Mob (UK): +44 7411 484454 E-mail: clement.twumasi@ndm.ox.ac.uk

G-mail: twumasiclement@gmail.com

ORCID: <u>https://orcid.org/0000-0001-6817-8356</u>

Oxford University website: click here

Medawar Website (Oxford University): click here

Personal website: https://twumasiclement.wixsite.com/website

LinkedIn Profile: click here

Personal YouTube Channel: click here

R programming class on Advanced Data Analysis: click here

DR. CLEMENT TWUMASI, PhD

PERSONAL INFORMATION

• Nationality: Ghanaian

■ Marital status: Single

Language Spoken: English and Asante Twi



Address:

Oxford.

Headington,

PROFESSIONAL SUMMARY:

I am a dedicated and results-driven statistician with a strong and robust foundation in mathematics and statistics, complemented by advanced computational and programming skills. I am committed to continuous professional development and to delivering high-quality, impactful work across academic and applied research environments. My expertise spans a broad range of statistical and mathematical modelling techniques, including:

- Stochastic and deterministic infectious disease modelling
- Agent-based modelling of biological systems (e.g., gyrodactylid-fish system)
- Clinical trials, observational studies & human challenge trials
- Adaptive, Bayesian model-based designs for dose finding and escalation
- Multi-state survival and regression modelling (fixed & mixed effects)
- Dimension-reduction and variable selection methods
- Functional data analysis, mathematical biology, and computational statistics
- Machine learning, proteomics, and genomic data analysis
- Markov models, Bayesian inference, and approximate Bayesian computation
- Econometric & Time series modelling and credit risk analysis
- State-of-the-art univariate and multivariate statistical techniques
- Actuarial Applications: Insurance loss or claim severity modelling

I have a strong passion for providing statistical consultancy and support to diverse research teams and research-intensive industries, always aiming to contribute meaningful insights and solutions that positively impact people's lives.

EDUCATION:

2018 to 2021

Cardiff University

UK

PhD in Mathematics

(Specialisation in Infectious Disease Modelling and other biological systems)

2016 to 2018 University of Ghana, Legon Accra

■ MPhil. Statistics (**GPA:** 4.0 out of 4.0)

2011 to 2015 University of Ghana, Legon

Accra

BSc. Statistics with Mathematics

EMPLOYMENT HISTORY:

Working Experience

Full-time Medical Statistician (current position)

September 2023-present

University of Oxford, Nuffield Department of Medicine, Experimental Medicine.

Detailed Oxford University Profile:

https://www.expmedndm.ox.ac.uk/team/clement-twumasi

Duties: This is an opportunity to support exciting research (funded by the National Institute for Health Research) to advance understanding of vaccination in chronic disease and aging & approaches for the prevention and treatment of persistent viral infections such as HIV/HBV/HCV. Based at the Medawar Building for Pathogen Research, I work with four Principal Investigators: Professors Eleanor Barnes, John Frater, Paul Klenerman (NDM Experimental Medicine Division) and Professor Susanna Dunachie (Tropical Medicine) on projects within the scope of the 'Vaccines in Chronic Disease and Aging' subtheme of the Oxford Biomedical Research Centre theme 'Life-saving Vaccines.

- As a senior medical statistician, I also provide statistical consultancy services to some research groups within the Oxford University Jenner Institute (i.e., Malaria and GonoVac research groups, respectively) over 30% of my time. I also collaborate with the Oxford Vaccine Group on some research projects/clinical trials.
- I provide comprehensive (one-on-one or group training) expert statistical support and consulting services to research students, postdoctoral researchers, and some principal investigators within the Oxford University NDM (and other Oxford Departments), including assistance with grant applications and supervisory roles to some postgraduate and PhD students.

Profile Interview with NIHR Oxford Biomedical Research Centre (BRC):

 $\underline{\text{https://oxfordbrc.nihr.ac.uk/dr-clement-twumasi-underpinning-our-research-withstatistical-expertise/}$

• Full-time Clinical Trials Statistician

November 2022-September 2023

Imperial College London, School of Public Health | Faculty of Medicine.

