

**FACULTY OF HEALTH SCIENCES**

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

**Doctor of Philosophy**

**ABOBAKER**, Magdi Elzubir Ali

*Pharmacy and Pharmacology*

**THESIS:** A Multi-Component, Dual-Release Topical Platform for Skin Cancer

This thesis presents a synergistic multi-component, dual-release topical drug delivery system for the management and treatment of skin cancer. This was achieved through the integration of fast-release chemotherapy, using curcumin-coated iron oxide nanoparticles, with sustained-release interferon-alpha immunotherapy, loaded in a topical hydrogel system. This study demonstrated improved anticancer activity, targeted delivery and enhanced biocompatibility, with the developed platform offering a potential system for improved patient outcomes, reduced systemic toxicity, and greater treatment precision for melanoma and non-melanoma skin cancer.

**Supervisors:** Professor Y Choonara and Dr M Govender

**BHANA**, Ridhwaanah

*Haematology and Molecular Medicine*

**THESIS:** Disruption of HBV gene expression using TALEN encoding Adeno-associated viral vectors

The thesis reports the development of a viral vector-based gene therapy against chronic hepatitis B, an incurable disease that continues to pose a significant health challenge worldwide. This study successfully delivered artificial nucleases (TALEN) using Adeno-associated viral vectors (AAVs) to specifically target and inactivate hepatitis B viral DNA. Findings revealed a substantial decrease in hepatitis B virus replication markers in both cell culture and animal models, with no signs of toxicity.

**Supervisors:** Associate Professor B Maepa and Professor P Arbuthnot

**BOANYAH**, Godfred Yaw

*Microbiology*

**THESIS:** Investigating life history characteristics of *Anopheles arabiensis* infected with *Microsporidia* MB, a *Plasmodium falciparum* blocking symbiont

This thesis investigated the impact of diet on the intensity and spread of *Microsporidia* MB (MB) in infected *Anopheles arabiensis*. MB conferred fitness benefits to mosquitoes were diet-dependent without detrimental effects even under limited diet. Tetramin 0.3 mg/larva/day and 6% glucose were the best diet regimes for mass rearing MB mosquitoes, crucial for future field releases. MB mosquito colonies were successfully established for the first time. These findings provide basis for the advancement of MB as a malaria control tool.

**Supervisors:** Dr J Herren, Professor L Koekemoer and Dr T Bukhari

**BOOTH**, Zelna

*Pharmacy and Pharmacology*

**THESIS:** Traditional medicine use in two public South African hospitals: Prevalence and interactive antimicrobial studies for combinations with conventional antimicrobials

This study provides critical insights into the interaction between traditional medicinal plants and conventional antimicrobials for the treatment of infectious diseases in South Africa. Through a combination of epidemiological surveys and laboratory-based antimicrobial and toxicity interaction studies, it offers foundational evidence to support safe integration of traditional medicine into the broader healthcare system. The work aligns with the World Health Organisation's universal healthcare objectives and proposes a novel approach to addressing the growing challenge of antimicrobial resistance in the country.

**Supervisors:** Professor SF van Vuuren and Professor SY Essack

**BOTHA, Ruan**

*Public Health*

**THESIS:** Occupational exposure to antineoplastic drugs and the development of tailor-made risk control strategies in South African oncology pharmacies

In this research, we investigated occupational exposure to antineoplastic drugs to pharmacists in the private sector. An observational survey was undertaken and local guidelines and regulations were evaluated. Surface contamination measurements and biological samples confirmed the presence of antineoplastic drugs on surfaces in the pharmacies and in some of the participants' urine. Based on the findings, decontamination and the use of personal protective equipment emerged as key interventions. The study provided evidence-based recommendations for South African oncology pharmacy practices, worker protection, and policy development.

**Supervisors:** Professor D Brouwer and Professor G Nelson

**CONSTANTINO, Demitri**

*Therapeutic Sciences*

**THESIS:** Methylphenidate: Physiological, neurocognitive, balance, and physical performance effects

A randomised, double-blind study investigated methylphenidate's effects on healthy adults. Results showed no significant differences between methylphenidate and placebo in physiological parameters, balance, or handgrip strength. Neurocognitive improvements occurred but were similar to placebo, with large effect sizes. ECG revealed no cardiac abnormalities. Findings suggest methylphenidate offers no significant enhancement over placebo in healthy adults, emphasising the need to control for practice effects and supporting short-term safety.

