

1.1 PERSONAL PROFILE

1.1.1 Personal Details

Name: Margaret Wairimu Chege
PF. No.: 7084
Department: Physics
Designation: Lecturer
Email: chege.margaret@ku.ac.ke; znimo@yahoo.com;
chegemargaretw@gmail.com

Area of Specialization:

- Environmental Physics
- Radiation Physics
- Nuclear Physics

Research Interests:

- Radon and Naturally Occurring Radioactive Materials (NORM)
- Environmental contaminants
- Occupational radiation exposure
- Nuclear safety, security, and nuclear communication

Google Scholar: <https://scholar.google.com/citations?user=adLfdnAAAAAJ&hl=en>

ORCID ID: <https://orcid.org/0000-0002-7637-2412>

1.1.2 Academic & Professional Qualifications

- 2011-2014: PhD, Department of Physics, Kenyatta University, Kenya
Thesis Title: Modelling Radon and Thoron Exhalation and Measurement of Total Natural Radiation Exposure in Mrima Hill, Kenya.
This was the first research in Kenya involving simultaneous measurement of indoor radon (Rn-222) and thoron (Rn-220) concentrations. Radon and thoron are radioactive gaseous isotopes which though formed in soil and rocks can become airborne and concentrate in significant amounts in confined spaces such as houses. The radon isotopes are carcinogenic and exposure to elevated levels has been shown to increase the risk of lung cancer. Mrima Hill region which was the focus of the study is one of the high background radiation areas in the country.
- 2003-2007: Master of Science, Department of Physics, Kenyatta University, Kenya
Thesis Title: Screening Measurement of Indoor Radon-222 Concentration by Gamma Ray Spectrometry in Kenyatta University.
This was the second time non-discriminative radon research was being done in Kenya. The research analysed radon levels in demonstration earthen huts that were located at Kenyatta University grounds at the time.
- 1992-1996: Bachelor of Education (Science), Egerton University, Kenya
Majored in two teaching subjects, Mathematics and Physics. This is in addition to other subjects that included Sociology, Psychology, Philosophy and Teaching Methods.
- 1987-1990: Kenya Certificate of Secondary Education (KCSE)
- 1979-1986: Kenya Certificate of Primary Education (KCPE)

1.1.3 Employment History

- February 2015 to date: Lecturer, Department of Physics, Kenyatta University, Nairobi, Kenya
Duties and responsibilities include:

- Teaching post-graduate and undergraduate physics units in the Department of Physics among them;
 - Post-graduate*
 - MSc: SPH 832: Environmental Monitoring Techniques
 - PhD: SPH 906 Review of research work and seminars
 - Undergraduate*
 - SPH 100/190 Mechanics I
 - SPH 102/192 Waves and Optics
 - SPH 200 Mechanics II
 - SPH 201/291 Electricity and Magnetism II
 - SPH 203/293 Thermal Physics I
 - SPH 301 Quantum Mechanics I
 - SPH 350 Principles of Environmental Physics
 - SPH 351 Physics of Environment and Energy
 - SPH 400 Classical Mechanics
 - SPH 401 Electrodynamics
 - SPH 451 Radiation and Environment
- Research: Involved in the supervision of post-graduate students, examining thesis reports, establishing networks with national and international researchers, and writing research-grant proposals.
- February 2009 to January 2015: Tutorial Fellow, Department of Physics, Kenyatta University (Mombasa Campus), Kenya
 - Duties and responsibilities included teaching undergraduate courses and supervision of undergraduate practical sessions.
 - Administration duties
- September 1996 to December 2008: Graduate Teacher, Teachers Service Commission (TSC), Kenya
 - January 1998 to August 2003: Worked as a physics lecturer at Kagumo Teachers Training College. Units taught included Mechanics, Wave Theory, and Electricity and Magnetism.
 - September 1996 to August 2003: Worked as a high school Mathematics and Physics teacher.