Duties: It was an exciting opportunity to be involved in the design and analysis of several Cardiovascular and Respiratory trials (such as MET-FINGER, ON-PACE, PROTECT-HF and NUC-B trials). I developed Statistical Analysis Plan (SAP) in accordance with the Imperial Standard Operating Procedures (SOP) for ongoing clinical trials studies as well as performed high-quality statistical analysis of datasets obtained from these trials over time.

PS: This full-time position at Imperial College was accepted after receiving 3 different offers in a row from **Imperial College London**, **University of Leicester**, and **University of Birmingham** after my postdoctoral studies at the University of Oxford Statistics Department. I accepted the Imperial offer because it involved an important

area/clinical trials studies which I wish to develop myself further in accordance with my future career goals.

• Academic Reviewer for top Q1 journals:

International Journal of Forecasting

URL: https://www.journals.elsevier.com/international-journal-of-forecasting

❖ PLOS ONE journal

URL: https://journals.plos.org/plosone/s/journal-information

PLOS Computational Biology journal

URL: https://journals.plos.org/ploscompbiol/

Duties: For the <u>International Journal of Forecasting</u> and <u>PLOS One Journal</u>, I review papers on time-series predictions using state-of-the-art time series models and machine learning techniques (with specific applications to blood supply chain). For <u>PLOS Computational Biology Journal</u>, I review works on modelling biological systems and infectious diseases (or mathematical biology).

Post-doctoral Biostatistics Research Assistant

April 2022-September 2022 Oxford University Department of Statistics

Duties: This post was connected to a BBSRC-funded research project developing a methodology for deep phenotyping based on latent stochastic processes, with applications in human health, genomics, and ageing. The goal was to provide statistical tools that can keep up with the explosive growth in the availability of high-dimensional genomic and longitudinal data from electronic health records, cohort studies, and biobanks to improve risk prediction, the allocation of health resources, and our fundamental understanding of ageing.

See attached Oxford Statistics Bulletin URL link:

https://www.stats.ox.ac.uk/statistics-department-bulletin-friday-1-april-2022/

Biostatistics Research Assistant (Part-time, 0.4 FTE)

February 2022-March 2022 Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Science, Oxford University (UK).

Duties: Performed biostatistics research works involving the mathematical modelling of musculoskeletal disorders (specifically, Metabolic bone diseases). I also assisted with teaching in relation to designing clinical research.

Clement's School on Advanced Data Analysis in R language (Tutor)

October 2019-Date Free online class

Cardiff & Oxford, UK

The main goal was to develop the interest in mathematical programming among students from Africa. However, anyone interested was welcome to join and learn at no cost. This class was an excellent introduction to data analysis with advanced statistical software like R. Close to 400 students already signed up/enrolled for the class for free. The class was managed entirely on Piazza, Zoom & MS Teams, and each lesson was uploaded on my YouTube channel dubbed Clement Twumasi Educative Channel. However, due to my demanding schedule in recent years, I now organize these lessons only occasionally, rather than as frequently as before.

For more information about the class, please visit link below: https://piazza.com/clements school on data analysis/fall2020/ss401/info

Postgraduate Tutor/Teaching assistant

September 2019-August 2021 Cardiff School of Mathematics

Wales, UK

Courses taught

Probability Theory, Statistical inference, and Time Series Analysis (Cardiff School of Mathematics), and Maths Support across all disciplines of Cardiff University.

Graduate Teaching Assistant

September 2017-2018 Department of Statistics and Actuarial Science, University of Ghana - Legon

Duties: I taught graduate courses including Stochastic Processes, Advanced Engineering Mathematics, Parameter estimation and Statistical Inference. In addition, I assisted other lecturers in courses involving statistics within and outside my school.

National Service (Research Assistant and Teaching Assistant)

September 2015- Oct. 2016 School of Public Health/Department of Statistic

University of Ghana Accra-Legon

Duties: Taught Multivariate Methods, Stochastic Processes, Actuarial Statistics and Numeracy Skills at the Department of Statistics as a teaching assistant.

Taught Financial Mathematics at the Department of Mathematics.

Assisted in Projects or academic research works and taught Biostatistics at the School of Public Health as a teaching assistant.

