

Fulgensia KAMUGISHA MBABAZI

+256703279199
 +256772657439
 Nationality: Ugandan
 Gender: Female
 Email address: fmbabazi1.sci@busitema.ac.ug
 Email address: fmbabazi2023@gmail.com

Website: https://busitema.ac.ug

Address: Faculty of Science and Education, Busitema University,

P. O. Box 236, Nagongera Campus, Tororo (Uganda)

Present position: Senior Lecturer of Mathematics/Deputy Dean Faculty of Science and Education H-index: 04

ABOUT ME

I am a Female, Ugandan. I hold a Doctor of Philosophy (Mathematics) from Pan African University for Basic Sciences, Technology and innovation (PAUSTI), Nairobi, Kenya, an Msc (Mathematics), Makerere University Kampala, Bsc.Ed, from Mbarara University of Science and Technology (MUST) and a Cerf. In Project planning and Management (MAK). I am currently the Deputy Dean of the Faculty of Science and Education. My expertise is in mathematical modelling and simulation. I have a teaching experience of over 20 years at different institutions of learning including secondary schools and Universities. They Include; Busitema University (14 years), Uganda Martyrs University, Bugema University and MaryHill High School. I have supervised up to 4 students of Master of Science in Industrial Mathematics during their research projects to completion. I have actively conducted teaching, research, engaged in community outreach and leadership. I am self- driven, good listener, communicator and team-work oriented.

EDUCATION

Doctor of Philosophy in Mathematics (Computational Option),

Pan African University Institute for Basic Sciences, Technology and innovation, [14 Mar 2016 – 28 Nov 2019]

Address: P.O. Box 62000-00200, +254 Nairobi (Kenya) https://jkuat.ac.ke

Field(s) of study: Natural sciences, mathematics and statistics

Thesis: Mathematical Models for Influenza A virus and Pneumococcus: Within-host and Between-host Infection

Academic Advisors: Prof Luboobi S Livingstone, Prof. J.Y.T. Mugisha and Dr. M. Kimathi

Abstract:

Infectious diseases have become problematic throughout the world, threatening individuals who come into contact with pathogens responsible for transmitting the diseases. Pneumococcal pneumonia, a secondary bacterial infection, follows an influenza A infection, responsible for morbidity and mortality in children, elderly and immune-compromised groups. This thesis gives new insights to the understanding of infectious diseases of viral-bacterial origin. Deterministic ODE's and DDE's are used with an aim of identifying parameters that influence the disease incidence and the most virulent pathogen. Lyapunov functions are constructed using the graph-theoretic method and it is shown that the unique endemic steady state is globally asymptotically stable. Numerical simulations are carried out, the results show that there exists a biologically important steady state where the two pathogens of unequal strength co-exist and replace each other in the epithelial cell population when the pathogen fitness for each infection exceeds unity. The stability theory of delay differential equations is used to study the dynamics of pneumococcal pneumonia with time delay. The stability of equilibria shows that the endemic equilibrium is locally stable without delays and stable if the delays are under conditions. The results suggest that as the respective delays exceed some critical value past the endemic equilibrium, the system loses stability and yields Hopf bifurcation. Finally, the stability analysis of pneumococcal pneumonia with antibiotic resistance awareness and saturated treatment is proposed. The global stability of the steady states are proved by the use of combined linear and quadratic Lyapunov functions, Goh-Voltera Lyapunov function and Lyapunov-LaSalle principle. The presence of awareness drastically reduces the basic reproduction number R0 to less than unity, which is an implication of disease eradication. However, if the treatment and awareness are reduced the reproduction number is greater than unity, and the disease persists in the population.