**Supervisors:** Professor A Rothberg and Professor M Lambert

**DINAT, Sarhana**

*Pharmacy and Pharmacology*

**THESIS:** Natural alternatives for the treatment of *Helicobacter pylori* and gastric ulcers

This study investigated South African natural products, including traditionally used medicinal plants, honey, and propolis, against *Helicobacter pylori*, a pathogen linked to gastric ulcers and growing antibiotic resistance. Selected natural products possessed strong anti-*H. pylori* activity, held no negative effects on naturally occurring gut microbiome species, and showed increased activity when combined with probiotics. These novel findings published in three publications support South African natural products as promising complementary therapies for managing *H. pylori* infections and gastric ulcers, while protecting the gut microbiome.

**Supervisors:** Professor S van Vuuren and Dr A Orchard

**DLADLA, Thobekile Precious**

*Physiology*

**THESIS:** The potential protective effects of stearic acid against diet-induced metabolic syndrome in growing fructose-fed sprague-dawley rats

Although saturated fats and fructose are commonly added to food, they have been associated with poor metabolic health. Recent studies have shown that some saturated fats can have positive health benefits. This study investigated the impact of a diet enriched with the saturated fat, stearic acid and high-fructose on general health, liver fat deposition and kidney health of rats. Stearic acid prevented high-fructose diet induced metabolic disorders and thus should be considered when saturated fat is required in the preparation of foods high in fructose.

**Supervisors:** Professor KH Erlwanger, Professor AR Ndhla and Dr MT Madziva

**DREYER, Abigail Ruth**

*Public Health*

**THESIS:** A comparative study of decentralised training platforms in undergraduate medical education at four South African universities

This thesis explored decentralised training platforms at four South African universities and their role in transformative medical education. It found that learning at decentralised training platforms enhance students' understanding of patients' contexts, improve their communication and empathy towards patients. Clinical educators emerged as vital mentors and role models to the students, despite the pressures of balancing service and teaching. The thesis underscored the need for ongoing professional development for clinical educators, sustainable financial and human resources to support and sustain the long-term impact of decentralised training in health professions education. The findings highlight the conceptual and theoretical discourse on education at decentralised training platforms and transformations in medical education.

**Supervisors:** Professor A Stewart and Dr S Pilusa

**EGUAVOEN**, Idemudia

*Anatomical Sciences*

**THESIS:** Diabetic skeletopathy of the Sprague-Dawley rat mandible in a chronic alcohol intake and antiretroviral therapy: An immunohistochemical and micro-focus X-ray computed tomography study

Type 2 diabetes, excessive alcohol consumption, and combination antiretroviral therapy (cART) due to HIV infection are among the most common health burdens in South Africa. This study investigated their combined impact on diabetic rat mandibles. Diabetes negatively affected mandibular dimensions and trabeculae, disrupted parathyroid hormone and calcitonin profiles, reduced bone forming cells with increased BMP-3 expression, all exacerbated by combined alcohol and cART, weakening bones. Diabetic patients should reduce alcohol intake and have their bone health monitored when undergoing cART.

**Supervisors:** Professor R Ndou and Professor EF Mbajorgu

**FARLANE**, Lindiwe

*Wits Reproductive Health and HIV Institute*

**THESIS:** Implementation evaluation of the Paediatric and Adolescent Scale-up Plan for 90-90-90 HIV outcomes in the inner City of Johannesburg, South Africa

This thesis used interrupted time series analysis to evaluate the effect of strategies aimed to improve clinical outcomes among HIV exposed children and adolescents. Overall, facility-based HIV care strategies compared to community-based showed better outcomes. Index and key entry point HIV testing are promising interventions for case finding, while enhanced clinical care with adherence counselling are associated with viral load suppression. Considering dwindling HIV program resources, promising interventions should be integrated into routine care to achieve 95% coverage by 2030.

