

## FACULTY OF HEALTH SCIENCES

DEAN: PROFESSOR SA MADHI MBBCh MMed PhD (Witwatersrand) FCPaed(SA) MASSAf, RSSAf, TWAS, CBE

### Doctor of Philosophy

**ABEASI**, Doreen Asantewa

*Nursing*

*Education*

*THESIS:* A psychosocial support programme for caregivers of children with developmental disabilities in Ghana. The complex and continuous nature of caregiving for children with developmental disabilities leads to stress and adverse health effects. Using a multi-method design, the Caregiver Well-being Improvement [CaWELLIS] programme was developed for Ghanaian caregivers. The study showed that the CaWELLIS programme positively impacted stress, anxiety, depression, burden, and blood pressure, ultimately improving their physical, emotional, and social well-being. This comprehensive, context-specific programme effectively addresses the needs of caregivers of children with developmental disabilities.

Supervisor: Dr N Nkosi

**ALAOUNA**, Mohammed

*Internal*

*Medicine*

*THESIS:* The effects of indigenous South African plant extracts (*Cotyledon orbiculata* and *Tulbaghia violacea*) on triple negative breast cancer cells

This dissertation investigated *C. orbiculata* and *Tulbaghia violacea* extracts for treating triple-negative breast cancer (TNBC). Cytotoxicity assays, extensive chemical profiling, and docking studies demonstrated significant effects, especially from *T. violacea*. Changes in signalling pathways were identified by whole transcriptome sequencing, which highlights the therapeutic potential of *T. violacea* for TNBC and the importance of investigating natural plant extracts for cancer treatment.

Supervisors: Professor A Dlamini, Dr R Hull and Dr C Penny

**DIX-PEEK**, Therese

*Internal*

*Medicine*

*THESIS:* Association of genetic variants with breast cancer intrinsic subtypes and splice variants of the fibroblast growth factor receptor 2 in a South African Population

The genetics and molecular subtyping of breast cancer has not been well studied in sub-Saharan African women. This study investigated concordance between molecular subtyping and immunohistochemistry in the diagnosis of breast cancer, and the association of genetic variants of the fibroblast growth factor receptor 2, with breast cancer in African women. The subtyping informs diagnostic and treatment options, and investigation of genetic variants can increase our understanding of breast cancer in Africa. Two papers have been published from this work.

Supervisors: Associate Professor R Duarte and Associate Professor T Augustine

**ERUMEDA**, Neetha Joe

*Family Medicine*

**THESIS:** An evaluation of the postgraduate Family Medicine decentralised training programme at the University of the Witwatersrand, South Africa, using the logic model

This parallel-convergent mixed-methods case study evaluated the resources, supervision, feedback, work-based learning opportunities and assessments in the registrar training programme using a complex logic model. The study was conducted with supervisors and registrars from five training districts in Gauteng and the North-West province. The final logic model identified, among others, the need for a supportive learning environment with improved resources and faculty development, all of which require more effective key-stakeholder support at institutional, national and provincial levels.

Supervisors: Dr A Zeta George and Professor L Jenkins

**LUBAKI**, Jean-Pierre Fina

*Family Medicine*

**THESIS:** Developing a framework to improve glycaemic control among patients with type 2 diabetes *mellitus* in Kinshasa, Democratic Republic of the Congo

Glycaemic control is critical in the management of type 2 diabetes. This study employed a mixed methods approach to explore drivers of poor glycaemic control and perspectives of patients and healthcare providers on potential interventions to optimize glycaemic control in Kinshasa. The study recommended an urgent need for an improved management framework for diabetes care in the Democratic Republic of Congo. Specifically, the Government needs to increase the investment in the prevention and treatment of noncommunicable diseases including diabetes.

