-authored three papers.
- Quality of life and sleep in Rheumatoid Arthritis (QUSAR) <https://www.arthritisresearchuk.org/news/arthritis-today/2016/july/links-between-sleep-and-living-well.aspx>
  - Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
  - Published one paper as a joint last author and co-authored one (under review).
- Opioid comparative safety and utilization (<http://www.cfe.manchester.ac.uk/research/projects/>)
  - Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
  - Co-authored one paper.

## Talks at Conferences and workshops

- 2022: Transparent and efficient preparation of CPRD drug data into information on individuals' drug use over time, Manchester Digital Epidemiology school, October 12-14, 2021, Manchester, UK
- 2021: Short-term forecasting of total number of reported COVID-19 cases in South Africa - A Bayesian temporal modelling approach, The Sub-Saharan Africa Network (SUSAN) of the International Biometrics Society, Kenya.
- 2021: Causal mediation analysis using Stan – a g-formula approach, Royal statistical society, Manchester, UK
- 2021: Transparent and efficient preparation of CPRD drug data into information on individuals' drug use over time, Manchester Digital Epidemiology Summer school, July 21-23, 2021, Manchester, UK
- 2019: Causal mediation analysis for longitudinal ordinal data, UK-RiME, University of East Anglia, Norwich, UK
- 2018: Handling Missing GPS data, Manchester Digital Epidemiology Summer school, July 18-20, 2018, Manchester, UK
- 2016: Bayesian variable selection for order restricted Dose-response modelling: Model Selection and Complexity, Annual Conference of The Belgian Statistical Society, October 13-14, 2016, Namur, Belgium
- 2016: Bayesian Model averaging in longitudinal studies using Bayesian variable selection methods, Ethiopian Statistical Association, May 20-22, 2016, Addis Ababa, Ethiopia
- 2016: Model selection and Multimodal inference in longitudinal studies using Bayesian variable selection methods, International Conference on Applied Statistics in Agriculture, 25-26 March 2016, Haramaya, Ethiopia
- 2015: Evaluating Durability of First-line cART using Multi-State survival model, an International Conference on Statistics-2015: Theory to Practice, March 16-18, 2015, Jimma University, Ethiopia

## Teaching

### Teaching at University of Manchester

- 2022: Longitudinal data analysis, Applied epidemiology and Biostatistics course, centre for epidemiology, University of Manchester.
- 2022: Bias and confounding, Introduction to Epidemiology, Genetic epidemiology, and Biostatistics course, centre for epidemiology, University of Manchester.
- 2021: Bias and confounding, Introduction to Epidemiology, Genetic Epidemiology, and Biostatistics Course, centre for epidemiology, University of Manchester.

### Teaching before joining university of Manchester

- 2017: Infectious disease modelling, MSC in Biostatistics program, Department of Epidemiology and Biostatistics, Gondar University, Invited lecture.
- 2017: Bayesian statistics, MSC in Biostatistics program, Department of Epidemiology and Biostatistics, Gondar University, Invited lecture, [course syllables](#).
- 2017: Principles of statistical inference, MSC in Biostatistics program, Department of Statistics, Jimma University, led-lecture, [course material](#).

- 2016: Principles of statistical inference, MSc in Biostatistics program, Department of Statistics, Jimma University, led-lecture.
- 2015: Survival analysis, MSc in Biostatistics program, Department of Statistics, Jimma University, co-lecture.
- 2015: Principles of statistical inference, MSc in Biostatistics program, Department of Statistics, Jimma University, co-lecture.
- 2014: Principles of statistical inference, MSc in Biostatistics program, Department of Statistics, Jimma University, co-lecture.

