



Dr. Josephine W. Kagunda

CV

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Personal Data

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Research Interest

- Mathematical modeling and analysis of emerging infectious disease pathogens
- Modeling of Vector-borne diseases, insecticides resistance and drug resistance in human
- Modeling behaviour change and its effects in communicable and non communicable diseases

Work Experience

Jan -April 2016 Visiting Assistant professor, California State University, Northridge.
Advisor: Prof. Jing Li, Prof. Carol Shubin, and Prof. Ramin Vakilian
2009 to date Lecturer, Applied Mathematics, University of Nairobi, Kenya
2002 to 2009 Lecturer, Kenya Polytechnic (Technical University of Kenya)
1994 to 2001 High school mathematics teacher.

Education

2012 Ph.D in Applied Mathematics, Joint thesis between University of Lorraine, Metz, France and University of Nairobi.
Thesis: *Mathematical analysis and dynamical systems modeling of Highland malaria in Western Kenya.*
Advisor: Prof. Sallet Gauthier and Prof. Wandera Ogana.

2007 M.Sc. In Applied Mathematics, University of Nairobi, Kenya.
Thesis Title- *Stability and persistence of synchronized manifold in diffusively coupled lattice oscillators with time lag.*
Advisor: Prof. Adu Wasike

1995 Diploma in Information Technology, Strathmore College, Kenya.

1994 B. Ed. Science (Double Maths), Egerton University, Kenya.

Administrative Responsibilities

Committee member of

- Disability and Gender Mainstreaming; Staff training and sensitization on disability and gender matters.
- Staff Welfare Committee; Works for the benefit and welfare of the general staff and provides a channel for the staff members to interact with each other.
- International Collaboration and Links Committee; Serves to foster awareness, facilitate educational opportunities and actively seek collaborative projects for the school.
- Research and Consultancy Committee; Ensures the implementation of the policy for research and consultancy
- PhD. Internal Examiner for Wanjohi Njori, December 2017.

Scholarship, Research Funding and Grants

- 2018 5th to 9th March: Self sponsored and attended the Sociaepidemiology workshop in Ohio, USA hosted by Mathematical Biosciences Institute at the Ohio State University.
- 14th to 16th March 2018, visited the University of Lorraine, France for a Ph.D co-supervision and collaborative project we are working on titled “Reliability Models of Failure propagation in a production system”.
- 2017 **November 30th to December 3rd 2017** : The Commission for Women on Mathematics (CWM/IMU) granted me sponsorship to represent Kenya in the Regional workshop in Africa for the project “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It, How to Reduce It?”. The meeting took place at AIMS Institute in Cape Town South Africa
- 24th June to 1st July 2017**: The BIOMATH 2017 gave me grant covering air travel, accommodation and subsistence for the BIOMATH conference held in Kruger Park, South Africa between 25th June to 30th June 2017, where I presented a research article.
- 2016 The African Institute for Mathematical Sciences South Africa / International Mathematical Union (IMU) has given me grant to attend this year’s workshop on “Global change impact on diseases and alien species” on 2nd to 6th May 2016 in Cape Town, SA.
- 2015 California State University Postdoc, Travel Grant by IMU-Simon’s Travel Fellowship of 4990 USD.
- 2015 I organized and run a Summer school July 2015 in Kenya 2015 titled, *Mathematical modeling and analysis of complex systems*. I applied and got grants amounting to 42,000 USD.
- 2015 I organized and run the African Women in Mathematics 2015 workshop (AWMA) in Kenya in July 2015 and we applied and got grants amounting to 30,000 USD.
- 2014 In August, I got a grant from ICWM to attend ICM 2014 conference in Seoul, South Korea.
- 2009 French Embassy in Nairobi scholarship. This PhD grant covered my air ticket, health insurance, Accommodation and stipend in France for a semester each year for four years until I defended my Thesis in 2012.
- 2013 In July I got a grant from CIMPA to Cape Town to attend a summer school on “Mathematics for Planet earth ”at AIMS, Cape Town, South Africa.
- 2013 I got a grant from SACEMA to attend on Clinic on “Meaningful Modeling of Epidemiological Data” at AIMS, Cape Town, South Africa.
- 2012 Grant from AWMA to attend the African Women in Mathematical Sciences workshop in Burkina Faso.
- 2011 UMMISCO / IRD sponsored my travel and upkeep in Cameroon to attend a Mathematical Epidemiology school in University of Yaoundé I.
- 2009 AMMSI sponsored my travel and accommodation in Maputo in Mozambique to attend the first ever African Women in mathematical Sciences, AWMA.
- 2006 I got a research grant of USD 1600, to cater for my masters research project from the Kenya Polytechnic Staff Development Fund (Currently Technical University of Kenya).
- 2005 I applied and got a scholarship from Gadhi Smarak Nidhi Fund that paid two years masters tuition Fees amounting to USD 3000.