**Supervisors:** Associate Professor L Fairlie and Associate Professor S Mullick

**FARONBI**, Grace Oluwatoyin

*Nursing Education*

**THESIS:** Reducing cardiovascular disease risks among retired older adults in Osun State Nigeria: An intervention study

Cardiovascular disease poses a significant threat to global health, particularly among older adults. This thesis developed, validated, and tested a nurse-led educational intervention programme to reduce cardiovascular disease (CVD) risk among retired older adults in Nigeria. The researcher employed an exploratory sequential multimethod approach to conduct the study in three phases. The intervention successfully reduced CVD risk among the participants. Their knowledge, perceptions, and intentions to make changes improved significantly ( $P < 0.014$ ), with positive changes in their biophysical measurements.

**Supervisors:** Dr AM Tshabalala and Associate Professor S Schmollgruber

**HALEY**, Cheryl Anne

*Physiotherapy*

**THESIS:** The impact of COVID-19 on Endurance Athletes' return to Pre-illness level of participation

This thesis examined the physiological and psychological impact of COVID-19 on endurance athletes' return to sport using a biopsychosocial framework. Cardiorespiratory symptoms delayed return to training, and post-COVID-19 fitness was lower than matched controls. Peak performance depends on optimal function of respiratory, cardiovascular, and muscular systems. Integrated quantitative and qualitative findings showed that quality of life declined following COVID-19, largely due to prolonged recovery. The study highlights the multifaceted barriers to returning to pre-illness sport participation in endurance athletes.

**Supervisors:** Professor H van Aswegen and Professor B Olivier

**HERBAYE**, Worku Woldegiorgis

*Physiotherapy*

**THESIS:** The Profile and psychosocial impact of burn injuries among children and their caregivers in Addis Ababa, Ethiopia

The multiple methods of this study identified the gaps in the burn injury prevention programme in place in Addis Ababa. Additionally, findings indicate caregivers' lack of first aid implementation knowledge and the impact of the burn injury on children's health related quality of life. Prevention strategies are outlined to minimize the extent and level of disability post-burn injury and increase the quality of life of children and their caregivers in Addis Ababa Ethiopia.

**Supervisors:** Professor V Ntsiea, Associate Professor R Roos and Dr T Agizew

**IYIOLA, Cherry Efe**

*Nursing Education*

**THESIS:** An intervention for family involvement in the care of adult intubated and mechanically ventilated patients with delirium

This study developed and validated a multicomponent intervention to support family involvement in the care of intubated, mechanically ventilated patients with delirium. Using a mixed-methods design, key strategies were identified and refined through qualitative analysis and Delphi validation. The final intervention enables intensive care nurses to engage families meaningfully and improve patient and family experiences in critical care.

**Supervisor:** Associate Professor S Schmollgruber

**KHOZA, Leon Joseph**

*Pharmacy and Pharmacology*

**THESIS:** Functionalized immunomodulatory biopolymeric nanosystem for the targeted delivery of anti-Tuberculosis Bioactives

This thesis developed a  $\beta$ -glucan-functionalized immunomodulatory biopolymeric nanosystem for targeted delivery of anti-TB bioactives. The system demonstrated enhanced macrophage targeting, potent bactericidal activity, and immune modulation in vitro, enabling effective killing at reduced drug doses. By addressing both pathogen elimination and host immune activation, the work presents a promising host-directed therapeutic strategy. Its translational potential and scientific merit led to a patent filing, contributing meaningfully to the advancement of nanomedicine-based interventions for tuberculosis.

**Supervisors:** Professor Y Choonara, Professor P Kumar and Professor A Dube

**LOUW, Nadja**

*Human Genetics*

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

This study applied bioinformatics tools to detect copy number variants in exome sequencing data for a cohort of patients with developmental disorders. This approach was shown to be an effective way of identifying disease associated variants and a cost-effective genomic analysis using existing data. Using this approach, an additional 7% of potentially disease-causing variants were identified over and above traditional analyses. The work highlighted the utility of this approach in improving diagnosis in resource-limited settings.