Supervisors: Associate Professor O Omole and Professor J Francis

**HAMOONGA**, Twaambo Euphemia

*Public Health*

**THESIS:** Salient beliefs, preferences, and intention to use HIV pre-exposure prophylaxis among pregnant and breastfeeding women in Zambia

Pregnant and breastfeeding women at substantial risk for HIV infection could benefit from HIV pre-exposure prophylaxis (PrEP). Despite its proven efficacy and safety during pregnancy and breastfeeding, PrEP uptake remains low in this population. This study investigated salient beliefs about PrEP, preferences for PrEP delivery and intention to use PrEP among pregnant and breastfeeding women in Zambia. Male partner support, positive health-care provider attitudes and multi-month scripting of PrEP, among others, could improve demand for PrEP in antenatal and postnatal settings.

Supervisors: Associate Professor J Igumbor, Professor B Chi and Professor W Mutale

**HULLEY**, Michaella Robyn

*Human Genetics*

**THESIS:** Differential gene expression in exfoliation syndrome and exfoliation glaucoma in the conjunctiva of Black South Africans

This thesis reports the first documented use of a specific cell impression device for whole transcriptome sequencing. Using this device, gene expression profiling in exfoliation glaucoma was carried out. This study both validated the involvement of known genes and genetic pathways identified in other populations, while also identifying a potential new contributory pathway.

Supervisors: Associate Professor S Williams, Professor M Ramsay and Dr T Ngcungcu

**KAMP**, Michelle

*Human Genetics*

**THESIS:** The development and value-assessment of an Integrated Cardiovascular Disease Risk Score in an African setting

This thesis developed and evaluated an integrated cardiovascular disease (CVD) risk score for African populations, incorporating both genetic and non-genetic risk factors. Ancestry-aligned polygenic scores (PGS) for cardiometabolic traits were included with conventional risk factors in prediction modelling. The results showed that genetic information significantly enhanced disease risk prediction, outperforming models based on non-genetic factors only. This research highlights the value of integrating genetic and non-genetic factors to improve CVD management and treatment in African populations.

Supervisors: Professor M Ramsay, Professor C Lewis and Dr O Pain

**MALATJI, Hlologelo**

*Public Health*

**THESIS:** Community-orientated primary health care: Exploring the interface between community health workers, the healthcare system and communities in South Africa  
Using qualitative research methods, this thesis investigated the application of community-orientated primary healthcare and supportive supervision approaches to strengthen the performance of community health workers in South Africa. The thesis provides insights into how these two approaches were used to encourage communities to participate in the implementation of community health worker programmes. Further, to improve the knowledge and performance of junior supervisors and community health workers in core activities such as household registration, medication delivery and patient follow-ups.  
Supervisors: Professor J Goudge and Professor F Griffiths

**MALATJI, Kanyane Bridgett**

*Virology*

**THESIS:** Development of a multiplex HIV/TB point-of-care diagnostic assay based on the microarray technology  
There is currently no diagnostic test for the simultaneous detection of HIV and TB; thus, this project sought to develop a point-of-care (POC) multiplex microarray-based technology for the detection of HIV/TB. The study showed that the technology is sensitive and specific and can detect HIV and TB antibodies in human serum at low concentrations. The test is destined for use as a low-cost, fast, and user-friendly assay at POC without the need for sophisticated equipment and highly trained personnel.  
Supervisors: Dr C Thobakgale, Dr A Singh and Dr K Alexandre

**MANYIKE-MODAU, Amukelani Portia**

*Public Health*

**THESIS:** Characterisation of emission and exposure to diesel engine exhaust from trackless mobile machinery in underground South African Platinum Mines: Evaluating strategies to prevent and control exposure  
This thesis characterised the exhaust (of diesel-powered machines (DDE) operating in underground mines. It evaluated how engine maintenance, installation of diesel particulate filters (DPF), and increased workplace ventilation impacted the levels of exposure to DEE in various scenarios. The study demonstrated that only a combination of maintenance and retrofitting with DPF would reduce the concentration of DEE to acceptable levels. This study strategically assists the South African Mining Industry with policy to regulate and reduce DEE exposure to underground miners.  
Supervisor: Professor D Brouwer

