

# Dr. Jimrise Ochwach, PhD

✉ ojimrise09@gmail.com, ochwach.jimrise@mnu.ac.ke

☎ +254 726 939 712, +254 732 261 607

🌐 Google Scholar

🌐 LinkedIn

🆔 0000-0002-6354-8706



## Personal Information

**Full Name:** Dr. Jimrise Ochwach, PhD  
**Job Category:** Teaching and Research  
**Current Position:** Lecturer, Applied Mathematics  
**Institution:** Mama Ngina University College  
**Department:** Computing and Information Technology  
**Birth Date:** 08 June 1986  
**Nationality:** Kenyan  
**Marital Status:** Married




## Personal Statement

I am an Applied Mathematician and researcher with expertise in mathematical modeling and analysis. My work spans human and plant disease dynamics, pest control, and fluid mechanics. I also apply data science methods to problems in agribusiness, education, finance, and computing. My goal is to develop practical solutions to socio-economic challenges in Kenya, Africa, and beyond.






## Employment History

- 2024–Present    **Lecturer**, Department of Computing and Information Technology, School of Pure and Applied Sciences, Mama Ngina University College.
- Teach undergraduate courses in differential equations and mathematical modelling.
  - Supervise BSc, MSc, and PhD research in Applied Mathematics.
- 2018–Present    **Adjunct Lecturer**, Department of Physical Sciences, Faculty of Science and Technology, Chuka University.
- Teach undergraduate courses in differential equations and mathematical modelling.
  - Supervise undergraduate and postgraduate research in Applied Mathematics.
- 2023–2024    **Adjunct Lecturer**, Department of Basic Sciences, Faculty of Life Sciences, Engineering and Technology, Tharaka University.
- Delivered undergraduate instruction in applied mathematics.
  - Supervised BSc and MSc research projects.




## Employment History (continued)

- 2012–2024     **Mathematics and Physics Teacher**, Teacher Service Commission (TSC), Ikuu Boys High School – Tharaka Nithi County.
- Held ranks from Secondary Teacher II (C2) to Senior Master IV (C4).
  - Taught Mathematics and Physics to students in Grades 9–12.
  - Managed internal assessments and examination processes.
  - Trained and coached students in co-curricular activities.
- 2010–2012     **Mathematics and Physics Teacher**, Board of Management (BoM), Raila Education Centre – Nairobi County.
- Taught Mathematics and Physics at secondary level.
- 2008     **Volunteer Mathematics and Physics Teacher**, Nyarach Mixed Secondary School.
- Delivered instruction in Mathematics and Physics.

## Education

- 2018–2021     **PhD in Applied Mathematics**, Chuka University *Thesis: Mathematical Modelling of Host-Pest Interactions in the Presence of Pheromone Traps and Sterile Insects Technique: A Case of False Codling Moth (Thaumatotibia leucotreta (Meyrick))*
- 2014–2018     **MSc in Applied Mathematics**, Chuka University *Thesis: Modelling Nitrate Leaching into Groundwater Using the Advection–Dispersion Equation*
- 2006–2010     **BEd in Science (Mathematics and Physics) with IT**, Maseno University
- 2001–2004     **Kenya Certificate of Secondary Education (B+ Grade)**, Uriri High School, Migori County
- 1993–2000     **Kenya Certificate of Primary Education (B Grade)**, Wasamo Primary School, Homa Bay County






## Leadership and Responsibility

- Jul 2025–Present     **Champion, Research Grant Writing**, Mama Ngina University College Identifies, analyzes, and delivers calls for available research grants.
- Jun 2025     **Chair, Ad-Hoc Library Stock Taking Committee**, Mama Ngina University College Led the 2024/2025 stock-taking exercise and submitted a comprehensive report.
- May–Sep 2025     **Ag. Chair of Department**, Environmental and Hospitality, Mama Ngina University College Oversaw departmental operations and academic activities.

