Dr. Belay Birlie Yimer

Center for Epidemiology Versus Arthritis
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Link to GitHub: belayb (Belay Birlie) (github.com)

Research Interest

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

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

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:
        - Providing expert statistical analysis for ongoing projects in the centre
        - 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.
        - Contribute to the development of the centre's funding proposals
- 2016 – 2017: **Assistant Professor of Statistics**, Jimma University, Jimma, Ethiopia
    - Duties:
        - Lead Lcturer 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 (6 MSc student thesis supervision completed)
- 2011 – 2015: **Lecture**r, Jimma University, Jimma, Ethiopia
    - Duties:
        - Teaching and supervision of undergraduate student thesis
- 2008 – 2011: **Graduate Assistant**, Jimma University, Jimma, Ethiopia

Grants

- 2022 – 2023: Risk stratification of patients with multi-morbidity at risk of COVID-19 associated adverse outcomes in Greater Manchester, University of Manchester internal funding, (Role: **Co-I**)
- 2020-2022: Trends and factors associated with prescription opioid utilization, dependence and deaths in patients with musculoskeletal conditions, FOREUM Foundation for Research in Rheumatology, 200,000 euro (Role: **Co-I**)
- 2016 – 2017: Statistics for development, Belgium government (VLIR) funded project, 58, 476 euro (Role: **Co-promotor**)
- 2015 – 2017: **Project leader-south**: Socio-economic and statistical modelling subproject, IUCJU (Belgium government (VLIR) funded project)

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)
- Cloudy with a chance of pain: a smartphone-based study to investigate the association between pain and the weather (https://www.cloudywithachanceofpain.com/)
    o Contribute to the development of a statistical analysis plan, data preparation, and analysis.
    o 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
    o Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
    o 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/)
    o Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
    o Co-authored one paper.

Talks at International Conferences and research Meetings

- 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

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 Debusho, 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
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
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
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
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

Application (epidemiology) papers

1. 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.

2. 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

3. 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.

4. 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.

5. 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.

6. 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.

7. 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**).

8. Burn, Edward, James Weaver, Daniel Morales, Albert Prats-Uribe, 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.

9. Dixon, William G., Anna L. Beukenhorst, **Belay B. Yimer**, Louise Cook, Antonio Gasparrini, 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.

10. 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

11. 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.

12. Seyoum, Dinberu, Jean-Marie Degryse, Yehenew Getachew Kifle, Ayele Taye, Mulualem 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.

13. 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.

14. **Birlie, Belay**, T. Diriba, K. Sisay, A. Gurmessa, 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.

15. 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.

16. 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**).

Software

- **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, belayb/drugprepr: An algorithm for the transparent and efficient preparation of CPRD drug data into information on individuals' drug use over time (github.com)

- **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: An R package for Bayesian causal mediation analysis using the g-formula approach (github.com)

Professional Responsibility

- Organize a monthly Biostatistics forum at the centre for epidemiology versus Arthritis, University of Manchester.
- Organizing committee member - R users Group at The University of Manchester
- Chairman for the planning committee- UK-Research in Musculoskeletal Epidemiology (UK-RiME) partnership
- Supervision of postgraduate dissertation – one successfully completed in MSc health data science
- Review articles for the Journal of Applied statistics, PLoS one, and BMC research methodology