Master of Science in Mathematics

Makerere University, Kampala [2003 – 2006] Address: +256 Kampala (Uganda) <u>https://mak.ac.ug</u>
Field(s) of study: Natural sciences, mathematics and statistics
Thesis: Mathematical Model for the transmission dynamics of Human African Trypanosomiasis with open vector

Bachelors of Science in Education (Mathematics Major)
Mbarara University of Science and Technology [1996 – 1999]
Address: P.O. Box 1410, Kabale road, Mbarara (Uganda)
https://must.ac.ug
Uganda Advanced Certificate of Education
Masheruka Secondary School [1994 – 1996]
Address: Bushenyi (Uganda)

Uganda Certificate of Education Nyakayojo Secondary School [1990 – 1993] Address: Mbarara (Uganda) Primary Leaving Education St. Helen's Primary School [1982 – 1989]

Address: Mbarara (Uganda)

TRAINING

A: Leadership Training (MUBS)

Skills Acquired:

- i) Communication and listening skills
- ii) Accountability skills
- iii) Royalty skills
- iv) Respect for positive criticism and tolerance to negative criticism
- v) Emotional, social and behavioural intelligence skills

- vi) Resilience
- vii) Cooperation

B: Forum for African Women Vice Chancellors (FAWoVC) Mentee [2021-2022]

Skills Acquired:

- (i) Leadership skills
- (ii) Organizational and planning skills

C: Post Graduate Certificate Training in Project Planning and Management, College of Business and Management Sciences, School of Business, Makerere University, Kampala Uganda [2nd-13th June, 2014]

Skills Acquired:

- i) Management skills
- ii) Design, Organisation, Development and Integration skills
- iii) Planning and Scheduling skills
- iv) Controlling and Analysing Project performance
- v) Implementation, Monitoring and evaluation skills
- vi) Proposal writing skills
- vii) Project Appraisal, Analysis and Selection"

WORK EXPERIENCE

Senior Lecturer/ Deputy Dean Faculty of Science and Education Busitema University

[Nov 2020 – Current]

City: Tororo

Country: Uganda

Lecturer of mathematics Busitema University [May 2009 - 2019]

City: Tororo Country: Uganda

Lecturer/HOD, Department of Mathematics

Uganda Martyrs University [Jan 2010– May2020]

City: Kampala **Country:** Uganda

Adjunct Lecturer, Department of Mathematics

Bugema University [10 May 2007 - 30 Jun 2009]

City: Wakiso **Country:** Uganda

Teacher, Namungaga Sec. School [Jan 2003 – May 2009]

City: Mukono

Country: Uganda

Teacher, Mary Hill High School [Jan 2000 – 2002]

City: Mbarara **Country:** Uganda

ACTING POSITIONS

- Acting Dean Faculty of Science and Education, Nagongera Campus, Busitema University [1st December, 2021- 30th December, 2021]
- ii) Acting Head of Mathematics Department, Busitema University [2015 2016]

LANGUAGE SKILLS

Mother tongue (s):

Rukiga

Other language(s):

English Luganda

DIGITAL SKILLS

Latex/Matlab/Mapple/Microsoft Office / Zoom / Google Drive / Power Point / Decision-making / Internet user / Analytical skills