## Leadership and Responsibility (continued)


Mar 2025–Present	<ul style="list-style-type: none"><li>■ <b>STI Champion</b>, Mama Ngina University College Monitors and evaluates Science, Technology, and Innovation activities.</li><li>■ <b>Member, Student Disciplinary Appeals Committee</b>, Mama Ngina University College Reviews appeals from the student disciplinary process.</li><li>■ <b>Chair, ODeL Committee</b>, Mama Ngina University College Developed a strategic plan and policy for Open, Distance, and e-Learning integration.</li></ul>
Jan 2025–Present	<ul style="list-style-type: none"><li>■ <b>Co-Chair, Gender Mainstreaming Committee</b>, Mama Ngina University College Formulated and implemented a workplace gender-based violence policy.</li></ul>
Nov 2024–Present	<ul style="list-style-type: none"><li>■ <b>Chair, SAMNUC Constitutional Oversight Committee</b>, Mama Ngina University College Guided the implementation of the student congress constitution.</li></ul>
Sep 2024–Present	<ul style="list-style-type: none"><li>■ <b>Program Leader</b>, Mathematics and Computer Science, Mama Ngina University College Coordinates curriculum design, execution, evaluation, and review.</li><li>■ <b>Member, Academic Quality Assurance Committee</b>, Mama Ngina University College Supports academic quality systems oversight and evaluation.</li><li>■ <b>Member, CBC Implementation Committee</b>, Mama Ngina University College Engages stakeholders in integrating Competency-Based Curriculum.</li><li>■ <b>Member, Quality Management Committee</b>, Mama Ngina University College Contributes to institutional quality policy development.</li></ul>
Nov 2024–Mar 2025	<ul style="list-style-type: none"><li>■ <b>Member, Career Day Committee</b>, Mama Ngina University College Planned and executed the 2025 Career Day.</li></ul>
Oct 2024–May 2025	<ul style="list-style-type: none"><li>■ <b>Member, Accreditation for Charter Committee</b>, Mama Ngina University College Prepared and submitted documentation to the Commission for University Education.</li></ul>
Oct–Nov 2024	<ul style="list-style-type: none"><li>■ <b>Member, Market Survey Committee</b>, Mama Ngina University College Conducted market analysis for infrastructural procurement in FY 2024/2025.</li></ul>
Mar 2018–Aug 2023	<ul style="list-style-type: none"><li>■ <b>Member, Ethics Committee</b>, Chuka University Reviewed Master's research proposals and ensured compliance.</li></ul>
Apr 2017–Aug 2024	<ul style="list-style-type: none"><li>■ <b>Physics Examiner</b>, Kenya National Examination Council Marked Physics Paper 1 for KCSE examinations.</li></ul>
Jan 2015–Aug 2024	<ul style="list-style-type: none"><li>■ <b>Dean of Studies</b>, Ikuu Boys High School Oversaw academic programming, evaluation, and timetable management.</li></ul>

## Leadership and Responsibility (continued)



- Mar 2022–Mar 2024     **Trainer of Trainers**, CBC Implementation, TSC Trained school principals and teachers on CBC delivery strategies.
- Jan 2020–Mar 2022     **Trainer of Trainers**, SEQIP, TSC Trained teachers in ASAL regions under the SBTSS framework.
- Aug 2017, Aug 2022     **Presiding Officer**, IEBC Managed polling stations during the 2017 and 2022 general elections.
- Jul–Sep 2019     **ICT Supervisor**, Kenya National Bureau of Statistics Supervised the 2019 Kenya Population and Housing Census in Tharaka Nithi County.
- Sep 2008–Sep 2009     **Secretary General**, Students Organisation of Maseno University (SOMU) Represented students in Senate and Council; acted as student spokesperson.

## Supervision of Postgraduate Students





### PhD Students (Ongoing)

- 1     **Alex Rwanda** — *Mathematical Model of Unsteady Micropolar MHD Fluid Flow on Nonlinear Stretching Sheet under Inclined Magnetic Field* PhD in Applied Mathematics, Department of Physical Sciences, Chuka University (2022–Present)


### MSc Students Supervised to Completion

1.     **Henri Milimo** — *Mathematical Modelling of SARS-COV-2 in Kenya Incorporating Non-Pharmaceutical Interventions Coupled with Vaccination* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2021–2023)
- 2     **Chege Kimani Samuel** — *Mathematical Modelling of the Control of Alcoholism Incorporating Treatment with Reference to Mount Kenya Counties* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2022–2024)