## Post-graduate students

### *Successfully completed*

- 2022: Huilian Xu, Patterns of inpatient opioid prescriptions among patients with non-cancer pain, MSc in health data science program, University of Manchester, Main supervisor
- 2015: Solomon Abebaw, Frailty modelling for spatially correlated survival data with application to infant mortality in Ethiopia, MSc in Biostatistics program, Jimma University, Main supervisor
- 2014: Tafere Tilahun: Application of semi-parametric mixed model for modelling a longitudinally measured fasting blood sugar level of adult diabetic patients in Jimma university specialized hospital, south-west Ethiopia, published [10.1186/s12874-018-0648-x](https://doi.org/10.1186/s12874-018-0648-x), MSc in Biostatistics program, Jimma University, Main supervisor
- 2014: Feysal Kemal, Survival analysis of time-to-recovery from vesicovaginal obstetric fistula: Application of the Lasso method for variable selection, MSc in Biostatistics program, Jimma University, Co-supervisor
- 2013: Biniyam Yegoraw, Modeling age at menarche: a comparison of multivariate time-to-event models, MSc in Biostatistics program, Jimma University, Co-supervisor
- 2013: Abyot Negash, Modeling time-to-recovery of adult diabetic patients: A comparison of Cox regression and shared frailty model, MSc in Biostatistics program, Jimma University, Co-supervisor

### *Currently advertising*

- 2023 **MRC DTP**: Understanding flares in rheumatoid arthritis using daily tracked symptoms, co-supervisor

## Publication

### Methodological papers - Research articles evaluating or demonstrating statistical modelling approaches.

1. **Belay B. Yimer**, Martin Otava, Teshome Degefa, Delenasaw Yewhalaw and Ziv Shkedy (2021). "Bayesian Model averaging in longitudinal studies using Bayesian variable selection methods", Communication in statistics: Computation and simulation, <https://doi.org/10.1080/03610918.2021.1914088>
2. **Belay B. Yimer** and Ziv Shkedy (2021). "Bayesian inference for Generalized linear mixed models: A comparison of different statistical software procedures", <https://doi.org/10.1080/27658449.2021.1896102>
3. Aniley, Tafere Tilahun, Legesse Kassa Debusio, Zelalem Mehari Nigusie, Wondwosen Kassahun Yimer, and **Belay Birlie Yimer** (2019). "A semi-parametric mixed model for longitudinally measured fasting blood sugar level of adult diabetic patients." *BMC Medical Research Methodology* 19, no. 1 (2019): 13. [10.1186/s12874-018-0648-x](https://doi.org/10.1186/s12874-018-0648-x)

4. **Belay B. Yimer**, Roel Braekers, Tadesse Awoke, Adetayo Kasim, and Ziv Shkedy (2017). "Multi-state models for the analysis of time-to-treatment modification among HIV patients under highly active antiretroviral therapy in Southwest Ethiopia." *BMC infectious diseases* 17, no. 1: 453. [10.1186/s12879-017-2533-3](https://doi.org/10.1186/s12879-017-2533-3)
5. Negash, Yasin, Wondwosen Kassahun, Abdisa Gurmessa, and **Belay B. Yimer** (2016). "Joint modelling of longitudinal systolic and diastolic blood pressure measurements of hypertensive patients receiving treatment." *Electronic Journal of Applied Statistical Analysis*, 9, no. 2: 308-325. [10.1285/i20705948v7n2p308](https://doi.org/10.1285/i20705948v7n2p308)
6. Banbeta, Akalu, Dinberu Seyoum, Tefera Belachew, **Belay B. Yimer**, and Yehenew Getachew (2015). "Modeling time-to-cure from severe acute malnutrition: application of various parametric frailty models." *Archives of Public Health* 73, no. 1: 6. [10.1186/2049-3258-73-6](https://doi.org/10.1186/2049-3258-73-6)
7. Seid, Awol, Muluye Getie, **Belay B. Yimer**, and Yehenew Getachew (2014). "Joint modelling of longitudinal CD4 cell counts and time-to-default from HAART treatment: a comparison of separate and joint models." *Electronic Journal of Applied Statistical Analysis* 7, no. 2: 292-314. [10.1285/i20705948v7n2p292](https://doi.org/10.1285/i20705948v7n2p292)

### Pre-prints (methodology)

8. **Yimer, Belay B.**, Mark Lunt, Marcus Beasley, Gary J. Macfarlane, and John McBeth. "BayesGmed: An R-package for Bayesian Causal Mediation Analysis." arXiv preprint arXiv:2210.08499 (2022).
9. Das, Rajenki, Mark Muldoon, Mark Lunt, John McBeth, **Belay Birlie Yimer**, and Thomas House. "Modelling and classifying joint trajectories of self-reported mood and pain in a large cohort study." arXiv preprint arXiv:2209.15553 (2022).