1.1.4 Achievements

- Recognition by African Commission on Nuclear Energy (AFCONE) on role played in supporting nuclear science and technology
- Set up a website Ma-Physics-Kenya (<https://www.physics.radonkenya.org/>) that provides high physics note and selected university notes for free. Sample notes;
 - Margaret W. Chege, 2022; Elastics, Plastics and Hooke's Law. High School Notes, <https://www.physics.radonkenya.org/all/notes/34/Elastics,%20Plastics%20and%20Hooke%27s%20Law>
 - Margaret W. Chege, 2022; Equilibrium, Moment of force, Work and Machines. High School Notes, <https://www.physics.radonkenya.org/all/notes/33/Equilibrium,%20Moment%20of%20force,%20Work%20and%20Machines>
 - Margaret W. Chege, 2022; Temperature, Heat Transfer, Calorimetry. High School Notes, <https://www.physics.radonkenya.org/all/notes/32/Temperature,%20Heat%20Transfer,%20Calorimetry>

- Margaret W. Chege, 2022; Intermolecular Forces, States of Matter, Diffusion. High School Notes,
<https://www.physics.radonkenya.org/allnotes/Physics%20PP1%20Notes>
- Margaret W. Chege, 2022. Gas Laws and the Kinetic Theory of Gases. High School Notes.
<https://www.physics.radonkenya.org/all/notes/28/Gas%20Laws%20and%20the%20Kinetic%20Theory%20of%20Gases>
- Margaret W. Chege, 2022. Circular Motion. High School Notes,
<https://www.physics.radonkenya.org/all/notes/24/Circular%20Motion>
- Margaret W. Chege, 2022. Upthrust, Viscosity and Terminal Velocity. High School Notes,
<https://www.physics.radonkenya.org/all/notes/23/Upthrust,%20Viscosity%20and%20Terminal%20Velocity>
- Margaret W. Chege, 2022. Pressure, Continuity and Bernoulli's principles. High School notes.
<https://www.physics.radonkenya.org/all/notes/21/Pressure,%20Continuity%20and%20Bernoulli%27s%20principles>
- Margaret W. Chege, 2022. Magnets, Electromagnetic Induction & Transformers. High School Notes.
<https://www.physics.radonkenya.org/all/notes/50/MAGNETS,%20ELECTROMAGNETIC%20INDUCTION%20&%20TRANSFORMERS>
- Margaret W. Chege, 2022. EM Radiation, Photoelectric Effect, X-rays, CRO. High School Notes.
<https://www.physics.radonkenya.org/all/notes/42/EM%20RADIATION,%20PHOTOELECTRIC%20EFFECT,%20X-RAYS,%20CRO>
- Margaret W. Chege, 2022. Radioactivity. High School Physics Notes.
<https://www.physics.radonkenya.org/all/notes/38/RADIOACTIVITY>

1.2 PUBLICATIONS

1.2.1 Refereed Journals

- R. Trevisi, T. Bituh, A. Canoba, M. Chege, A. Cordelle, D. Chambers, N. Chambers, P. Egidi, R. Gellermann, F. Grandia, J. Hondros, C. Kunzel, J. Lee1, B. Michalik, F. Otoo, S. Pepin, K. N. Rovenska, R. Sapoi, P. Tchokossa, and O. van Dongen, (2025). Overview of national regulatory approaches to assess worker's exposure to radon in industries involving NORM. The European Physical Journal Plus, **140**, 1004 (2025). <https://doi.org/10.1140/epjp/s13360-025-06837-5>
- Sophy Njoki, Nadir Omar Hashim and Margaret Chege. (2024). Seasonal Variation of Heavy Metal Concentration in Water of Rupingazi River, Kenya. Journal of Natural Sciences Research. 15 (3)
- Sophy Njoki, Nadir Omar Hashim and Margaret Chege. (2024). Evaluation of Heavy Metal Concentration in Sediments of Rupingazi River, Kenya. International Journal of Innovative Science and Research Technology. 9, (9) 647-653
- Collins Omondi, Margaret Chege and Samson Omondi. (2024). Assessment of Occupational Radiation Exposure for Radiotherapy Healthcare Workers at Kenyatta National Hospital Using Thermoluminescence Dosimeter LiF:Mg,Ti; Journal of Geoscience and Environment Protection, 12,.7 DOI: 10.4236/gep.2024.127002
- Collins Omondi, Margaret Chege and Samson Omondi (2024). Evaluation of Dosimetric Impact of Uncertainty of Measurement in Estimating External

Radiotherapy Dose. Open Journal of Applied Sciences, 14. (8). DOI: 0.4236/ojapps.2024.148130