GRE/GMAT/SAT Maths Instructor

June 2015-Mar 2017 Akins Educational Consult

Accra-Kesema

Duties: Taught SAT, GMAT and GRE mathematics

SKILLS:

 Robust background in Mathematics and statistics, Programmer, Outstanding teaching skills, Computer Literate, Good interpersonal skills, Good Communication skills, Team player, Able to work under pressure and an Intrinsic motivator.

INTEREST/ HOBBIES:

Guidance and Counselling to young students and researchers, Mathematical & Computing challenge, Football, Reading & Researching, Teaching, Mathematical Programming, Listening & Dancing to gospel music and helping with community work and supporting other student-led associations.

LEADERSHIP EXPERIENCE, & ACTIVITIES:

National President of Ghanajan students in Wales-UK

2020-2021 National Union of Ghanaian Students Association Wales-UK

Student representative

2019-Present Ghana Union of Wales Wales-UK

Acting General Secretary

2019-2020 National Union of Ghanaian Students Association Wales-UK

President

2014/2015 Asanteman Past Student Association University of Ghana

WORKSHOPS, TRAINING COURSES & CONFERENCES

- Main Speaker for the NIHR Oxford BRC Statistics Hub Lunchtime Seminar:
 "Survival analysis techniques in clinical trials from traditional methods to multi-state Markov modelling approaches".
 - Formal event advertisement link and specific presentation details: <u>click here</u>. Main slides/Lecture material: <u>access from here</u>.
- Leveraging External Information in Clinical Trials (a professional training course taught by Professor James Wason), Newcastle University (from 28th May to 29th May 2024).
- Adaptive Designs and Multiple Testing Procedures (a professional training course taught by Professor James Wason), Newcastle University (from 11th May to 12th May 2023).
- A novel image from one of my research works was selected by Cardiff University Doctoral Academy towards our annual Image of Research Competition (dated December 7-11, 2020) among PhD students across all disciplines of the university. To view my image with detailed description and novelty, click the link below: https://twitter.com/ClementMetal/status/1336375913647394817?s=20
- I was considered as the resource person for a 2-day virtual Academic program organized by National Union of Ghanaian Students in Shanghai-China (NUGS-Shanghai) on statistics & the use of statistical software for academic research (dated November 27-28, 2020). For the links to the 2-day seminar, click below: https://www.youtube.com/watch?v=SRGpeSYyOoA&t=3463s (Day 1) https://www.youtube.com/watch?v=qqVcYfRkB5k&t=2517s (Day 2)
- Cambridge University Plus Magazine interview with me over the prestigious Virtual Heidelberg Laureate conference 2020 (https://www.heidelberg-laureate-forum.org/). I was also selected among a few PhD students worldwide to present a poster at this prestigious event. Video link to my interview with Cambridge University Plus Magazine is attached below: https://plus.maths.org/content/young-researchers-clement-twumasi
- Three-minute thesis competition among PhD students across all schools of Cardiff University: https://www.youtube.com/watch?v=KXt5RjKfO w&t=17s
- Statistics and Computation Conference on Machine Learning sponsored by The Alan Turing Institute and Google: https://www.turing.ac.uk/events/statistics-and-computation
- Stochastic Modelling in Health and Disease Conference at School of Mathematics, Leeds University (UK), 11-13th September 2019. I gave a presentation on one of my PhD works entitled "Comparative modelling of parasite population dynamics of two *Gyrodactylus* species" https://matml.github.io/smhd2019.html.
- Second National UK Mathematical Modelling competition held by Manchester University School of Mathematics and Innovate UK using Machine learning for Rare Disease Prediction (26-28th June 2019).
- A 3-day National UK Artificial Intelligence (AI) modelling Challenge sponsored by Cardiff University and Innovate UK was held on 22nd-24th May 2019 (I used Machine learning algorithms to discover novel findings and knowledge gap on Osteoarthritis prediction during this event)
- Mathematical Models for Infectious Disease Dynamics- [2018] (held at the Wellcome Genome Campus Advance Course, Cambridge- Over 59 hours of training)
- National Taught Course Centre in Operational Research (NATCOR)-UK [2019]: Stochastic Modelling (by Lancaster University- 40 hours of training) and Simulation (by Loughborough University- 40 hours of training)
- Bioinformatics and Statistics Training Course- [2018] (held by Cardiff University School of Biosciences- 40 hours of training)
- Cardiff University Doctoral Workshops
- Postgraduate Research Students Seminar/Talks (Cardiff School of Maths)
- UG-Florida Academic Partnership for TB/HIV Research Training