### Open-source Software tool

- **drugprepr**: R package for the transparent and efficient preparation of CPRD drug data into information on individuals' drug use over time, <https://CRAN.R-project.org/package=drugprepr>
- **doseminer**: Extract Drug Dosages from Free-Text Prescriptions, <https://cran.r-project.org/package=doseminer>
- **BayesGmed**: R package for Bayesian Causal Mediation Analysis using Stan, [belayb/BayesGmed](https://github.com/belayb/BayesGmed): [An R package for Bayesian causal mediation analysis using the g-formula approach \(github.com\)](https://github.com/belayb/BayesGmed)

### Application (epidemiology) papers

1. **Yimer, B. B.**, Schultz, D. M., Beukenhorst, A. L., Lunt, M., Pisaniello, H. L., House, T., ... & Dixon, W. G. (2022). Heterogeneity in the association between weather and pain severity among patients with chronic pain: a Bayesian multilevel regression analysis. *Pain reports*, 7(1).
2. McBeth, John, William G. Dixon, Susan Mary Moore, Bruce Hellman, Ben James, Simon D. Kyle, Mark Lunt, Lis Cordingley, **Belay Birlie Yimer**, and Katie L. Druce. "Sleep Disturbance and Quality of Life in Rheumatoid Arthritis: Prospective mHealth Study." *Journal of medical Internet research* 24, no. 4 (2022): e32825.
3. Druce, Katie L., David S. Gibson, Kevin McEleney, **Belay B. Yimer**, Stephanie Meleck, Ben James, Bruce Hellman, William G. Dixon, and John McBeth. "Remote sampling of biomarkers of inflammation with linked patient generated health data in patients with rheumatic and musculoskeletal diseases: an Ecological Momentary Assessment feasibility study." *BMC musculoskeletal disorders* 23, no. 1 (2022): 1-9.