**MASEME, Mantombi Rebecca**

*Bioethics and Health Law*

**THESIS:** An ethico-legal analysis of broad consent for biobank research in South Africa: Towards an enabling framework  
Broad consent is permitted by the South African National Department of Health Ethics Guidelines but appears to be prohibited by section 13(1) of the Protection of Personal Information Act 4 of 2013. Additionally, the Act mandates that all personal data (including biobank sample data) be collected for legitimate, definite, and clearly stated purposes. There is room for several interpretations of the Act because of this discord between the two instruments.  
Supervisors: Dr J Gardner and Professor S Mahomed

**MASHATOLA, Thabo Rhine**

*Clinical Microbiology and Infectious Diseases*

**THESIS:** Development of an *Anopheles arabiensis* sex separation strain and optimisation of mosquito handling, packaging and transport conditions for the South African Mosquito Sterile Insect Technique programme  
This thesis addresses the challenges of separating females from males during development of the Sterile Insect Technique (SIT) for malaria vector control. Additionally, the researcher optimised handling, transportation and release procedures of sterile males to ensure that these males remain competitive under natural field conditions. The researcher's findings significantly advance the SIT as a supplementary vector control approach in South Africa. Moreover, his research offers essential insights for the future of genetic-based vector control methods, crucial for addressing challenges in malaria elimination.  
Supervisors: Dr G Munhenga and Professor L Koekemoer

**MOKHACHANE, Mantoa**

*Health Sciences Education*

**THESIS:** Medical Students' professional identity formation during a social upheaval: A qualitative study  
This phenomenological qualitative study, with an autoethnographic aspect, explored the University of the Witwatersrand's medical students' experiences of professionalism and professional identity formation amidst #FeesMustFall protests. Thirteen participants were interviewed. An African lens, Ubuntu, allowed the use of metaphors to reorientate professional identity formation, what professionalism means to contemporary students and how professionalism is weaponised against those who do not fit the western ideals of a medical professional. The study adds an African voice to the western professional identity theories.

Supervisors: Dr A George, Associate Professor L Green-Thompson, Professor A Kuper and Professor T Wyatt

**MOLATOLI, Mhlekezi Cathrine**

*Human Genetics*

**THESIS:** The role of small genetic variants in the aetiology of developmental disorders in South Africa - a whole exome sequencing study

Whole exome sequencing (WES) is the recommended first-line genetic test for patients with developmental disorders due to higher diagnostic yields. However, in South Africa and other resource-poor settings, it has not been implemented. This study investigated the clinical utility of WES in an African setting. Additionally, it made recommendations for variant filtering and prioritization. Of the 117 patients from 115 families analysed, a positive molecular diagnosis was achieved for 29 families, resulting in a diagnostic yield of 25.2%. Our findings resulted in both recommendations for improving patient clinical management, and for variant filtering and prioritization strategies for research and diagnostics.

Supervisors: Dr N Carstens and Associate Professor Z Lombard

**MOTSOENENG, Boitumelo Madika**

*Virology*

**THESIS:** Defining Fc-mediated functions in people living with HIV during respiratory viral infection and vaccination  
People living with HIV who have impaired immunity are burdened with severe respiratory diseases and respond poorly to vaccination. This thesis described the differential antibody cytotoxic functions in people living with HIV after influenza vaccination and showed these were protective against influenza-illness. SARS-CoV-2 infection and vaccination resulted in delayed but comparable humoral response kinetics in these participants. These findings, resulting in three publications, provide insights for future vaccine strategies, informing correlates of protection and supporting vaccination in this population.

Supervisors: Professor P Moore and Dr S Richardson

**MUDZI, Patricia Yeukai**

*Nursing Education*

**THESIS:** Public nursing colleges' readiness for integration into the higher education sector in South Africa using an Organisational Development Framework

Integrating nursing colleges into higher education is crucial for global alignment and advancing nursing science. In South Africa, public nursing colleges offer accredited programmes yet governance and capacity constraints persist amid changing to higher education. Using an organisational development lens within a multi-method research design this study investigated the readiness for change of nursing colleges. Data from a scoping review, and quantitative and qualitative studies were triangulated to identify key organisational inputs and priorities relating to infrastructure, funding, technology, policies, human resources, and organisational culture. An intervention strategy was developed to guide nursing education institutions through the change process.

