Belay B. Yimer

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Research Interest

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

Education

Hasselt University   *Hasselt, Belgium*

PhD in Statistics   *Oct 2021*

- **Thesis:** Analysis of infectious disease data: A Flexible Bayesian Statistical Modeling Approach
- Supervisor: Prof Ziv Shkedy

Jimma University   *Jimma, Ethiopia*

MSc in Biostatistics   *Sept 2011*

- Graduated with Distinction
- **Thesis:** Comparison of Cox and frailty models for clustered time-to-event data
- Main modules: Epidemiology, Clinical Trial, Design of Experiment, Survival Analysis, Longitudinal models, Principles of Statistical Inference, Computer Intensive Methods

Hawassa University   *Hawassa, Ethiopia*

BSc in Applied Statistics   *July 2008*

- Graduated with Distinction

Work Experience

Center for Epidemiology, University of Manchester   *Manchester, Uk*

Biostatistician/Research Associate   *Sep 2017 - Present*

- Developed robust statistical analysis plans for multiple projects, aligning methodologies with study objectives.
- Conducted complex epidemiological and statistical analysis of diverse health data types, including primary and secondary care data as well as data collected directly from patients.
- Led in-house statistical training by delivering lectures, seminars, and workshops
- Contributed to the development of the centre's funding proposals, securing over £200k as a co-applicant
- Mentoring - successfully completed supervision for three M.Sc. students and currently supervising one PhD student

Jimma University   *Jimma, Ethiopia*

Lecturer   *Sept 2011 - Sept 2017*

- Lecturer for Principles of statistical inference course and co-lecturer Survival analysis course for graduate students in Biostatistics
- Supervision of student thesis both at undergraduate and graduate level (5 MSc student thesis supervision completed)
- Led two VLIR-UOS funded capacity building projects between 2014 and 2017

Selected Projects

Cloudy with a chance of pain: a smartphone-based study to investigate the association between pain and the weather

University of Manchester

- The study recruited more than 13,000 participants and recorded daily pain severity on a 5-point scale (range: no pain to very severe pain) along with hourly GPS location data to be linked with weather data for up to 15 months.
- We established the link between weather and pain at the population level as well as demonstrated the heterogeneity in weather-pain association at the individual level
- **Role:**
  - Developed an algorithm that links the hourly GPS data to the nearest weather station within a 100 KM radius and downloads weather data from NOAA's Integrated Surface Database (ISD)
  - Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
  - First authored one and co-authored three publications

Quality of life and sleep in Rheumatoid Arthritis (QUSAR): mHealth study aimed to test whether sleep disturbance (both absolute values and variability) causes poor HRQoL

University of Manchester

- Over 250 participants wore a triaxial accelerometer for 30 days to objectively assess sleep, and provided daily reports via a smartphone app that assessed sleep (Consensus Sleep Diary), pain, fatigue, mood, and other symptoms.
- We showed sleep predicts poor HRQoL independent of disease severity.
- **Role:**
  - 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 in BMC Rheumatology)

Opioid comparative safety and utilization

University of Manchester

- We studied 1,968,742 new opioid users without cancer from primary care electronic health records across the UK and identified factors associated with long-term use.
- **Role:**
  - Led the development of the statistical analysis plan, prepared the data, and conducted the analysis.
  - Co-authored one publication and secured a follow-up funding as a co-applicant

Awards

Risk stratification of patients with multi-morbidity at risk of COVID-19 associated adverse outcomes in Greater Manchester, Turing-UoM Sandpit: AI and Data Science for Translational Digital Health, 2022, £14,000 , Co-applicant

Trends and factors associated with prescription opioid utilization, dependence and deaths in patients with musculoskeletal conditions, FOREUM Foundation for Research in Rheumatology, 2020, 200,000 (Euro), co-applicant

Travel grant, rstudio::conf(2022), annual RStudio conference, Washington, USA, 2022, $1500.00 plus accommodation

Statistics for development: capacity building in statistics at higher education in Ethiopia, VLIR-UOS, 2017, €119, 869, co-applicant