4. Beukenhorst AL, Sergeant JC, Schultz DM, McBeth J, **Yimer BB**, Dixon WG  
Understanding the Predictors of Missing Location Data to Inform Smartphone Study Design: Observational Study JMIR Mhealth Uhealth 2021;9(11):e28857
5. Bekalo, Daniel Biftu, Zelalem Mehari Nigussie, **Belay Birlie Yimer**, and Zelalem Alamrew Anteneh. "Modeling Determinants of Low Birth Weight for Under Five-Children in Ethiopia." *Annals of Data Science* 8, no. 3 (2021): 475-496.
6. Jani M, **Birlie Yimer B**, Sheppard T, Lunt M, Dixon WG (2020) Time trends and prescribing patterns of opioid drugs in UK primary care patients with non-cancer pain: A retrospective cohort study. *PLoS Med* 17(10): e1003270. <https://doi.org/10.1371/journal.pmed.1003270>.
7. Burn, E., You, S. C., Sena, A. G., Kostka, K., Abedtash, H., Abrahão, M. T. F., ... & Aragon, M. (2020). Deep phenotyping of 34,128 adult patients hospitalized with COVID-19 in an international network study. *Nature communications*, 11(1), 1-11.
8. Schultz, David M., Anna L. Beukenhorst, **Belay Birlie Yimer**, Louise Cook, Huai Leng Pisaniello, Thomas House, Carolyn Gamble, Jamie C. Sergeant, John McBeth, and William G. Dixon. "Weather Patterns Associated with Pain in Chronic-Pain Sufferers." *Bulletin of the American Meteorological Society* 101, no. 5 (2020): E555-E566.
9. Costello, Ruth E., **Belay B. Yimer**, Polly Roads, Meghna Jani, and William G. Dixon. "Glucocorticoid use is associated with an increased risk of hypertension." *Rheumatology* (2020).
10. Burn, Edward, James Weaver, Daniel Morales, Albert Prats-Urbe, Antonella Delmestri, Victoria Y. Strauss, Ying He et al. "Opioid use, postoperative complications, and implant survival after unicompartmental versus total knee replacement: a population-based network study." *The Lancet Rheumatology* 1, no. 4 (2019): e229-e236.
11. Dixon, William G., Anna L. Beukenhorst, **Belay B. Yimer**, Louise Cook, Antonio Gasparini, Tal El-Hay, Bruce Hellman et al. "How the weather affects the pain of citizen scientists using a smartphone app." *NPJ digital medicine* 2, no. 1 (2019): 1-9.
12. Prieto-Alhambra, D., A. Bourke, T. S. Burkard, E. Burn, R. E. Costello, D. J. Culliford, A. Delmestri et al. "Development And External Validation Of A Patient-level Prediction Model For 60-day Mortality Following Total Knee Arthroplasty: A Multinational Cohort Study." *Osteoporosis International* 30 (2019): S178-S179
13. Habtamu, Tadesse, Afework Bekele, Raya Ahmed, Tsegaye Gadisa, **Belay Birlie**, Taye Tolemariam, and Berhanu Belay. "Diets of the African Civet *Civettictis civetta* (Schreber, 1778) in selected coffee forest habitat, south-western Ethiopia." *African Journal of Ecology* 55, no. 4 (2017): 573-579.
14. Seyoum, Dinberu, Jean-Marie Degryse, Yehenew Getachew Kifle, Ayele Taye, Muluaalem Tadesse, **Belay Birlie**, Akalu Banbeta, Angel Rosas-Aguirre, Luc Duchateau, and Niko Speybroeck. "Risk factors for mortality among adult HIV/AIDS patients following antiretroviral therapy in Southwestern Ethiopia: an assessment through survival models." *International journal of environmental research and public health* 14, no. 3 (2017): 296.
15. Awoke, Tadesse, Alemayehu Worku, Yigzaw Kebede, Adetayo Kasim, **Belay Birlie**, Roel Braekers, Khangelani Zuma, and Ziv Shkedy. "Modeling outcomes of first-line antiretroviral therapy and rate of CD4 counts change among a cohort of HIV/AIDS patients in Ethiopia: A retrospective cohort study." *PloS one* 11, no. 12 (2016): e0168323.
16. **Birlie, Belay**, T. Diriba, K. Sisay, A. Gurmesssa, D. Seyoum, and M. Tadesse. "Mother to child HIV transmission and its predictors among HIV-exposed infants: a retrospective follow-up study in Southwest Ethiopia." *J AIDS Clin Res* 7, no. 605 (2016): 2.
17. Degefa, Teshome, Ahmed Zeynudin, Ameyu Godesso, Yohannes Haile Michael, Kasahun Eba, Endalew Zemene, Daniel Emana, **Belay Birlie**, Kora Tushune, and Delenasaw Yewhalaw.

"Malaria incidence and assessment of entomological indices among resettled communities in Ethiopia: a longitudinal study." *Malaria journal* 14, no. 1 (2015): 24.

18. Hamu, Haji, Serkadis Debalke, Endalew Zemene, **Belay Birlie**, Zeleke Mekonnen, and Delenasaw Yewhalaw. "Isolation of intestinal parasites of public health importance from cockroaches (*Blattella germanica*) in Jimma Town, Southwestern Ethiopia." *Journal of Parasitology Research* 2014 (2014).

#### **Programme Management public service in a professional capacity**

- 2019 - onwards: Seminar organiser for the Biostatistics forum, Centre for Epidemiology Versus Arthritis
- 2019 – onwards: Centre for Epidemiology Versus Arthritis representative for the UK-RIME
- 2019 – onwards: Organizer for the R-user group, University of Manchester and Metropolitan university of Manchester
- *Referee for the journals:*
  - PLOS ONE
  - BMC research methodology
  - Journal of applied statistics
  - The International Society for Pharmacoepidemiology (ISPE) conference