### MSc Students (Ongoing)

- 1     **Kimanthi Angela Mbaika** — *Modelling the Effect of Stigma in Tuberculosis in the Presence of Counselling* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2021–Present)
- 2     **Amos Kiugo** — *Modelling Locust Plague with Surveillance Treatment on the Breeding Zones* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2022–Present)
- 3     **Julius Njiru Nyagah** — *Modelling the Dispersion of Air Pollutants in the Atmospheric Boundary Layer Using a Two-Dimensional Advection–Dispersion Equation* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2022–Present)
- 4     **Ngari W. Maureen** — *Modelling the Impact of Unemployment and ARV Treatment Literacy on HIV/AIDS Transmission Among Women in Kenya* MSc in Applied Mathematics, Department of Physical Sciences, Chuka University (2021–Present)

## Supervision of Postgraduate Students (continued)







- 5  **Nicholus Waithaga** — *Mathematical Modelling of Healthy Cell–Tumor Cell Interactions with Radiotherapy Integration* MSc in Applied Mathematics, Department of Basic Sciences, Tharaka University (2024–Present)

## Research Interests

-  Mathematical Modelling, Dynamical Systems in Epidemiology, Fluid Dynamics, Data Science, and Machine Learning

## Research Publications


### Refereed Journal Articles

- 1 N. Danson, **J. Ochwach**, K. Jacob, and M. Okongo, “Hydromagnetic casson nanofluid flow past a wedge in a porous medium in the presence of induced magnetic field,” *American Journal of Applied Mathematics*, vol. 13, no. 1, pp. 30–56, 2025.  DOI: 10.11648/j.ajam.20251301.13.
- 2 **J. Ochwach**, O. B., and O. M. O., “A mathematical model for effective fungicide use in rice blast re-infection,” *Journal of Mathematical Analysis and Modeling*, vol. 6, no. 1, pp. 117–143, 2025.
- 3 H. M. Wanjala, M. O. Okongo, and **J. O. Ochwach**, “Mathematical modelling with optimal control of infectious diseases with vaccination,” *Computational Methods for Differential Equations*, 2025.  DOI: 10.22034/cmde.2024.62350.2743.
- 4 H. M. Wanjala, M. O. Okongo, and **J. O. Ochwach**, “Mathematical model of an infectious respiratory disease with a double-dose vaccine, isolation and use of face-mask,” *International Journal of Mathematical Sciences and Computing*, vol. 11, no. 2, pp. 10–27, 2025.  DOI: 10.5815/ijmsc.2025.02.02.
- 5 S. Chege, M. O. Okongo, and **J. O. Ochwach**, “Mathematical model of alcoholism incorporating treatment: A case study in kenya,” *Journal of Mathematics Instruction, Social Research and Opinion*, vol. 4, no. 1, pp. 73–90, 2024.  DOI: 10.58421/misro.v4i1.316.
- 6 J. Jason, M. Okongo, J. Kirimi, and **J. Ochwach**, “Modelling fluid flow in zone 2 of an open horseshoe channel with lateral inflow channels,” *Journal of Advances in Mathematics and Computer Science*, vol. 39, no. 8, pp. 33–42, 2024.  DOI: 10.9734/james/2024/v39i81919.
- 7 J. Jason, M. Okongo, J. Kirimi, and **J. Ochwach**, “Modelling fluid flow of an open horseshoe channel with lateral inflow channels,” *Journal of Advances in Mathematics and Computer Science*, vol. 39, no. 7, pp. 34–44, 2024.  DOI: 10.9734/james/2024/v39i71910.
- 8 D. Nyaga, J. Kirimi, **J. Ochwach**, and M. Okongo, “Modeling the impact of flow parameters on fluid velocity and temperature in an electrically conducting fluid past a wedge,” *International Journal of Multidisciplinary Sciences and Engineering*, vol. 15, no. 4, 2024.
- 9 B. O. Obita, M. O. Okongo, **J. O. Ochwach**, and A. M. Lunani, “Mathematical modelling for rice blast re-infection,” *American Journal of Applied Mathematics*, vol. 12, no. 2, pp. 37–49, 2024.  DOI: 10.11648/j.ajam.20241202.12.
- 10 H. Wanjala, M. Okongo, and J. Ochwach, “Bifurcation analysis of an infectious respiratory disease with lockdown and social distancing,” *ARRUS Journal of Mathematics and Applied Science*, vol. 4, no. 2, pp. 118–134, 2024.
- 11 H. M. Wanjala, M. O. Okongo, and **J. O. Ochwach**, “Mathematical model of the impact of home-based care on contagious respiratory illness under optimal conditions,” *Jambura Journal of Biomath*, vol. 5, no. 2, pp. 83–94, 2024.  DOI: 10.37905/jjbm.v5i2.27611.