PUBLICATIONS

A: Peer-Reviewed Publications

- Batiibwe, M.S.K., Nannyonga, B.K., Nalule, R.M, Mbabazi F.K. *et al.* Factors related to teenage pregnancy during the COVID-19 pandemic: a case of selected villages in Mayuge District, Eastern Uganda. *SN Soc Sci* 3, 103 (2023). https://doi.org/10.1007/s43545-023-00694-8
- Nyadoi P., Mbabazi F.K., Nachuha S., & Thomposon J (2023). Career Growth for Uganda's Women and Girls in Sciences, the Challenges, Opportunities and Experiences. AJPO Journals and Book Publishers. <u>https://ajpojournals.org/product/career-growth-for-ugandas-women-and-girls-in-sciences-the-challenges-opportunities-and-experiences/</u>
- Muhumuza, A. K., Mbabazi, F. K., Nalule, R. M., Mwasa, A., Kyomuhangi, A., & Kadedesya, s. (2023). Enhancing Research Output in Higher Institutions of Learning: A Case Study of Busitema University Research Model. *The Uganda Higher Education Review*, 9(2), 68.
- 4) Mbabazi, F. K., Biira, S., Rwahwire, S., Olupot-Olupot, P., Opaka, A. R., Gavamukulya, Y., & Luboobi, L. S.(2022). A Mathematical Model Approach for Prevention and Intervention Measures of the COVID-19 Pandemic in Uganda. *Asian Research Journal of Mathematics*, 18(11), 233-248.
- Nagulama, M., Rwahwire, S., Mbabazi, F. K., & Tulirinya, J. (2021). Modeling of Tire-Road Surface Interaction under Wet Conditions. *Asian Journal of Pure and Applied Mathematics*, 9-28.
- Tulirinya, J., Awichi, R. O., Mbabazi, F. K., & Nagulama, M (2021). Modelling the influence of evaporation on residual chlorine in water storage tanks using CFD. *East African Journal of Engineering*, 3(1), 33-49.
- 7) **Mbabazi, F. K.,** Mugisha, J. Y. T., & Kimathi, M. (2020). Global stability of pneumococcal pneumonia with awareness and saturated treatment. *Journal of Applied Mathematics*, 2020.
- 8) Mbabazi, F. K., Mugisha, J. Y., & Kimathi, M. (2019, February). Hopf-bifurcation analysis of pneumococcal pneumonia with time delays. In *Abstract and Applied Analysis* (Vol. 2019). Hindawi.

9) **Mbabazi, F. K.,** Mugisha, J. Y. T., & Kimathi, M. (2018). Modeling the within-host co-infection of influenza A virus and pneumococcus. *Applied Mathematics and Computation*, *339*, 488-506

B: Pre-print

1) Mbabazi, F. K. (2020). Projection of COVID-19 Pandemic in Uganda.

medRxiv. https://doi.org/10.1101/2020.04.02.20051086

2) **Mbabazi, F. K.,** Osman, S., Kweyunga, E. H., Abubakar, M., Keikar, A. M., Muhumuza, N. R., ... & Luboobi, L. S. (2023). An Optimal Control for Ebola Virus Disease with a Convex Incidence Rate: Imputing from the Outbreak in Uganda. *Qeios*.

3) Patricia, N., **Mbabazi, F. K.,** Muhumuza, N. R., & Topilista, N. (2023). Assessing the Impact of COVID-19 on Food Consumption Preferences. *Qeios*.

C: Under Review

1) Fulgensia Kamugisha Mbabazi and Edward Andama, The Effect of Fear in a Predator-Prey Interaction with Beddington–DeAngelis Functional Response-Advances in Wildlife and Environment Management in uganda

2) Shaibu Osman, Fulgensia Kamugisha Mbabazi, Mwasa Abubakar, Asaph Muhumuza Keikara Kweyunga Horeb, Nalule Rebecca Muhumuza, Nekaka Rebecca, Peter Olupot-Olupot and Livingstone S. Luboobi. A mathematical modelling approach for the control of Ebola Virus Disease (EVD): imputing from outbreak in Uganda.

2) Fulgensia Kamugisha Mbabazi, Richard Awichi Opaka, Stephen Kandedesya,

Topista Nabirye, Jackson Okiring ,Livingstone S. Luboobi, Effect of Time Delay of Management and Control of Banana Xanthomonas Wilt on Banana Production and Yield

3) Namujjuzi Teddy, Fulgensia Kamuigisha Mbabazi, Kizito Omona, Ocan Johnson and Shira Tendo NamageroeMedical, Experiences and limitations to Patients' Participation in Decision Making on Prescribed Treatment in a Rural Central Hospital of Uganda: A mixed-methods Study.