M.Sc. Students Supervision

1. Marilyn Noah (University of Nairobi)- Project titled “A mathematical model of rift valley fever in livestock in Kenya” - 2014.

2. Silas Kyeny (University of Nairobi) - Project titled “ *Using a mathematical model to illustrate the spread of malaria*“ - 2014.
3. Petro Theonest (University of Dar es Salaam) - Project titled “ *Modeling the combined effect of rainfall and temperature on the dynamics of malaria.*“ - 2014
4. Jonnes Lugoye (University of Dar es Salaam)- project titled “*Mathematical Model Exploring the Impact of Spread of Rift Valley Fever Virus (RVFV) on Human Health*“ - 2015
5. Fred Ongowe (University of Nairobi)- project titled “ *Determination of the Risk of malaria using different models for mosquito biting and mortality Rates*- 2015
6. Laura Amwata (University of Nairobi)- project titled “*Modeling HIV-Malaria Co-Infection in Kenya* - 2015
7. Jacinta Waweru (CUEA)- Project title “*Mathematical Model of Schistosomiasis in Kenya*“ - 2015

Ph.D. Supervision

1. Marylin Rono - *The Role of Comprehensive Knowledge in HIV/AIDS Disease Transmission among the Adolescents and Young Adults in Kenya: A Deterministic Model* (Under OWSD fellowship scholarship)

External Examination and Consultancy

University of Dar es Salaam (Masters Deserations) ;

1. Simeon Mayala - *Mathematical modeling of HIV Viral Dynamics with ART treatment.*
2. Elimercy E. Ntangelida - *Mathematical modeling of the effects of Vaccination and Treatment on the transmission dynamics of Typhoid.*
3. Baraka Moses Kabigi - *Modelling the dynamics of cholera through controlling latrine waste in unofficial drainage system in tanzania.*
4. Mapunda Alanus - *Mathematical modelling of the optimal control of prey-predator system with harvesting in the presence of drought.*

Strathmore University;

1. Purity Ngina - *Mathematical modelling of HIV in-vivo dynamics and optimal control* (PhD Proposal Defense)
2. Titus Orwa - *Mathematical Models for Hepatocytic - Erythrocytic Dynamics and Therapeutic Control of Malaria* (PhD Proposal Defense)

Publications (Wairimu J.)

10. Ongowe F., Hennequin S., A. Nyoungue A., **Wairimu J.** and Ogana W. : *Adaptation of an Epidemiological Model to Study Failure Propagation in a Production Resource* (Submitted on 18th January 2018).
9. Ongowe F., Hennequin S., **Wairimu J.**, and Nyoungue A., : *Biomathematics Modelling for the study of Failures Propagation: Application to a Production Resource* Preprints of the 20th World Congress The International Federation of Automatic Control Toulouse, France, July 9-14, 2017
8. **Wairimu J.**, Farai C., , Rono M, Malonza D. *The dynamics mosquito adaptation and insecticides resistance in Anopheles mosquitoes.* (Submitted 24th February 2017, Ref: BIO_2017_29, BioSystems)
7. **Wairimu J.**, Rono M., *Modeling insecticide resistance and mosquito adaptation in Endemic regions of Kenya.* AM. Vol.7 No.6, pp542-555 March 2016.
6. Mligo G., **Wairimu J.**, Marijani T., Rono M. *Modeling the effects of Temperature variation on schistosomiasis transmission dynamics: Submitted and accepted abstract in March 2016* (Submitted)

