NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service








ANNUAL REVIEW

2023/2024


SAMPLE
SAMPLE
SAMPLE





CONTENTS

CONTENTS





LIST OF ABBREVIATIONS

AFRICA	Asbestos Fibre Regular Informal Counting Arrangement
AOP	Adverse Outcomes Pathway
ARAOH	African Regional Association for Occupational Health
ASLM	African Society for Laboratory Medicine
AUDA	African Union Development Agency
BRICS	Brazil, Russia, India, China and South Africa
CCMA	Commission for Conciliation, Mediation and Arbitration
CDC	Centers for Disease Control and Prevention, US
CEFT	Committee for Evaluations and Technical Function
CEO	Chief Executive Officer
COIDA	Compensation for Occupational Injuries and Diseases Act
COVID-19	Coronavirus Disease
CPD	Continuing Professional Development
CSIR	Council for Scientific and Industrial Research
CTDC	Counter-Trafficking Data Collaborative
DMRE	Department of Mineral Resources and Energy
DoEL	Department of Employment and Labour
DOH	Diploma in Occupational Health
DOMH	Diploma in Occupational Medicine and Health
DPSA	Department of Public Service and Administration
DSI	Department of Science and Innovation
ESBB	European, Middle Eastern and African Society for Biopreservation and Biobanking
EU	European Union
FFR	Filtering Facepiece Respirator
FIOH	Finnish Institute for Occupational Health
FTIR	Fourier Transmission Infrared Spectroscopy
GEMP	Graduate Entry Medical Programme
GLP	Good Laboratory Practice
GPG	Gauteng Provincial Government
HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
HRA	Health Risk Assessment
HSE	Health, Safety and Environment
HSL	Health and Safety Laboratory, UK
HSRC	Human Sciences Research Council
HWSETA	Health and Welfare Sector Education Training Authority

LIST OF ABBREVIATIONS

ICOH	International Commission on Occupational Health
IEC	International Electrotechnical Commission
ILO	International Labour Organization
ISBER	International Society for Biological and Environmental Repositories
ISO	International Organization for Standardization
IT	Information Technology
MBA	Master of Business Administration
MBOD	Medical Bureau for Occupational Diseases
MCSA	Minerals Council South Africa
MHI	Moist Heat Incubation
MHSC	Mine Health and Safety Council
MMPA	Mine Medical Professionals Association
MoU	Memorandum of Understanding
MPH	Master's in Public Health
MRC	Medical Research Council
MSc	Master of Science
NBD	National Burden of Disease
NEDLAC	National Economic Development and Labour Council
NEPAD	New Partnership for Africa's Development
NHLS	National Health Laboratory Service
NICD	National Institute for Communicable Diseases
NIOH	National Institute for Occupational Health
NIOSH	National Institute for Occupational Safety and Health, US
NMBP	Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing
NMISA	National Metrology Institute of South Africa
NOMS-SA	National Occupational Mortality Surveillance South Africa
NRF	National Research Foundation
NRGC	Nano Risk Governance Council
NUM	National Union of Mineworkers
OECD	Organization for Economic Cooperation and Development
OEHS	Occupational and Environmental Health and Safety
OHASIS	Occupational Health and Safety Information System
OHORT	Occupational Health Outbreak Response Team
OHS	Occupational Health and Safety
OHSS	Occupational Health Surveillance System
OMP	Occupational Medicine Practitioner
PACC	Premier's Advisory Committee on COVID-19
PATHAUT	Pathology Disease Surveillance Database
PathReD	Pathology Research and Development Congress
PCM	Phase Contrast Microscopy
PCR	Polymerase Chain Reaction
PhD	Doctor of Philosophy
PMR	Proportional Mortality Ratio
PPE	Personal Protective Equipment