**Supervisors:** Professor Z Lombard and Dr N Carstens

**MAGNI, Sarah Elizabeth**

*Public Health*

**THESIS:** Mechanisms leading to transactional sex-understanding pathways for women and men in urban informal settlements

This study explored transactional sex among women and men in South African urban informal settlements. It introduced a new measure of transactional sex and utilised structural equation modelling and latent class analysis on data from two randomised controlled trials. Women engaged in transactional sex when their primary male partners were more controlling. Men used transactional sex when they held more restrictive views of masculinity. The research supports multi-level interventions addressing gender norms and economic drivers.

**Supervisors:** Associate Professor N Christofides, Dr A Hatcher and Dr J Wamoyi

**MAPENGO, Rutendo Eugenia**

*Clinical Microbiology and Infectious Diseases*

**THESIS:** Investigating diagnostic methods for histoplasmosis and the ecological niche and comprehensive population structure genomic analysis of African *Histoplasma capsulatum*

This thesis explored the epidemiology, diagnostics, and molecular characteristics of the high-priority fungal pathogen *Histoplasma* in South Africa. A novel African clade, *Histoplasma africanus* sp. nov, was identified through genomic analysis. National laboratory surveillance data revealed the burden of endemic mycoses including histoplasmosis, while diagnostic assays were evaluated in people living with HIV. Environmental sampling confirmed *Histoplasma* presence in bat-inhabited caves. This highlights the need for increased clinical awareness, accessible point-of-care diagnostics, and research to guide region-specific public health interventions.

**Supervisors:** Professor N Govender and Dr T Maphanga

**MATIWANE**, Busisiwe Precious

*Public Health*

**THESIS:** Multiple job holding among public sector medical doctors, professional nurses and rehabilitation therapists in Gauteng and Mpumalanga

This novel PhD focused on public sector health professionals who also work in the private sector. It generated new knowledge on the prevalence, forms, and factors influencing multiple job holding among public sector medical doctors, professional nurses, and rehabilitation therapists, and is one of the first studies to investigate the preferences of these workers for different ways of regulating multiple job holding. The study methodology and findings have global relevance, while providing critical insights for policy review in South Africa.

**Supervisors:** Professor L Rispel and Dr D Blaauw

**MATOGA**, Mitch Mirichi

*Public Health*

**THESIS:** Effectiveness of intensified health education, SMS/telephone tracing and transport reimbursement in increasing the uptake of voluntary medical male circumcision among men attending a sexually transmitted infections clinic in Lilongwe, Malawi: a pre- and post-interventional study

This thesis demonstrated the effectiveness, acceptability, feasibility and appropriateness of using transport reimbursements, intensified health education and SMS/telephone tracing (The RITe intervention), in enhancing voluntary medical male circumcision (VMMC) uptake among uncircumcised men with sexually transmitted infections at sexual and reproductive health clinic in Lilongwe, Malawi. The thesis highlighted the importance of implementation science research in improving programs such as the VMMC program and the potential of scale-up of the RITe intervention in VMMC programs in Malawi and other settings.

**Supervisors:** Professor M Hosseinipour, Professor C Chasela and Dr S Jewett

**MUKORA**, Rachel Wanjiru

*Public Health*

**THESIS:** The feasibility, acceptability and cost-effectiveness of using treatment monitors with a differentiated care approach to improve TB treatment adherence in South Africa

Digital Adherence Technologies have the potential to accurately monitor and support TB treatment adherence thus improving TB treatment success rates. This thesis sought to determine the feasibility, acceptability and cost-effectiveness of an adherence monitoring and support system involving the Wisepill evriMED 1000 device to inform a Differentiated Care Approach involving text messages, phone calls and home visits in three provinces of South Africa. The evidence generated will help guide policy decisions on which DAT to prioritize for successful large-scale implementation.