Statistics for development: capacity building in statistics at higher education in Ethiopia, VLIR-UOS, 2016, €58, 476, co-applicant

Selected Talks at International conferences

Causal mediation analysis using Stan – a g-formula approach, Royal statistical society, September 6-9, 2021, Manchester, UK, slide

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, September 5-9 (virtual), 2021, Kenya. slide

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, slide

Bayesian Model averaging in longitudinal studies using Bayesian variable selection methods, Ethiopian Statistical Association, May 20-22, 2016, Addis Ababa, Ethiopia

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

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

Selected Publications

Software   **BayesGmed**: R package for Bayesian Causal Mediation Analysis using Stan, Github

drugprepr: R package for the transparent and efficient preparation of CPRD drug data into information on individuals' drug use over time, CRAN

doseminer: R package for extracting Drug Dosages from Free-Text Prescriptions, CRAN

Methodology

Yimer, B. B., Lunt, M., Beasley, M., Macfarlane, G. J., & McBeth, J. (2023). BayesGmed: An R-package for Bayesian causal mediation analysis. Plos one, 18(6), e0287037.

Das, R., Muldoon, M., Lunt, M., McBeth, J., **Yimer, B. B.**, & House, T. (2023). Modelling and classifying joint trajectories of self-reported mood and pain in a large cohort study. PLOS digital health, 2(3), e0000204.

Jani, M., **Yimer, B. B.**, Selby, D., Lunt, M., Nenadic, G., & Dixon, W. G. (2023). "Take up to eight tablets per day": Incorporating free-text medication instructions into a transparent and reproducible process for preparing drug exposure data for pharmacoepidemiology. Pharmacoepidemiology and Drug Safety. https://doi.org/10.1002/pds.5595

Yimer, B. B., & Shkedy, Z. (2021). Bayesian inference for generalized linear mixed models: A comparison of different statistical software procedures. RMS: Research in Mathematics & Statistics, 8(1), 1896102.

Yimer, B. B., Otava, M., Degefa, T., Yewhalaw, D., & Shkedy, Z. (2021). Bayesian model averaging in longitudinal studies using Bayesian variable selection methods. Communications in Statistics-Simulation and Computation, 1-18.

Aniley, T. T., Debusho, L. K., Nigusie, Z. M., Yimer, W. K., & **Yimer, B. B.** (2019). A semi-parametric mixed models for longitudinally measured fasting blood sugar level of adult diabetic patients. BMC medical research methodology, 19, 1-11.

Yimer, B. B.„ Braekers, R., Awoke, T., Kasim, A., & Shkedy, Z. (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(1), 1-13.

Negash, Y., Kassahun, W., Gurmessa, A., & **Yimer, B. B.** (2016). Joint modeling of longitudinal systolic and diastolic blood pressure measurements of hypertensive patients receiving treatment. Electronic Journal of Applied Statistical Analysis, 9(2), 308-325.

Banbeta, A., Seyoum, D., Belachew, T., **Yimer, B. B.**, & Getachew, Y. (2015). Modeling time-to-cure from severe acute malnutrition: application of various parametric frailty models. Archives of Public Health, 73(1), 1-8.

Seid, A., Getie, M., **Yimer, B. B.**, & Getachew, Y. (2014). Joint modeling 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(2), 292-314.

Application

Huang, Y. T., Jenkins, D. A., **Yimer, B. B.**, Benitez-Aurioles, J., Peek, N., Lunt, M., ... & Jani, M. (2023). Trends for opioid prescribing and the impact of the COVID-19 pandemic in patients with rheumatic and musculoskeletal diseases between 2006 and 2021. Rheumatology, kead346.

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).

McBeth, J., Dixon, W. G., Moore, S. M., Hellman, B., James, B., Kyle, S. D., ... , **Yimer, B. B.** & Druce, K. L. (2022). Sleep disturbance and quality of life in rheumatoid arthritis: prospective mHealth study. Journal of Medical Internet Research, 24(4), e32825.

Druce, K. L., Gibson, D. S., McEleney, K., **Yimer, B. B.**, Meleck, S., James, B., ... & McBeth, J. (2022). 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(1), 770.