5. Ronoh M., Rym J., Kamdoum V., Matendechere N., Fotso P., **Wairimu J.**, Auma R., Lugoye J. A *mathematical model of tuberculosis with drug resistance effects*. Applied Mathematics, 2014, 5, 1535-1545
4. Lugoye J., **Wairimu J.**, Alphonse C.B., Ronoh M. *Modeling Rift Valley Fever with treatment and trapping control strategies*. Applied Math. Journal. Vol.7 No.6, PP. 556-568. March 2016
3. **Wairimu J.**, Gauthier S., Ogana W., *Mathematical Analysis of a large scale Vector SIS malaria model in a patchy environment*. Applied Mathematics Journal Vol.5 No.13, 1913-1926 July 2014
2. **Wairimu J.**, Gauthier S., Ogana W., *Formulation of a vector SIS malaria model in a patchy environment with two age classes*. Applied Mathematics Journal Vol.5 No.10, 1535-1545. June 2014 , DOI: 10.4236/am.2014.510147
1. **Wairimu J.**, Ogana W., *The dynamics of vector-host feeding rate with saturation; A case of malaria in Western Kenya*. Applied Mathematics. Journal. Vol.4 No.10, 1381-1391, 2013.

Conference Presentations

- 2009 AWMA conference in Maputo, Mozambique: *Stability and persistence of synchronized manifold in diffusively coupled lattice oscillators with time lag.*
- 2010 UMMISCO, Yaoundé, Cameroon : *A model for the transmission of HBV among high risk patients.*
- 2011 Mathematical modeling School in Naromoru, Kenya : *Formulation of a Vector SIS malaria model in a patchy environment with two age classes.*
- 2013 Meaningful Modeling of Epidemiological Data. MMED, Cape Town, SA: *A Network model of HIV spread among Fishing communities in Kisumu, Kenya.*
- 2013 Mathematics for Planet earth Conference in Capetown, SA: *Analysis of a Vector SIS malaria model in a patchy environment with two age classes.*
- 2014 ICM 2014, Seoul, Korea: *A large scale metapopulation model for Malaria with age structure ; A case of malaria in the Western Kenyan Highlands.*
- 2015 CIMPA School Kenya in Panorama Park, Naivasha, Kenya. *Formulation and analysis of metapopulation models.*
- 2016 SASA conference in Kenyatta University, Nairobi, Kenya in August 2016, *Advancing Africa's Sustainable Development Through Science, Technology and Innovation.*
- 2017 BIOMATH Conference in Kruger Park South Africa (June 25th - 1st July 2017), paper presented; *Modeling the effects of Temperature variation on Schistosomiasis transmission dynamics.*
- The 4 Strathmore International Mathematics Conference (SIMC 2017). Paper presented; *Modeling the effects of Temperature variation on Schistosomiasis transmission dynamics*
- Kenyatta University Hands on workshop: Model building, analysis and simulation, 12th – 16th June, 2017. Role played, Facilitator.

Professional Membership

- Founder / President of Kenya Women in Mathematical Sciences Association (KWIMSA)
- Member of Association of Women in Mathematics, AWM
- Member of African Women in Mathematical Association (AWMA)
- Member of International Mathematics Union Committee for Women in Mathematics (IMU-CWM)

Social Welfare Commitment

- Association of French Alumni in Kenya (AFRAKEN), Secretary
- PEFA Syokimau Community Church Management Board, member

- PEFA Syokimau Community Children Development Center (CBO), Chairperson
- PEFA Syokimau Children's ministry, Patron of the Sunday School program

Mentorship

- I work with students in high schools to form mathematics clubs. In these clubs, we develop simple models of diseases common in the community and I help the students explore the different interventions strategies and expected results. This helps them apply the classroom mathematics to real life situations.
- As an African Woman, from a poor background, with the struggles I went through as a student, I have realised how important it is for young women to be encouraged to go into mathematics by female mathematicians. In Kenya, female scientists are rare, underrepresented in higher education and academia. Being a woman, being a mathematician in our developing country, I have to work harder to achieve half of what my male counterparts achieve. To help the young girls and women, and solve the gender imbalance in mathematics and sciences, I begun the Kenya Women in Mathematical Sciences Association (KWIMSA) in 2014, with the sole aim of identifying young women in science and walk with them through mentorship and role modeling. I offer the experience that I have as a researcher, mathematician, lecturer and a family career person to help the younger women in mathematics. I help them stabilize in their careers, I give me emotional support in difficult times, balance family and career responsibilities, and help them form good networks for further studies and international visits. Above all, I supervise those who are working in projects in my area of expertise.

Referees :

1. Prof. Ogana Wandera, Professor, School of Mathematics,
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