- Collins Omondi, Margaret Chege and Samson Omondi, (2024). Evaluation of Air-Kerma and Absorbed Dose to Water for External Radiotherapy Beam Using Ionization Chamber. Open Journal of Radiology, 14, (3) DOI: 10.4236/ojrad.2024.143012
- W.O.G. Odongo, M. Chege, S. Tokonami, N. Hashim, C. Kranrod and C. Nyambura, 2021. Radon and thoron exhalation rates from earthen building materials used in high background radiation areas of Homa and Ruri, Kenya, Radiation Protection Dosimetry, 2021; ncab156, <https://doi.org/10.1093/rpd/ncab156>
- W.O.G. Odongo, M. Chege, N. Hashim, S. Tokonami, K. Chutima and C. Rotich, (2021). Determination of activity concentration of natural radionuclides and radiation hazards' assessment of building materials in high background radiation areas of Homa and Ruri, Kenya, Scientific World Journal, 2021; doi: 10.1155/2021/9978619.
- F.O. Wanjala, N.O. Hashim, D. Otwoma, J. Kebwaro, M. Chege, C. Nyambura and C. Atieno, 2021. Lung cancer risk assessment due to radon and thoron exposure in dwellings in Ortum, Kenya. Journal of Environment Pollution and Human Health, 9(2); 64-70.
- W.O.G Odongo, N. Hashim and M.W. Chege, 2021. Gamma ray spectrometric analysis of sand samples from selected beaches along Kenyan coastline. The Scientific World Journal, 2021.
- C. Nyambura, N.O. Hashim, M.W. Chege, S. Tokonami and F.W. Omonya, 2020. Cancer and non-cancer health risks from carcinogenic heavy metal exposures in underground water from Kilimambogo, Kenya. Groundwater for Sustainable Development, 2020, 10; 100315
- C.K. Rotich, N.O. Hashim, M.W. Chege and C. Nyambura, 2020. Measurement of radon activity concentration in underground water of Bureti Sub-County of Kericho County Kenya. Radiation Protection Dosimetry, 192(1); 56-60
- C.K. Rotich, N.O. Hashim, M.W. Chege and C. Nyambura, 2020. Naturally occurring radionuclides in soil samples of Bureti Sub-County of Kericho County Kenya. Radiation Protection Dosimetry, 192(4); 491-495.
- L.N. Munyao, D.K. Ketui, C. Otieno and M.W. Chege, 2020. Assessment of Levels of Natural Radioactivity in Sand Samples Collected from Ekalakala in Machakos County, Kenya. The Scientific World Journal, 2020.
- F.O. Wanjala, N.O. Hashim, D. Otwoma, C. Nyambura, J. Kebwaro, A. Mauring, J. Bartilol and M Chege, 2019. Human exposure to background radiation in Ortum, Kenya. Radiation Protection Dosimetry.
- M. Chege, N. Hashim, C. Nyambura, A. Mustapha, M. Hosada and S. Tokonami, 2019. Radon and thoron; radioactive gases lurking in earthen houses in rural Kenya. Frontiers in Public Health, 2019, 7; 113. <https://doi.org/10.3389/fpubh.2019.00113>
- C. Nyambura, S. Tokonami, N.O. Hashim, M.W. Chege, T. Suzuki, H. Kudo and M. Hosoda, 2019. Annual effective dose assessment due to radon and thoron progenies in dwellings of Kilimambogo, Kenya. Radiation Protection Dosimetry, 184(3-4); 430–434, <https://doi.org/10.1093/rpd/ncz090>
- M.W. Chege, N.O. Hashim, A.S. Merenga and J. Tschiersch, 2015. Analysis of internal exposure associated with consumption of crops and groundwater from the

high background radiation area of Mrima Hill, Kenya. Radiation protection dosimetry, 167(1-3); 276-278

- M.W. Chege, N.O. Hashim and A.S. Merenga, O. Meisenberg A. S and J. Tschiersch, 2015. Estimation of annual effective dose due to radon and thoron concentrations in mud dwellings of Mrima Hill, Kenya. Radiation Protection Dosimetry, 167(1-3); 139-42. doi: 10.1093/rpd/ncv231
- M.W. Chege, N.O. Hashim and A.S. Merenga and J. Tschiersch, 2013. Lead contamination of traditional hand-dug wells in parts of Kwale County, Kenya. International Journal of Physical Sciences, 8(17): 835-839
- M.W. Chege, N.O. Hashim and A.S. Merenga, 2013. Physico-chemical analysis of groundwater in the Gazi-Mrima Hill region of Kwale County, Kenya. Asian Journal of Science and Technology, 4 (5): 55-058.
- M.W. Chege, I.V.S Rathore, C.S. Chhabra and A.O. Mustapha, 2009. Influence of meteorological parameters on indoor radon in selected traditional Kenyan Dwellings. Journal of Radiological Protection, 29: 95-103.
- Margaret Chege, 2009. Comparative study of radon concentrations in selected modern and model traditional buildings at Kenyatta University.
https://inis.iaea.org/collection/NCLCollectionStore/_Public/47/006/47006503.pdf

1.2.2 Reviewed Conference Papers

- M. Chege and C. Nyambura, 2019. Review of radon and thoron research in Kenya: 1997–2017. Radiation protection dosimetry, 183(3-4); 479-481
9th International Conference on High Level Environmental Radiation Areas (ICHLERA), 24-27 September 2018, Hirosaki University, Aomori, Japan.