- 12 **J. Ochwach**, M. Okongo, and M. Muraya, "Stability analysis of a sterile insect technique model for controlling false codling moth," *Journal of Mathematical Analysis and Modeling*, vol. 4, no. 1, pp. 78–105, 2023.
- 13 **J. O. Ochwach**, M. O. Okongo, and A. L. M. Murwayi, "On basic reproduction number  $R_0$ : Derivation and application," *Journal of Engineering and Applied Sciences Technology*, 2023, SRC/JEAST-234.  DOI: 10.47363/JEAST/2023(5)173.
- 14 M. O. Okongo, M. A. Lunani, B. K. Menge, and **J. O. Ochwach**, "The impact of hiv/aids treatment and counseling on the prevalence of tuberculosis and malaria co-infections," *International Journal of Mathematical Analysis*, vol. 17, no. 2, pp. 51–67, 2023.  DOI: 10.12988/ijma.2023.511270.
- 15 H. M. Wanjala, M. O. Okongo, and **J. O. Ochwach**, "Impact of media awareness and use of face-masks on infectious respiratory disease," *Pan-American Journal of Mathematics*, vol. 2, p. 15, 2023.
- 16 C. Ngari, C. G. Ngari, M. Okongo, and J. Ochwach, "Mathematical modelling of cholera incorporating the dynamics of the induced achlorhydria condition and treatment," *Journal of Progressive Research in Mathematics*, vol. 19, no. 2, pp. 60–88, 2022.  URL: <http://scitecresearch.com/journals/index.php/jprm/article/view/2168>.
- 17 **J. Ochwach**, M. Okongo, and O. Ochieng, "Mathematical modelling and simulation of nitrate leaching into groundwater," *International Journal of Systems Science and Applied Mathematics*, vol. 7, no. 4, pp. 74–84, 2022.  DOI: 10.11648/j.ijssam.20220704.12.
- 18 J. Ochwach, M. O. Okongo, and M. M. Muraya, "Mathematical model for false coding moth control using pheromone traps," *International Journal of Applied Mathematical Research*, vol. 10, no. 2, pp. 32–52, 2021.
- 19 **J. O. Ochwach**, M. O. Okongo, and M. M. Muraya, "Mathematical modelling of host - pest interactions in stage-structured populations: A case of false codling moth [thaumatotibia leucotreta]," *Journal of Progressive Research in Mathematics*, vol. 18, no. 4, pp. 1–21, 2021.  URL: <http://scitecresearch.com/journals/index.php/jprm/article/view/2087>.
- 20 O. J. Ochwach, S. W. Musundi, and M. O. Okongo, "Stability analysis of the modified advection-dispersion model for the leaching of nitrates into groundwater," *Journal of Progressive Research in Mathematics*, vol. 14, no. 2, 2018.
- 21 O. J. Ochwach, M. O. Okongo, and S. W. Musundi, "Modelling the impact of soil porosity on nitrate leaching to groundwater using the advection dispersion equation," *IOSR Journal of Mathematics*, vol. 14, no. 4, pp. 18–26, 2018, Version II (July–August 2018).  URL: <http://www.iosrjournals.org>.