Supervisors: Dr S Mabizela and Professor J Bruce

**MUREREREHE, Julienne**

*Community Dentistry*

**THESIS:** Risk factors for caries and periodontal diseases: A comparative study among HIV-Positive and HIV-Negative adults in Nyarugenge District, Rwanda

The study assessed caries, periodontal status, and associated risk factors among HIV-positive compared to HIV-negative adults in Rwanda. A higher prevalence of caries and periodontal diseases was among HIV-positive persons than HIV-negative participants. In addition to shared risk factors, increased CD4 counts, and HIV-medication was associated with oral diseases. Poorer Oral Health-Related Quality of Life was among HIV-positive adults than HIV-negative individuals. The study results are important to inform a multidisciplinary oral care strategy for HIV-positive persons in Rwanda.

Supervisors: Professor V Yengopal and Professor Y Malele-Kolisa

**MUTI, Monica**

*Paediatrics and Child Health*

**THESIS:** Relationship of diet and physical activity with genetic susceptibility to obesity: A longitudinal analysis in adults in South Africa

The thesis demonstrated geographical, male and female differences between physical activity and adiposity across African populations. Furthermore, a genetic risk score was developed, which revealed higher risk of developing severe obesity over time in women compared to men. Novel gene-environment interactions were also identified between diet, physical activity and adiposity, illustrating the complex interplay of factors influencing obesity in African populations.

Supervisors: Dr T Chikowore, Dr L Ware and Professor S Norris

**MWEENE, Morgan Dimakweenda**

*Internal Medicine*

**THESIS:** Sepsis associated acute kidney injury biomarker profile and outcome

Sepsis-associated acute kidney injury (SA-AKI) is a significant contributor to morbidity and mortality in critically ill patients. The thesis examined a selection of novel biomarkers in patients with AKI diagnosed by creatinine and urine output, to assess their value in the diagnosis of SA-AKI, and their ability to predict mortality at 90 days in patients with sepsis admitted to the intensive care units at Charlotte Maxeke Johannesburg Academic Hospital and Chris Hani Baragwanath Academic Hospital. Urine Neutrophil gelatinase-associated lipocalin was the strongest discriminator associated with SA-AKI among the novel biomarkers tested with reasonable accuracy in the prediction of mortality at 90 days.

Supervisors: Dr C Dickens, Professor G Paget and Professor G Richards

**NAIDOO, Vivash**

*Internal Medicine*

**THESIS:** An *in-silico* analysis of the glycosylation inhibitors Brefeldin A and Tunicamycin C in colorectal cancer; characterization of novel targets

This is a novel *in-silico* investigation of the therapeutic role of the glycosylation inhibitors Tunicamycin and Brefeldin in colorectal cancer. Thymidine kinase 1, Protein Kinase C, and Map Kinase 1, promoters of cell proliferation, were computationally identified as key target proteins. Dynamic molecular modelling simulations indicate that both drugs induce conformational changes in these protein targets, to inhibit their activity. These findings will lead to developing novel inhibitors against Thymidine kinase 1 and Protein Kinase C, blocking glycosylation and cell growth, thus providing therapeutic strategies against this cancer.

Supervisors: Dr C Penny, Dr S Mirza and Dr R Hull

**NSINGWANE, Zanele**

*Surgery*

**THESIS:** Identification of (novel) immune targets with potential roles in the progression of pancreatic ductal adenocarcinoma (PDAC)

This thesis investigated the expression profile of immune response-related genes in patients with Pancreatic Ductal Adenocarcinoma (PDAC). Complement pathway components C3 and C5 were shown to be elevated in early-stage disease but reduced as the tumour progressed. In vitro experiments revealed that blocking the complement pathway intensified tumour aggression, stimulating cellular growth, proliferation, and migration, shedding light on the potential involvement of the complement pathway in PDAC. These findings could pave the way for targeted therapies to improve patient outcomes.