1.2.3 Short Communication in Scholarly Journals

- M.W. Chege and J.M Kebwaro, 2019. Validation of popular models used in the analysis of specific activity of primordial radionuclides in environmental samples through 1-D analytical modeling. Radiation environment and medicine, 8(2); 45-50.

1.2.4 Non - Reviewed Conference Papers

- Chege, M. W., Hashim, N. O., Merenga, A. S., Meisenberg, O. and Tschiersch, J., 2016. Thoron exhalation rate and Th-232 content in traditional building materials used in the coastal region of Kenya. Proceedings of the 14th International Congress of the International Radiation Protection Association (IRPA). Cape Town, South Africa 9 – 13 May 2016: 1511-1514.

1.2.5 Scholarly Presentations at Conferences and Workshops

- M. Chege and Felix Wanjala. Real-time measurement of indoor radon concentration in an apartment unit in Kiambu County, Kenya. 16th International Congress of the International Radiation Protection Association (IRPA), 7 to 12 July 2024, Orlando, Florida, USA.
- M. Chege and C. Nyambura. Thoron: The Unrecognized Carcinogen in Earthen Dwellings Typical to Rural Africa and Asia. 9th International Symposium on Naturally Occurring Radioactive Material. 23-27 September 2019, Denver, Colorado, USA.

1.3 QUALITY TEACHING, LEARNING AND MENTORSHIP

1.3.1 Student Evaluations

- SPH 200 Mechanics II
- SPH 203 Thermal Physics
- SPH 301 Quantum Mechanics 1
- SPH 400 Classical mechanics

1.3.2 Trainings in Higher Education

- Nuclear Security Dialogue (Virtual) – 17, 19 November 2025
- Shaping the future of Radiation Protection (RP); Engaging the next generation. Virtual, 1-2 April 2025
- IAEA Regional Meeting on Identifying and Addressing Gaps in Existing Radiation Exposure Situation with Focus on Radon and other Natural Radiation Sources. Harare, Zimbabwe, 3 - 7 March 2025.
- New Research Management System (KENRIS) and Science, Technology and Innovation (STI) mainstreaming, 19th May 2022

1.3.3 Supervision of Postgraduate (Ongoing)

1.3.3.1 Masters

- Jeremiah Mutinda Mulemba, Reg. No. I56/CE/28335/2013
Determination of Natural Radionuclides and Selected Heavy Metals in Sediment and Water Samples from Athi River, in Machakos County, Kenya
Successfully defended proposal, working on proposal submission
- Ngiri Christine Kawira, Reg No. I56/CE/28393/2018
Heavy Metal Concentration in Soils and Water of Magando Crater Lake, Meru County Kenya.
Submitted proposal.

1.3.3.2 PhD

- Collins Omondi, Reg. No. I84/22605/2021
Dosimetric and occupational exposure Audit of LINAC beam parameters for accuracy and precision of a clinical case for breast treatment at Kenyatta University Teaching, Research and Referral Hospital
Successfully defended thesis
- Njiru Sophy Njoki, Reg. No. I84/33082/15
Modeling and simulation of concentration of heavy metals in water and sediments in Rupingazi river in Embu County, Kenya
Successfully defended thesis

1.3.4 Supervision of Postgraduate (Completed)

1.3.4.1 Masters

- Gitahi Agnes Wangari, Reg. No I56/CE/28349/2013;
Determination of the level of naturally occurring radioactive materials of soil samples in Kikuyu, Kiambu County, Kenya
Graduated in July 2022
- Songa Kamwani Luke, Reg No. I56/CE/25842/2014
Thesis title: Analysis of natural radioactivity levels and radiation hazards due to murrum quarried in Kakamega County, Kenya
Graduated in July 2021
- Echesa Malack Khabana, Reg. No. I56/Ce/25851/2014
Thesis title: Natural radioactivity measurement and evaluation of radiation hazards in soil samples of Shinyalu, Kakamega County, Kenya
Graduated in December 2020
- Kiprono Vincent, Reg. No. I56/CE/25839/2014
Thesis title: Radiometric assessment of natural radioactivity levels and radiation hazard indices for soil samples of Bureti Sub- County, Kericho county, Kenya
Graduated in December 2020
- Willis Otieno Gor Odongo, Reg. No. I56/CE/28375/2013