RESEARCH IN PROGRESS

 Fulgensia Kamugisha Mbabazi, Julius Wandabwa, Betty K. Nanyyoga and Luboobi Livingstone, A Mathematical Model for the Impact of Time Delays in Maternal Mortality Epidemic

CONFERENCES AND WORKSHOPS

- Attended a 2 day training about 'Digital Pedagogy', 25th-26th September, 2023 at faculty of Engineering, Buaitema University
- Attended a 3 day training Course about 'Human Subjects Protection', 26th-28th June, 2023 at TLT Tororo, Uganda.
- 3) Attended a one day workshop 'The Data Validation Workshop for Examining Participation and Quality of Experiences of Women in Science Technology Engineering and Mathematics (Stem): Postgraduate Training Programs and Careers in Uganda. April 20th, 2023 at the Protea Hotel by Marriott Kampala.
- 4) F.K.Mbabazi and E. Andama (2023). The Effect of Fear in a Predator-Prey Interaction with Beddington– DeAngelis Functional Response. *World Wildlife Day Conservation Conference 2023; Partnerships for Wildlife Conservation*. 9th February, 2023 Makerere University, Central Teaching Facility 2 (CTF2) Auditorium.
- 5) **F.K. Mbabazi**, Mathematical Modelling for Infectious Diseases: Artificial Intelligence and Interdisciplinary Research Launch [**Busitema University, Uganda, 20 APR 2021**],

- F.K. Mbabazi et al., Effect of Time Delay on the Control of banana xanthomonas Wilt on Banana Production and Yield. The1st Busitema University Science, Technology and Innovation Symposium [Busitema University, Uganda, 24th Jun 2021 – 25th Jun 2021]
- 7) F.K. Mbabazi, et al., A Mathematical Model Approach for Prevention and Intervention Measures of COVID-19 Pandemic in Uganda [Busitema University, 26 May 2020 – 26 May 2020] Virtual research seminar, Busitema University.
- F.K. Mbabazi, et al., 3rd Colloquium: COVID-19 Forecast and Prediction, virtual workshop (Invited speaker)-Polland [Virtual, 15 May 2020 16 May 2020]
- 9) F.K.Mbabazi, et al., Scientific Perspectives on COVID-19, Attended 1st International Online Conference on COVID-19/ Scion scientific online conference. [Virtual, 4 May 2020 – 4 May 2020]
- 10) Participated in a 1 day girl child mentorship workshop [Makerere University, Uganda, Aug 2019]
- 11) A Unified Model to Assess ICT Integration into Distance Learning/Teaching : Mathematical Modelling, Conference Proceedings, The 2nd Inverse Problem Africa 2015 HEI-ICI
- [Dar Es Saalam-Tanzania, 19 Oct 2015 23 Oct 2015]
- 12) The Importance of Mathematical Modeling of Infectious Diseases, Conference Proceedings, Higher
 Education Institute Co-operation (HEI-ICI) [Makerere University., 2 Dec 2013 11 Dec 2013]
- 13) UGANDA GENDER CHAMPIONS' WORKSHOPS', Uganda National Council for Science and Technology [Kampala, 10 Mar 2020 – 12 Mar 2020]
- 14) Writing successful grant proposals' at Busitema University
- 15) [28 Jan 2020 29 Jan 2020]

16) Participated in Capacity Building Training organized by Eastern Africa Network for Women in Basic Sciences (EANWoBAS)-UNIK [Kampala, Uganda, 16 Aug 2019 – 18 Aug 2019]

- 17) Mathematics Teachers' Conference 2019, 'Innovative Practices in Mathematics for Future Predictions [Kampala, Uganda, 26 Jul 2019]
- 18) Writing for Publication' [Makerere University, Kampala, 6 Aug 2018 8 Jul 2019]
- 19) 1st PAN AFRICAN BIOMATHEMATICS CONGRESS on Importance of Mathematical Modelling of Biological Processes and Biomedical. [Makerere University, Kampala-Uganda., 8 Dec 2003 – 12 Dec 2003]

SERVICE TO BUSITEMA UNIVERSITY AND COMMUNITY

A: Executive Committee member of Organization for Women in Science for the Developing World (OWSD) [Jan 2021 to date]

B: Chairperson to the following Faculty of Science and Education Committees [2020-to date]

1) Academics Affairs Committee

C: Member to the following Faculty of Science and Education Committees [2020-to date]