Supervisors: Dr E Nweke, Associate Professor T Augustine and Professor G Candy

**NTAMATUNGIRO, Alex John**

*Public Health*

**THESIS:** Trend of pre-antiretroviral therapy HIV-1 drug resistance in Kilombero and Ulanga antiretroviral cohort, South-Western Tanzania, for over 15 years (2005-2020)

Pretreatment HIV drug resistance can limit the effectiveness of antiretroviral therapy. This thesis investigated the trends and patterns of pretreatment HIV drug resistance in the Kilombero and Ulanga antiretroviral cohort in rural Tanzania. The study highlights the benefit of programmatic uptake of dolutegravir-based antiretroviral therapy in low- and middle-income countries. Moreover, emphasises the necessity of stepping up routine surveillance of HIV drug resistance prior to therapy, particularly for those with recently acquired HIV.

Supervisors: Associate Professor J Kagura, Professor J Francis and Professor M Weisser

**OBIMAKINDE, Abimbola Margaret**

*Family Medicine*

**THESIS:** Children on the streets of Ibadan, Nigeria: Experiences, family dynamics and health status

Mixed-methods explored family dynamics, lived experiences, health, and needs of children-on-the-streets. Participants included children-on-the-streets, child welfare-officers, street shop-owners, and parental figures. Analysis (Atlas-Ti & SPSS) revealed the children averaged 15.8years, averaged 4years street dweller, and were from broken large-sized poor families with poor filial relationships. Health problems included injuries, dental problems, lower BMI, household hunger, sexual, verbal and substance abuse. Many experienced school failures, adverse street events and their unmet needs stemmed from governmental and parental child's rights neglect.

Supervisor: Associate Professor S Moosa

**PHASWANA, Merling**

*Biokinetics*

*THESIS:* Sedentary behaviour in a sample of South African office-based workers

This thesis examined the effectiveness of 12 weeks height-adjustable sit-to-stand desk intervention on sedentary behaviour and health outcomes in office-based workers. It also explored workers' experiences and early withdrawal in a sedentary behaviour intervention to reduce sedentary behaviour at work. The findings indicate that short-term use of height-adjustable desks effectively decreases sedentary behaviour in the workplace and shows potential for enhancing cardiometabolic health outcomes. This thesis concludes that prolonged implementation of such interventions could lead to notable long-term benefits.

Supervisor: Associate Professor P Gradidge

**SCHWALBE, Nina Rebecca**

*Clinical Microbiology and Infectious Diseases*

*THESIS:* Equitable access to vaccines: Exploring the role of the acceptability, accessibility, affordability, availability with a focus on COVID-19

Building on previous access to medicines definitions, this thesis focuses on the practical application of the "4A's" framework (Availability, Affordability, Acceptability, Accessibility), exploring associated successes (and failures) of supply-side policy interventions for each. The research combines various methods, including narrative review, expert knowledge, website and document review, and data and statistical analysis. It explores the role of incentives for vaccine uptake and develops a novel proof-of-concept model assessing equity in the rollout of COVID-19 vaccines rollout in New York City.

Supervisors: Professor M Nunes and Dr C Cultand

**SEABI, Tshegofatso Martha**

*Public Health*

*THESIS:* Adolescent health in rural South Africa: Building an evidence-base to inform a health promotion intervention supporting healthier lifestyles

In South Africa, rural adolescents face a double burden of malnutrition marked by both undernutrition and overnutrition. This thesis examined changes in adolescents' BMI between 2007 and 2018; explored adolescents' perceptions of obesity; and assessed the feasibility and acceptability of a community health worker-led intervention to promote healthier lifestyles among adolescents. Findings from this work highlight the need for more adolescent-focused interventions and provide insights into the importance of context specific health promotion strategies.