CURRENT AWARDS:

- Selected among 200 most exceptional mathematicians and computer scientists worldwide of their generation by international experts for the 8th Heidelberg Laureate Forum, Germany 2021: https://www.heidelberg-laureate-forum.org/
- Best/favourite presenter award from a PhD thesis poster presentation in welcoming new first year PhD students in the Cardiff University School of Mathematics on the 1st of October 2019; following an induction and a competition among continuing PhD students within the School of Mathematics.
- Selected as the only student among group of experts during an Innovate UK data analysis competition (in 2019) to serve as an advising data scientist and a statistical consultant for a startup company called AI Rehab Ltd till date: https://airehab.com/the-team
- Vice Chancellor's International Scholarship for Research Excellence Award for Doctor of Philosophy of Mathematics, Cardiff University (UK) 2018/2019
- Full-Time Leeds International Doctoral Scholarship (LIDS) Award for PhD in Mathematics, 2018/19
- Nominated for Outstanding Postgraduate Tutor, Cardiff University 2019
- Graduate Student Research Work of the year in Mathematics among all universities in Ghana: GRASAG Excellence Award 2018
- Best MPhil Statistics Student in the Department of Statistics with a GPA of 4.0 out of 4.0, University of Ghana, 2018
- Scholarship award by National Institute for Mathematical Sciences (NIMS) to purse 2-year master's program in Scientific Computing and Industrial Modelling.
- Diamond (performance) award winner in WASSCE 2011/2012 academic year for Asanteman Secondary School, Kumasi.

PROFESSIONAL SOCIETIES & FELLOWSHIPS:

Fellow of the <u>Royal Statistical Society (RSS)</u>

Membership Number: 231797

PS: I submitted my application for **Chartered Statistician (CStat)** accreditation to the Royal Statistical Society (RSS) on June 10, 2025, as a formal recognition of my professional competence and ongoing commitment to continuing professional development (CPD) throughout my academic career.

- Member of <u>The Oxford Medical Statistics Network (OxStat)</u>.
 Main aim: To facilitate networking, communication and collaboration, and to provide informal support and foster good practice among Oxford University staff and postgraduate students with an interest in medical statistics, working or studying within the Medical Sciences Division.
- Member of the <u>Society for Mathematical Biology</u> (since March 2024).
 Membership Number: 73799161
 Other related SMB research highlight: https://smb.org/news/13344477.
- Associate Fellow of the Higher Education Academy (UK). A professional teaching recognition awarded on 09/08/2024 by UK's Advance HE. Fellowship reference: PR297536
- Member of the <u>Operational Research Society (UK)</u>.

TECHNOLOGY/ STATISTICAL SOFTWARE:

• R, Python, Graphpad Prism, G*Power software for Power Analysis & Sample Size Calculations, STATA, MATLAB, EVIEWS, GRETL, IBM SPSS, Minitab and LaTeX for scientific report writing as well as beamer presentations.

AREA OF EXPERTISE

Clinical Trials, Stochastic and Agent-based Modelling, Regression modelling (fixed and random-effect models), Mathematical/Computational Biology, Computational Statistics, Machine Learning, Proteomics & Genomic Data Analysis, Disease modelling (both deterministic and stochastic class of models), Functional Data Analysis, Machine Learning, Markov Models, Bayesian Networks, Approximate Bayesian Computation, Time series models, Credit Risk Modelling/ Credit Scorecard Building, and general statistical analysis (Univariate and Multivariate analyses).