- 1) Faculty Board Committee
- 2) Higher Degrees Committee
- 3) Appointments, Promotion and Staff Development Committee
- 4) School Practice and Industrial Training Committee
- 5) Finance Committee
- 6) Busitema University of Science and Education Research Ethics Committee (BUFSEREC)
- D: Member to Busitema University Staff Sacco Committee [2019 to date]
- E: Program Coordinator Master of Science in Industrial Mathematics [Jan 2019- Dec 2020]
- F: Served as a member of Busitema University Conference Steering Committee [2021]
- G: Head of Department Natural Sciences Uganda Martyrs University [2019 Jan 2021]
- H: Deputy Head teacher St Barnabas College [2004 2005]
- I: Program Coordinator Master of Science in Industrial Mathematics

COMMUNITY OUTREACH

(1) Lead person: Visit to pregnant mothers, babies below six months and the elderly (>60 years) :magola sub county after rainfall disaster due 8th March, 2021 [8 MAR 2021 – 30 MAR 2021]

(2) 23rd December, 2021: Visit to Mayunge district in collaboration with EANWoBAS for a drive of taking back schools girls that gave birth during Covid-19 lock down

(3) 11th February, 2022; led the Mobilization team to collect funds for supporting the launch of the 43rd Organization for Women Scientists in the Developing Countries (OWSD) for Uganda Chapter
(4) March 2022, with other members of Eastern African Network for women in Basic Sciences (EANoWBAS-Uganda) organized a maths run to celebrate Pi- day that took place at Buddo Junior Primary School **PROJECT GRANTS**

- Busitema University Research and Innovation Fund (BURIF), (Grants No. 7/DGSRI/2022/2023), UGX15,000,000 (Words) Fifteen million shillings [Co-Principal Investigator] Busitema University
- Small Research Grant- Directorate of Graduate Studies, Research and Innovations (GSRI)- (Project Grant No: DGSRI-SRG2019-05), worth UGX4,474,800 (Four Million, Five Hundred Thousand Shillings Only). [Principal Investigator]

Busitema University

AWARDS AND STUDY SCHOLARSHIP

- African Union Study Scholarship (Ref: PAU/ADM/PAUSTI/2016/1) to undertake Doctor of Philosophy in Mathematics- (Computational option) at Pan African University Institute for Basic Sciences, Technology and innovation (PAUSTI), Nairobi, Kenya [2016-2019]
- Merit admission to Mbarara University of Science and Technology (MUST) by the Government of Uganda to undertake an undergraduate Degree of Bachelor of Science and Education [1996-1999]

NETWORKS AND MEMBERSHIPS

- Member of Uganda Mathematical Society (UMS) [Kampala Uganda, 2005 to date]
- Organization of Women in Science for the Developing World (OWSD)
- Eastern Africa Network for Women in Basic Sciences (EANWOBAS
- 4) Uganda Women Mathematicians (UGAWOM)

SOCIAL AND POLITICAL ACTIVITIES

- Actively solicited funds for launching the 43rd Organization for Women Scientists, Uganda National Chapter [November 29, 2021]
- Presented about awareness of COVID-19 spread in Uganda, at NBS Television. [Kampala Uganda, 29 Mar 2020]
- 3) Financially supported in the construction of the Nansana Parish Church of Uganda Project [Nansana, Wakiso, Jan 2019 Dec 2021]
- 4) Official Usher at the Pontifical Mass presided over by HIS HOLINESS POPE FRANCIS [Namugongo Catholic Martyr's' Shrine- Uganda, 28 Nov 2015]

ACADEMIC SUPERVISION

A: Supervisor to Students' Dissertations/Thesis to Completion

 Modeling of the Tire-Road Surface Interaction under Wet Conditions (2020), M. Nagulama, S. Rwahwire and F.K. Mbabazi (Busitema University).