**Supervisors:** Associate Professor S Charalambous and Dr C Chetty-Makkan

**NZABONIMANA**, Emmanuel

*Community Dentistry*

**THESIS:** Oral Health in Nyarugenge District of Rwanda: The Role of Mobile Application in Oral Health Education

This thesis generated new knowledge on the oral health knowledge, attitudes, and practices among adults in Nyarugenge District, Rwanda, and highlighted challenges faced by oral health professionals in providing dental services to the community. A mobile App for oral health education was found to be feasible and widely accepted, particularly among younger participants. Significant gaps were identified in public awareness, preventive tools, and healthcare resource constraints. The study underscores the potential use of a mobile App based oral health education to improve oral health behaviours and support overburdened dental services in low-resource settings.

**Supervisors:** Professor P Hlongwa and Adjunct Professor Y Malele-Kolisa

**OLORUNMOTENI**, Oluwatosin Eunice

*Physiology*

**THESIS:** Sleep characteristics among In-school Adolescents in South-Western Nigeria: Pattern, Determinants and Association with Cardiometabolic risk factors

This study assessed sleep characteristics among 900 rural and urban Nigerian adolescents using sleep questionnaires, actigraphy, and health assessments. Existing knowledge on Adolescent Sleep in Africa was summarized in a scoping review. She found shorter sleep duration and poorer sleep quality among urban adolescents, linked with higher cardiometabolic risk. Poor sleep health was associated with early school start and late end times. Targeted sleep health interventions are recommended for African adolescents, particularly in urban areas, to mitigate health risks.

**Supervisors:** Associate Professor K Scheuermaier, Associate Professor FX Gómez-Olivé and Professor AO Fatusi

**POOPEDI, Evida**

*Clinical Microbiology and Infectious Diseases*

**THESIS:** Evaluation of occupational health risks from bacterial contaminants at wastewater treatment plants in Gauteng Province, South Africa

This thesis investigated health risks among wastewater treatment plant workers in Gauteng, South Africa, focusing on respiratory and enteric bacterial pathogens. It identified several pathogenic bacteria in wastewater and bioaerosols, revealed novel antibiotic resistance genes and detected spontaneous mutations in *Legionella pneumophila* linked to resistance. By quantifying infection risks across different workstations, the study provides compelling evidence for enhancing personal protective equipment use, tailored safety training and risk-based interventions, marking an important contribution to occupational health in high-risk environments.

**Supervisors:** Associate Professor T Singh and Dr A Gomba

**RAMADHAR, Anishka**

*Public Health*

**THESIS:** Understanding the epidemiology and pathways to care of gastric cancer in South Africa

The thesis explores gastric cancer (GC) epidemiology and care pathways in sub-Saharan Africa (SSA) and South Africa (SA). It includes a systematic review, a cross-sectional study using registry data, and interviews with healthcare professionals. Findings reveal high variability in GC incidence across SSA, differential exposure to risk factors in SA, and challenges in the GC care pathway. Accurate estimation of SA GC burden is crucial for public health policies and improved patient outcomes through early diagnosis and robust treatment plans.

**Supervisors:** Dr M Muchengeti, Associate Professor J Kagura and Dr N Khamisa

**RAMATSEBE, Majoalane Tina Maria**

*Clinical Microbiology and Infectious Diseases*

**THESIS:** Molecular evaluation of the association of the vaginal microbiome and adverse pregnancy outcomes in South Africa

This study evaluated the vaginal microbiome at delivery among South African pregnant women using a multiplex qPCR assay. Women living with HIV and those with preterm birth or stillbirth, showed a higher prevalence and density of community state type-III and community state type-IV microbiota, commonly associated with dysbiosis. In contrast, *Lactobacillus gasseri* was more prevalent in healthy term deliveries. These findings underscore the role of vaginal microbiome imbalance in adverse pregnancy outcomes and highlight the need for targeted interventions to improve maternal-neonatal health.

**Supervisors:** Professor SA Madhi, Professor MC Nunes, and Dr CP Olwagan

**SHAFE, Mercy Omoje**

*Physiology*

**THESIS:** Lycopene: Protective potential against diet-Induced metabolic derangements in Wistar rats

This study investigated the prophylactic potential of lycopene, a phytochemical with antioxidant activity, against dietary fructose-induced metabolic disturbances in growing Wistar rats mimicking adolescents fed an obesogenic diet. As a dietary supplement lycopene enhanced antioxidant activity, prevented hepatic steatosis and enhanced gastrointestinal, kidney, liver, and bone health of the rats. Furthermore, it mitigated dietary fructose-induced metabolic derangements thus demonstrated potential to be used as a dietary supplement that can enhance the health of growing children exposed to obesogenic diets.