CURRENT RESEARCH FOCUS/PUBLIC ATIONS:

- Predicting Adverse Perinatal Outcomes in Early Onset Pre-Eclampsia Using Competing Machine Learning Methods: Prospective Cohort Study in a Low-Resource Setting (Publication status: under peer review in a Q1 journal, submitted to BJOG: An International Journal of Obstetrics & Gynaecology).
- Uteroplacental Detachment on Transvaginal Ultrasound Predicts Severe Antepartum
 Hemorrhage and Emergency Cesarean Section in Placenta Previa (Publication
 status: under review in the top-tier American Journal of Obstetrics & Gynecology).
- Likelihood-Free Bayesian Estimation of Non-Life Insurance Claim Severity: A
 Sequential Monte Carlo ABC of the Truncated Composite Lognormal-Pareto Model
 [Publication status: under peer review in a Q1 journal, Insurance: Mathematics and
 Economics (IME); the largest journal in actuarial science research around the world].
- Novel blood protein signature predictive of T cell vaccine responses after two doses of COVID-19 mRNA vaccine in a UK Healthcare worker cohort (with a Conference paper to be submitted to the <u>Oxford Immunology Symposium 2025</u> & <u>International</u> Congress of Immunology 2025).
- Modelling Catastrophic Extinction in Stochastic Birth-Death Process: Analytical Insights, Estimation, and Efficient Simulation (Publication status: under review in the Computational Statistics and Data Analysis Q1 journal).
- Prospective evaluation of sonographic signs to predict surgical management of complex caesarean section in high-risk placenta accreta spectrum cases (Publication status: under review in the top-tier <u>American Journal of Obstetrics & Gynecology</u>).
- Kinetic Pattern Recognition in Home-Based Knee Rehabilitation Using Machine Learning Clustering Methods on the Slider Digital Physiotherapy Device: Prospective Observational Study. <u>Journal of Medical Internet Research</u> (JMIR) Formative Research (Published on 18th March 2025).

URL: https://formative.jmir.org/2025/1/e69150/

 Mathematical modelling of parasite dynamics: stochastic simulation-based approach and parameter estimation via modified sequential-type approximate Bayesian computation. *Bulletin of Mathematical Biology* (Q1 journal, Published- 10th April 2024).

URL: https://link.springer.com/article/10.1007/s11538-024-01281-5

 Determinants of durable humoral and T cell immunity in myeloma patients following COVID-19 vaccination. European Journal of Haematology (Q1 journal; Published-20th December 2023).

URL: https://onlinelibrary.wiley.com/doi/epdf/10.1111/ejh.14143

- In Silico Modelling of Parasite Dynamics (PhD Thesis, Cardiff School of Mathematics, UK)- PhD Thesis completed and successfully defended. Cardiff University ORCA URL: https://orca.cardiff.ac.uk/id/eprint/150632/
- Spatial and Temporal Parasite Dynamics: Microhabitat preferences and infection progression of two co-infecting gyrodactylids. *Parasites & Vectors* (Q1 Springer Nature) Journal (Published- 24th September, 2022).
 URL: https://doi.org/10.1186/s13071-022-05471-9
- Machine Learning Algorithms for Forecasting and Backcasting Blood Demand Data with Missing Values and Outliers: A Study of Tema General Hospital of Ghana. International Journal of Forecasting (Q1 journal; Published- 31st December, 2021).

URL: https://www.sciencedirect.com/science/article/pii/S0169207021001710

- An Experimental Study of Lesions Observed in Bog Body Funerary Performances.
 Experimental Archaeology Journal (Published- 26th August, 2021). URL: https://exarc.net/ark:/88735/10595
- Markov Modelling of HIV, Tuberculosis and Hepatitis B Transmission: A Study of a Regional Hospital in Ghana. *Interdisciplinary Perspectives on Infectious Diseases*. (Published-20th November, 2019).
 URL:https://doi.org/10.1155/2019/9362492
- Statistical Modelling of HIV, Tuberculosis and Hepatitis B Transmission in Ghana.
 Canadian Journal of Infectious Diseases and Medical Microbiology (Published-24th December, 2019).

URL:https://doi.org/10.1155/2019/2697618

 Modelling the Transmission Dynamics of Tuberculosis in the Ashanti Region of Ghana. *Interdisciplinary Perspectives on Infectious Diseases* (Publised-31st March, 2020). URL: https://doi.org/10.1155/2020/4513854

PS: There are several ongoing research projects currently in progress or about to be submitted for peer-review publication.

CURRENT/ ONGOING RESEARCH & GRANT APPLICATIONS:

- NIHR EME/Postdoctoral awards (NIHR508483): Using human challenge to assess efficacy and mechanism of protection of 4CMenB against gonorrhoea.