## Conference Presentations

### Conference Proceedings



- 1 H. M. Wanjala, M. O. Okongo, and **J. Ochwach**, "Mathematical modeling on the impact of lockdown and social distancing on an infectious respiratory disease," in *15th KEMRI Annual Scientific and Health Conference*, 2025.
- 2 S. C. Kimani, **J. O. Ochwach**, and M. O. Okongo, "Mathematical model of alcoholism incorporating treatment: A case study in kenya," in *11th Chuka University Annual International Conference*, Oct. 2024.
- 3 H. M. Wanjala, M. O. Okongo, and **J. Ochwach**, "Mathematical model of covid-19 with a double-dose vaccine," in *14th KEMRI Annual Scientific & Health Conference*, Safari Park Hotel and Casino, Feb. 2023.  URL: <https://www.kemri.go.ke/wp-content/uploads/2024/02/14-KASH-ABSTRACT-BOOK-1.pdf>.
- 4 H. M. Wanjala, M. O. Okongo, and **J. Ochwach**, "The impact of home-based care on infectious respiratory disease: A case of covid-19," in *14th KEMRI Annual Scientific & Health Conference*, Safari








Park Hotel and Casino, Feb. 2023.  URL: <https://www.kemri.go.ke/wp-content/uploads/2024/02/14-KASH-ABSTRACT-BOOK-1.pdf>.

- 5 H. M. Wanjala, M. O. Okongo, and **J. O. Ochwach**, "Covid-19 transmission dynamics model with double-dose vaccination and use of face masks: A case study in kenya," in *10th Chuka University Annual International Conference*, Oct. 2023.
- 6 **J. Ochwach**, "Mathematical modelling of the sterile insect technique for control of false codling moth," in *8th Chuka University Annual International Conference*, Oct. 2021.
- 7 **J. Ochwach**, "A note on the basic reproduction number: Novel coronavirus (2019-ncov)," Jul. 2020.
- 8 **J. Ochwach**, "Effect of harvesting and stocking under delayed time regulation on the logistic population model," Oct. 2019.
- 9 **J. Ochwach**, "Modelling nitrate leaching to groundwater using a modified diffusion advection equation," in *5th Chuka University Annual International Research Conference*, Oct. 2018.


## Research Grants

- 1  **Title:** Modelling the Nutritional Value of Underutilized Traditional Vegetables in Ngenda Location, Kiambu County **Type:** Internally awarded research grant **Funding Body:** Mama Ngina University College **Grant Amount:** KES 400,000 **Period:** 2024–2025 **Role:** Principal Investigator
- 2  **Title:** Advanced Optimization Techniques for Efficient University Operations — A Mixed Integer Linear Programming (MILP) Approach **Type:** Internally awarded research grant **Funding Body:** Mama Ngina University College, implemented by the School of Pure and Applied Sciences **Grant Amount:** KES 400,000 **Period:** 2024–2025 **Role:** Co-Principal Investigator

## Professional Qualifications and Certifications

- 2022  **The Data Scientist with R**, Johns Hopkins University, Coursera **Certificate:** <https://www.coursera.org/account/accomplishments/certificate/WVNV93YREV8F>
-  **Data Science Bootcamp with Python**, Udemy **Certificate:** <https://ude.my/UC-2a9059e4-f7e1-4c1e-8d1e-77646ec9bac1>
- 2013  **Certified Public Accountants Part I and II (CPA I & II)**, KASNEB
- 2011  **IT Essentials: PC Hardware and Software**, CISCO
- 2006  **Micro-Computer Software Applications**, Goread Library and ICT Services

## Postgraduate Thesis Examination

- 1  **Grace Makena Njoka**, *Modelling of Predictors of Diabetic Kidney Disease Among Diabetic Patients*, Msc. Applied Statistics Thesis, Chuka University: September, 2024.

## Membership in Professional Bodies and Societies

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- Kenya National Statistical Society (KNSS), Membership number:1589621
- Mathematics Association of Kenya (MAK).
- The Applied Malaria Modeling Network (AMMnet)

## Community Leadership and Outreach

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- 2024–Present
  - Chair, Jaseco Welfare Group
  - Member, Mama Ngina University College Staff Welfare Association
- 2022–Present
  - Secretary, Development Committee, Full Gospel Church – Karandini
- 2021–Present
  - Member, Great Lakes Welfare Group, Chuka University
- 2015–2024
  - Investment Chair, New Ikuu Teachers Welfare Association (NITWA)
- 2012–2024
  - Member, New Ikuu Teachers Welfare Association (NITWA)
  - Member, Kenya Union of Post Primary Education Teachers (KUPPET)
- 2014–2023
  - Member, Ikuu Boys Educational Outreach Program
- Feb–Apr 2008
  - Volunteer Teacher, Physics and Mathematics, Nyarach Secondary School
- 8 Jun 2008
  - Community Clean-Up, Nyanza Provincial Hospital, organized by Kenya Red Cross – Maseno Chapter
- 28 Feb 2007
  - Community Clean-Up, Maseno University, organized by SOMU
- 24 Feb 2007
  - Community Clean-Up, Lwanda, organized by Kenya Red Cross – Maseno Chapter