Thesis title: Gamma ray spectrometric analysis of sand samples from selected beaches on coastline of Kenya
Graduated in August 2018

1.3.4.2 PhD

- Nyambura Catherine Reg. No. I84/ 32272/2015
Thesis title: Risk assessment due to naturally occurring radioactive materials and technologically enhanced naturally occurring radioactive materials in Kilimambogo, Kenya
Graduated on 15/12/2023
- Willis Otieno Gor Odongo, Reg. No. I84/28545/2018
Determination of exposure from thoron, radon and terrestrial radionuclides and modeling indoor gamma radiation dose in Homa and Ruri in Homa Bay County, Kenya
Graduated on 21 July 2023
- Rotich Charles Kipngeno, Reg. No. I84/33082/2015
Thesis Title: Human exposure to natural radiation in Bureti Sub-County of Kericho County, Kenya
Graduated 16 December 2022

1.4 PROFESSIONAL/CONSULTING

1.4.1 Networks/Collaborations

- Prof. Shinji Tokonami, Hirosaki University, Japan
- Dr. Peter Waithaka, Murang'a University of Technology
- Dr. John Wandeto, Dedan Kimathi University of Technology

1.4.2 Consulting for International/National Boards

- State Department for Science, Research and Innovation –Draft Nuclear Science and Technology Policy and Kenya Atomic Energy Agency Bill Stakeholder Engagement
- Kenya Nuclear Regulatory Authority (KNRA) - Entrance Meeting for the Occupational Radiation Protection Appraisal Service (ORPAS) Mission NRA-IAEA Mission
- Preparatory Meeting for the 11th International NORM Symposium, Accra, Ghana
- IAEA e-learning course on Conventional Safety and Radiation Protection in the Uranium Production Cycle
- African Commission on Nuclear Energy (AFCONE) -Judge and African Commission on Nuclear Energy Outstanding performance award
- African Commission on Nuclear Energy (AFCONE) – Women Shaping Africa's Nuclear Landscape Speaker
- International Radiation Protection Association Naturally Occurring Radioactive Material Technical Group (IRPA NORM TG)
- Kenyan Representative Member to the Africa Regional Young Generation Network
- Kenya Bureau of Standards (KEBS) – training of radiation workers

1.4.3 Membership to Academic/Professional Bodies

- Physics Society of Kenya – regular membership
- Health Physics Society (HPS) – Early Career
- East African Association for Radiation Protection (EAARP) – regular membership

1.4.4 Examiner

- Internal examiner, Kenyatta University

1.5 ADMINISTRATIVE AND RESPONSIBILITIES

- 2025 to date: Examination Coordinator, Department of Physics
- 2025 – Date: Online Mentorship
- March -April 2025: Organizing committee for Webinar on Nuclear Energy
- 2024 to date: School Committee on Disposal of Non-Conforming Products in all the Departments
- 2024 to date: Departmental Research, Innovation and Product Development
- 2024 to date: Departmental Examinations Moderation and Marks Verification Committee
- 2024 -Date: Departmental Research Innovation and Product Development Board
- 2023-Date: Patron, Radiation Protection and Nuclear Safety Youth Network (RPNS-YN)
- 2020 - 2024: Member, Departmental Programme Development Committee
- 2019: Member, Mombasa Campus Collaboration Committee

1.6 COMMUNITY ENGAGEMENTS AND OTHER CONTRIBUTIONS

1.6.1 Research Funding

- National Research Fund (NRF) Multidisciplinary Research Grant
 - Project on: Radon Isotopes and Particulate Matter Measurement in Kenya
 - Progress: At the final stage

1.6.2 Community Outreach

- Newcomer4Nuclear and Women in Nuclear (WiN) -Speaker at the First E-Virtual Newcomers4Nuclear (NC4N) Summer School
- Nuclear Education and Training in Africa and Europe Landscape – Webinar Co-organizer
- Organized Online public lecture by William D. Magwood, IV, Director General of OECD Nuclear Energy Agency: Peaceful Applications of Nuclear Energy: Radiological Protection, Safety and Security
- Founder Member and East Africa Representative to the African NORM and Radon Association (ANRA)
- Member, Board of Management Member (BOM), Kenyoho Secondary School, Thika