**Supervisors:** Professor E Chivandi, Professor TT Nyakudya, and Dr NM Gumede

**SILIMA, Mpho**

*Public Health*

**THESIS:** Exploring the HIV/AIDS infection, intimate partner violence experience and poor mental health syndemic and its association with parenting amongst women in Mpumalanga

The mixed-methods thesis explored how the syndemic of HIV, intimate partner violence (IPV), and poor mental health (MH) shapes parenting among women in Mpumalanga, South Africa. Findings reveal that IPV and MH interact in ways that heighten use of emotional abuse and complicate caregiving among those in a mother-role. Childhood trauma, economic hardship, and fractured relationships with fathers further strained parenting. The study deepens syndemic theory by highlighting how structural and psychosocial adversities intersect to undermine women's wellbeing and parenting.

**Supervisors:** Associate Professor N Christofides, Dr F Meinck, Dr H Franchino-Olsen and Dr N Woollett

**SINGARAM**, Kerry-Ann

*Nursing Education*

**THESIS:** Development of a neonatal intensive care short course for singly qualified professional nurses practising in Johannesburg

A practical, evidence-based solution to enhance neonatal care and reduce preventable deaths was developed for singly qualified nurses who do not have access to formal postgraduate courses. This group is at the forefront of providing specialised care to neonates but lack the knowledge and skills to do so. The online short course development was guided by the ADDIE model and followed a mixed-methods approach. Best practices were identified, core competencies formulated, and a course outline validated through expert consensus.

**Supervisors:** Dr S Armstrong and Dr M Botes

**SINGH**, Prashika

*Haematology and Molecular Medicine*

**THESIS:** Targeted transcriptional silencing of hepatitis B virus using designer epigenome modifiers expressed from in vitro transcribed mRNA

Chronic hepatitis B affects up to 8% of sub-Saharan Africans due to persistent covalently closed circular DNA (cccDNA) untreatable by current therapies. This thesis evaluated mRNA-based designer epigenome modifiers (DEMs) to silence Hepatitis B virus (HBV) by targeting the viral genome, offering a safer alternative to gene editing. The first mRNA-encoded DEMs achieved significant reductions in replication markers in vitro without toxicity. These promising results highlight mRNA-based epigenome editing as a safer, innovative strategy to advance hepatitis B therapies.

**Supervisors:** Associate Professor A Ely and Professor P Arbuthnot

**TAKALANI**, Funanani

*Pharmacy and Pharmacology*

**THESIS:** Development of a nanoparticle-in-film matrix for enhanced antiretroviral drug absorption in the female genital tract

This study explored strategies for lipid-drug conjugation and delivery systems for enhancing antiretroviral drug efficacy. It therefore investigated the potential of nanocarriers for encapsulating tenofovir disoproxil fumarate, which was then integrated into a hydroxypropyl methylcellulose platform intended for localised vaginal use. The results suggested that incorporating hybrid nanoparticles into a film-based platform could preserve and sustain the release of bioactives in the female genital tract.

**Supervisors:** Professor Y Choonara and Professor P Kumar

**VAUGHAN**, Jenifer Leigh

*Haematology and Molecular Medicine*

**THESIS:** Evaluation of the association between tumour enrichment with M2-macrophages and survival among South African patients with Diffuse Large B-cell Lymphoma

Diffuse large B-cell lymphoma is a malignancy which is common among people living with HIV, where it has a more aggressive clinical course and generally poorer outcomes. This study investigated the immune milieu of HIV-associated diffuse large B-cell lymphoma, with emphasis on the role of anti-inflammatory (M2) tumour associated macrophages. The study revealed that HIV-associated diffuse large B-cell lymphoma has more pronounced immunological derangements than what is seen among HIV-negative patients, and that these differ in their prognostic impact.

**Supervisors:** Professor M Patel and Dr T Wiggill