## Electoral Engagement

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- 2022
  - Deputy Presiding Officer, General Elections, Kenya
- 2017
  - Presiding Officer, General Elections, Kenya
- 2013
  - Deputy Presiding Officer, General Elections, Kenya
- 2007
  - Polling Clerk, General Elections, Kenya



## Workshops and Training








- 2024  Workshop on malaria modelling using R software, 29–30 August, focused on data-driven strategies to combat malaria in Kenya.
- 2020  SBTSS Training Workshop – Education Technologist, Kitui TTC, 29 January–1 February.
- 2019 
- Curriculum design workshop for Senior School (Grades 10–12), Physics and Physical Sciences, KICD Nairobi, 16–20 December.
  - ICT Supervisor Training for 2019 Population and Housing Census using CAPI, Kenya School of Government, Embu, 24 July–1 August.
- 2017  KNEC Examiner Training for Physics Paper 1, State House Girls, Nairobi, 24–29 April.
- 2016  Rugby Coaching Workshop, Sub-County Secondary Sports Training, Ikuu Boys, 27 February.
- 2015  Physics and Mathematics Workshop, Magumoni Girls, 2 June.
- 2014  SMASE In-Service Training, Chuka Girls High School, 25–29 August.
- 2009 
- Gender Mainstreaming Workshop, Maseno University, 31 July–1 August.
  - Life Skills Training, Maseno University, 13–15 March.
  - Peace Leader Training, Maseno University, 13 March.
- 2007 
- Disaster Management Training, Kenya Red Cross, Maseno University, 24 March–1 April.
  - HIV/AIDS Peer Educator Training, I Choose Life Africa, Maseno University, 14 November.
  - Community-Based First Aid Training, Kenya Red Cross, Maseno University, April.

## Skills

- Languages  Fluent in English, Kiswahili, and Luo; working knowledge of Abasuba and Kimeru.
- Programming  Python, R, SQL, Matlab, Mathematica,  $\text{\LaTeX}$
- Databases  MySQL, PostgreSQL,
- Web Development  HTML, CSS
- Academic Tools   $\text{\LaTeX}$  typesetting, academic publishing, technical writing, teaching and research supervision



## Awards and Recognitions

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- 2023  Recognized for service as Rugby Coach, Eastern Region Games (Term II), Machakos Boys High School — Team placed 4th.
- 2022  Appreciation for coaching Rugby Team, Eastern Region Games (Term I), Kangaru Boys High School — Team placed 3rd.
- 2019  Commended for Rugby Coaching, Tharaka Nithi County Games (Term I), Chuka Boys High School — Team placed 1st.
- 2018  Successfully coached Rugby 15s and 7s teams to:
- 5th and 4th positions at Eastern Region Games (Kangaru and Kitui Schools)
  - 2nd and 1st positions at County Level
  - 1st position in both at Sub-County Level (Chogoria Girls)
- 2017  Coordinator, Energy Transport, Meru South District Science & Engineering Fair, 17–18 March.
- 2016 
- Participated in Kenya National Music Festival, Nairobi, 17 August.
  - Junior Rugby Coach, HIGHRESSSA Term I Championship — Team placed 3rd.
- 2015  Organized and launched the 1st Ikuu Boys Mathematics Contest.
- 2013 
- Awarded merit certificate — Physics mean score 9.052, top in Meru South Sub-County (KCSE 2013).
  - Served as Chief Technical Advisor, 51st Kenya Science & Engineering Fair, Kisii High School.
  - Named Best Physics Teacher, Tharaka Nithi County.
- 2009  Team Manager, Maseno University Delegation to East Africa Inter-University Games, Uganda, 3–8 February.

## Personal Interests

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-  Travelling.
-  Reading novels, spiritual and motivational books.

## References

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Available on Request