 Lead University: University of Oxford Role: Co-applicant/Medical Statistician
- MRC Grant Application Number (APP83698): Phase 1 first-in-human study of a gonococcal outer membrane vesicle vaccine to prevent gonorrhoea and reduce antimicrobial resistance.

Lead University: University of Oxford **Role:** Specialist (Medical Statistician)

 MRC Grant Application Number (APP67893): Analytical treatment interruption to boost T-cell-mediated cure/remission in children living with HIV: a mechanistic study.

Lead University: University of Oxford Role: Specialist (Medical Statistician)

MRC Grant Application Number (APP76421): The impact of early CMV acquisition, HIV exposure and early life immune sex differences on immune outcomes in Sub-Saharan African children.

Lead University: University of Oxford **Role:** Specialist (Medical Statistician)

■ Grant Application (Gates Foundation): Development and Validation of clinical model for preeclampsia management (ID: 0000000464). Program: Reducing the Burden of Preeclampsia.

Lead University: University of Oxford Role: Senior Statistician

• MRC Grant Application Number (APP45524): Phase IIa Study: Impact of bnAb VRC07-523LS with ART on HIV Virological Control via Analytical Treatment Interruption in Very Early-Treated Children

Opportunity: OPP557: MRC: Jul 2024: stage one: developmental pathway funding scheme.

Lead University: University of Oxford **Role:** Specialist (Statistician)

• MRC Grant Application Number (APP38125): Vaccines for Anti-Microbial resistance Pathogens (VAMP): defining target antigens and human immunity to Escherichia coli and Klebsiella pneumoniae

Opportunity: OPP482: MRC: Infections and immunity: research grant: May 2024: responsive mode.

Lead University: University of Oxford **Role:** Specialist (Medical Statistician)

• MRC Grant Application Number (APP31993): Utilising the Controlled Human Infection Model to de-risk Neisseria gonorrhoea vaccine development and understand immune responses to gonorrhoea

Opportunity: OPP381: MRC: developmental pathway funding scheme: stage one: Mar 2024.

Lead University: University of Oxford **Role:** Specialist (Medical Statistician)

• **AbVax clinical trial:** Combination Vaccination and Broadly Neutralising Antibody Therapy in HIV to induce a protective T cell 'vaccinal effect' - a randomised phase II clinical trial.

Sponsor: University of Oxford **Role**: Trial Statistician

COVCHIM01 clinical trial: A phase I, experimental dose finding, open label, clinical infection, safety and viral detection optimisation in previously SARS-CoV-2 infected (unvaccinated or vaccinated) or uninfected vaccinated volunteers.
 Sponsor: University of Oxford
 Role: Senior Statistician & Co-author

STATISTICAL RESEARCH CONSULTANCY:

Title: Artificial Intelligence and HCD-informed early warning system design for tracking the community effects of climate change on maternal and newborn health **Goal:** Quantifying the impact of climate change on maternal, neonatal, and child

Role: Statistician/Statistical Consultant (contract basis) **Duration:** July 2024 – July 2026 (spanning 24 months)

Funder: Grand Challenges Africa

REFREES:

Professor Ellie Barnes

Address: Nuffield Department of Medicine, Experimental Medicine Division Peter Medawar Building for Pathogen Research, OX1 3SY, UK.

Teter Medawar Dunding for Latinogen Research, OAT

Email: ellie.barnes@ndm.ox.ac.uk

Professor David Steinsaltz

Address: Department of Statistics, University of Oxford, 24-29 St Giles', Oxford, OX1 3LB, UK.

Email: steinsal@stats.ox.ac.uk/ david.steinsaltz@worc.ox.ac.uk

Professor Joanne Cable

Address: School of Biosciences, Cardiff University, Cardiff, CF10 3AX, UK. **Email:** CableJ@cardiff.ac.uk

Professor Nikolai Leonenko

Address: School of Mathematics, Cardiff University, Cardiff, CF24 4AG,

Email: leonenkon@cardiff.ac.uk

• Dr Emanuela Falaschetti

Address: Imperial College London, School of Public Health, Faculty of

Medicine, Imperial College Clinical Trials Unit, W12 7RH.

Email: e.falaschetti@imperial.ac.uk