Beukenhorst, A. L., Sergeant, J. C., Schultz, D. M., McBeth, J., **Yimer, B. B.**, & Dixon, W. G. (2021). Understanding the predictors of missing location data to inform smartphone study design: observational study. JMIR mHealth and uHealth, 9(11), e28857.

Jani, M., **Yimer, B. B.**, Sheppard, T., Lunt, M., & Dixon, W. G. (2020). Time trends and prescribing patterns of opioid drugs in UK primary care patients with non-cancer pain: a retrospective cohort study. PLoS medicine, 17(10), e1003270.

Burn, E., You, S. C., Sena, A. G., Kostka, K., Abedtash, H., Abrahão, M. T. F., ... & Ryan, P. (2020). Deep phenotyping of 34,128 adult patients hospitalised with COVID-19 in an international network study. Nature communications, 11(1), 5009.

Costello, R. E., **Yimer, B. B.**, Roads, P., Jani, M., & Dixon, W. G. (2021). Glucocorticoid use is associated with an increased risk of hypertension. Rheumatology, 60(1), 132-139.

Schultz, D. M., Beukenhorst, A. L., **Yimer, B. B.**, Cook, L., Pisaniello, H. L., House, T., ... & Dixon, W. G. (2020). Weather patterns associated with pain in chronic-pain sufferers. Bulletin of the American Meteorological Society, 101(5), E555-E566.

Dixon, W. G., Beukenhorst, A. L., **Yimer, B. B.**, Cook, L., Gasparrini, A., El-Hay, T., ... & McBeth, J. (2019). How the weather affects the pain of citizen scientists using a smartphone app. NPJ digital medicine, 2(1), 105.

Habtamu, T., Bekele, A., Ahmed, R., Gadisa, T., Birlie, B., Tolemariam, T., & **Yimer, B. B.** (2017). Diets of the African Civet Civettictis civetta (Schreber, 1778) in selected coffee forest habitat, south-western Ethiopia. African Journal of Ecology, 55(4), 573-579.

Seyoum, D., Degryse, J. M., Kifle, Y. G., Taye, A., Tadesse, M., **Yimer, B. B.**, ... & Speybroeck, N. (2017). 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(3), 296.

Awoke, T., Worku, A., Kebede, Y., Kasim, A., **Yimer, B. B.**, Braekers, R., ... & Shkedy, Z. (2016). 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(12), e0168323.

Yimer, B. B., Diriba, T., Sisay, K., Gurmessa, A., Seyoum, D., & Tadesse, M. (2016). 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(605), 2.

Degefa, T., Zeynudin, A., Godesso, A., Michael, Y. H., Eba, K., Zemene, E., ... & Yewhalaw, D. (2015). Malaria incidence and assessment of entomological indices among resettled communities in Ethiopia: a longitudinal study. Malaria journal, 14(1), 1-11.

Teaching

Bias and confounding - Introduction to Epidemiology, Genetic Epidemiology, and Biostatistics course, center for epidemiology, University of Manchester, 2021 & 2022 academic year.

Longitudinal data analysis - Applied Epidemiology and Biostatistics course, center for Epidemiology, University of Manchester, 2022 academic year.

Principles of statistical inference, MSc in Biostatistics program, Jimma University, course led 2014 - 2016 academic years, course material

Survival analysis, MSc in Biostatistics program, Jimma University, Co-lecturer, 2014 academic year

Bayesian Statistics, MSc in Biostatistics program, invited lecture, Gondar University, May 22 - 25, 2017 , course syllables

Infectious disease modelling, MSc in Biostatistics program, invited lecture, Gondar University, May 29 - Jun 02, 2017.

Leadership and service

Centre for Epidemiology Versus Arthritis representative for the UK Research in Musculoskeletal Epidemiology (UK-RiME) partnership, 2019 - present

Seminar organiser for the Biostatistics forum, Centre for Epidemiology Versus Arthritis, 2020 - present

Organising committee for the R-user group, University of Manchester, 2019 - 2022

References available upon request.