- Modeling the Influence of Evaporation on Chlorine Residual in Water Storage Tanks using CFD (2020), J.Tulirinya, R. Awichi and F.K. Mbabazi (Busitema University, Uganda).
- The Impact of Patients Participation in Decision Making on Prescribed Treatment in Hospitals: A Case Study Nkozi Hospital (2021), T.Namujjuzi (Uganda Martyr's University, Uganda).
- 4) Assessment of the Effects of Covid-19 Pandemic on Food Consumption Preferences: Case Study of Kira Municipality, Nabirye Patricia (Uganda Martyr's University, Uganda).

B: On-going

- Modeling Heat and Mass Transfer for the Quality of Banana Bread Production: The Computational Fluid Dynamics Approach, [Ocen George Darius, Busitema University]
- 2) Particulate Matter Transport in Jinja city: The Computational Fluid Dynamics(CFD) Approach
- Modelling the Effect of Storm water on Solid Waste Flow in Open Drainage Channel Systems: A Case of Tororo, Municipality, Uganda', Okolimong John Stephen [Busitema University]

EXTERNAL AND INTERNAL EXAMINATION OF DISSERTATIONS/THESIS

- 1) Mbarara University of Science and Technology, Uganda]
- 2) Busitema University

REVIEWER

A: International Journals (Review history: https://www.webofscience.com/wos/author/rid/AAM-3357-2020)

I have a total of 27 reviewed manuscripts for the following International Journals

Verified peer reviews

Journal name (No. verified)

- 1) Advances in Difference Equations (4)
- 2) Applied Mathematics and Computation (2)
- 3) Asian Journal of Probability and Statistics (2)
- 4) Asian Research Journal of Mathematics (2)
- 5) International Journal of Tropical Disease and Health (2)
- 6) Journal of Advances in Mathematics and Computer Science (2)
- 7) Journal of Advances in Medicine and Medical Research (2)
- 8) Applied Mathematics & Information Sciences (2)

- 9) Applied Mathematics and Information Sciences (1)
- 10) Asian Journal of Advances in Research (1)
- 11) Asian Journal of Medicine and Health (1)
- 12) Asian Journal of Pure and Applied Mathematics (1)
- 13) Asian Journal of Research in Medicine and Medical Science (1)
- 14) Asian Soil Research Journal (1)
- 15) Journal of Advances in Medical and Pharmaceutical Sciences (1)
- 16) Journal of Pharmaceutical International (1)
- 17) Mathematical Biosciences and Engineering (1)
- 18) Plant Cell Biotechnology and Molecular Biology (1)

B: Internal peer reviewer for projects

 Reviewer for research application grants for the Directorate of Graduate Studies, June 2021, Research and Innovations (DGSRI)]

RESEARCH GROUPS /NETWORK

1. APPLIED PROBABILITY RESEARCH IN EASTERN AFRICA (APREA)

ORGANIZING COMMITTEE MEMBER TO CONFERENCES

1. CONSERVATION CONFERENCE 9th February, 2023, Focus on Partnerships in Wildlife Conservation;

Theme:

ADVANCES IN WILDLIFE AND ENVIRONMENT MANAGEMENT IN UGANDA, *Elucidating knowledge contribution of Sciences Technology Engineering Mathematics (STEM) and non-STEM field actors in the sector.* Venue: CTF2 Auditorium at Makerere University, Kampala Uganda.

2. Busitema University Conference Steering Committee [2021]

REFEREES

- Assoc. Prof DK Olema Dean Faculty of Science and Education, Busitema University. <u>dkaniolema@gmail.com</u>
- Assoc. Prof Saphina Biira, Deputy Vice Chancellor (Finance and Administration), Busitema University.

bsaphina@gmail.com

 Professor L.S. Luboobi , Department of Mathematics, Makerere University, P.O. Box 7062, Kampala, Uganda

luboobi@gmail.com

4. Dr. Mark Kimathi
Department of Mathematics, Statistics and Actuarial Sciences,
Machakos University,
P. O. Box, 136-90100,
Machakos, Kenya.
memkimathi@gmail.com

I Fulgensia Kamugisha Mbabazi (PhD) declare that the information given above is true