Supervisors: Professor K Kahn and Dr R Wagner

**SHOKO, Mercy**

*Public Health*

*THESIS:* Exploring the relationship between orphanhood status, living arrangements and sexual and reproductive health outcomes among female adolescents in Southern African

The thesis uses comparable data from nine Southern African countries to show the complex interplay between non-coresidency with parents, whether due to orphanhood or general absence, and heightened risk of adverse sexual and reproductive health outcomes. It underscores the central role of parent-child coresidency in fostering positive adolescent health, a departure from exclusive focus on orphanhood or parental absence.

Supervisors: Professor K Kahn and Dr C Ginsburg

**SHONGWE, Sithembile Siphwe**

*Nursing Education*

*THESIS:* A Framework for Integrating Simulation into the Bachelor of Nursing Science Programme in Eswatini

A mixed method approach was used to develop a framework for guiding the integration of simulation in the preparation of undergraduate nursing students in Eswatini, guided by the NLN Jeffries simulation theory. A scoping review identified best practices, and an audit identified the current state of simulation use in nursing education in Eswatini. The framework was developed together with simulation experts and validated by means of a Delphi study. It provides a step-by-step approach for the successful integration of simulation.

Supervisors: Dr S Armstrong and Dr C Thurling

**SILAULE, Olindah Mkhonto**

*Occupational Therapy*

*THESIS:* Developing strategies for alleviating caregiver burden among informal caregivers of persons with severe mental disorders in Bushbuckridge, Mpumalanga Province

Informal caregivers of persons with severe mental disorders are faced with high levels of distress. This study employed a mixed method approach to explore the extent of the burden of care and develop strategies for alleviating this burden among informal caregivers of persons with severe mental disorders in Bushbuckridge, Mpumalanga Province. The findings informed the development of a multilevel conceptual framework for alleviating caregiver burden in low-resourced settings with strategies at the individual, interpersonal, organisational, community, and policy levels.

Supervisors: Dr N Nkosi and Dr F Adams

**SODO**, Pumla Pamella

*Public Health*

*THESIS:* Attrition in the dental therapy profession: An exploration of the contributing factors and solutions  
This mixed-methods thesis examines the attrition rate and factors contributing to attrition in the South African dental therapy profession using Herzberg's Two-Factor Theory and the Human Resources for Health System Development framework. The thesis significantly contributes to existing knowledge on attrition by offering valuable insights into an under-researched area, enhancing the understanding of factors influencing workforce retention and attrition, and providing practical recommendations to address these issues.

Supervisors: Dr S Jewett Nieuwoudt, Professor M Nmutandani, and Professor V Yengopal

**VAN STORMBROEK**, Kirsty

*Occupational Therapy*

*THESIS:* Contextually responsive support and development strategies for generalist occupational therapists delivering hand-injury care in South Africa

Hand injuries are common and hand rehabilitation is essential for hand-injured patients to return to participating in life and earning a livelihood. The therapists responsible for this rehabilitation typically have limited expertise, in complex settings with limited support, supervision and resources. The evidence generated from four studies within this PhD was synthesised to develop evidence-based guidelines for the support and development of these therapists towards strengthening quality hand rehabilitation in the public sector.

Supervisors: Professor L O'Brien, Dr T Rauch-van der Merwe and Professor H Myezwa

**XELWA**, Ntombikayise Hendrietta Marcia

*Surgery*

*THESIS:* Gene expression patterns of signalling pathways in PDAC: Towards inhibiting metastases

This project aimed to discover potential novel therapeutic targets for PDAC in cohort of South African patients. Using targeted gene expression arrays, SPP1 was demonstrated to be highly expressed in PDAC tumours. By using RNA interference to knockdown SPP1 in MIA PaCa-2 cells and combining it with gemcitabine, the study discovered that it enhanced the apoptotic response and reduced cell migration and invasion. Proteomic analyses revealed the cellular processes affected by SPP1 downregulation, suggesting that SPP1 could be a promising therapeutic target for PDAC treatment, especially as a combination therapy.

Supervisors: Dr E Nweke, Professor G Candy and Associate Professor T Augustine