LIST OF ABBREVIATIONS

QCTO	Quality Council for Trades and Occupations
QMS	Quality Management System
qPCR	Quantitative Polymerase Chain Reaction
RedCap	Research Electronic Data Capture
SABCOHA	South African Business Coalition on Health and AIDS
SABS	South African Bureau of Standards
SACCESS	South African Collaborative COVID-19 Environmental Surveillance System
SACNSP	South African Council for Natural Scientific Professions
SADC	Southern African Development Community
SAFETP	South African Field Epidemiology Training Programme
SAIMR	South African Institute for Medical Research
SAIOH	Southern African Institute for Occupational Hygiene
SANAS	South African National Accreditation System
SARS	Severe Acute Respiratory Syndrome
SASOHN	South African Society of Occupational Health Nursing Practitioners
SASOM	South African Society of Occupational Medicine
SETA	Sector Education Training Authority
SHE	Safety, Health and Environment
SHSPH	School of Health Systems and Public Health
SOP	Standard Operating Procedures
SPH	School of Public Health
TB	Tuberculosis UK United Kingdom
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNISA	University of South Africa
URL	Uniform Resource Locator
USA	United States of America
UVGI	Ultraviolet Germicidal Irradiation
VH	Vapourised Hydrogen Peroxide
VOC	Volatile Organic Compound
WHO	World Health Organization
WHWB	Workplace Health Without Borders
Wits	University of the Witwatersrand
WPMN	Working Party on Manufactured Nanomaterials
WRC	Water Research Commission
WWTP	Wastewater Treatment Plant
XRD	X-ray Diffraction
XRF	X-ray Fluorescence

EXECUTIVE DIRECTOR'S OVERVIEW

Prof. Spo Kgalamono
Executive Director

The NIOH is the only World Health Organization (WHO) Collaborating Centre for Occupational Health in Sub-Saharan Africa and has maintained its status for the 17th consecutive year.

INTRODUCTION

I am pleased to present the National Institute for Occupational Health's (NIOH) review report for the 2023/24 financial year. Our report seeks to demonstrate how the Institute continues to be resilient and uphold its value and relevance in Sub-Saharan Africa during these uncertain times marked by resource constraints, while meeting its obligations to the NHLS and the occupational health fraternity. All key performance indicators were met, except one, which was negatively affected by austerity measures.

The NIOH is the only World Health Organization (WHO) Collaborating Centre for Occupational Health in Sub-Saharan Africa and has maintained its status for the 17th consecutive year. Alongside two institutions of higher learning, the NIOH has also been declared a Centre of Excellence nationally for its contribution to new knowledge and information generation through research and capacity building. The NIOH's multi-disciplinary team provides specialised occupational health services, most of which are the only offerings in the public sector or the country. It is important to note that the NIOH remains the only entity in South Africa that has achieved and maintained four South African National Accreditation System (SANAS) International Standards Organization (ISO) accreditation standards. The Institute continues to impact Occupational Health and Safety (OHS) practice (expert advice, policy development, legislative review, etc.) through participation in professional and technical committees across disciplines, nationally and internationally.

This has led to rich collaboration with many stakeholders to advance occupational health surveillance and initiate innovative projects to promote occupational health and prevent occupational injuries and diseases. This report highlights achievements and elaborates on critical activities undertaken for the period under review.

HIGHLIGHTS

Below are a few highlights focusing on activities covering specialised services, research, local and international partnerships, capacity building, surveillance, and support to the NHLS.

Specialised services

The specialised laboratories continue to strive for excellence in diagnostic services. The Pathology Division has made significant progress in opening its PCR laboratory to establish a centre of excellence in diagnostic cardiothoracic pathology. Unused equipment from other NHLS laboratories was acquired and serviced (as a cost-saving strategy), and preliminary validation and testing of molecular targets for lung cancer is underway.

A new initiative is PDL-1 testing for lung cancer, a service that currently exists only in the private sector. A pathologist in the division has been certified as a trainer after attending the internationally recognised Professional Expert Course on PD-L1 Testing (22C3) in Triple-Negative Breast Cancer Virtual Training. This service offering bridges the gap in the public sector.

The Occupational Hygiene Section addressed occupational health hazards as part of promoting the health and well-being of employees at workplaces. Most exposure assessments were conducted at the NHLS Laboratories as part of the Department of Employment and Labour's legal requirement for routine monitoring of hazardous chemical agents (HCA). The assessment reports recommended controls to guide the NHLS in reducing exposure to HCA as part of continuous occupational health and safety improvement. These assessments and those from other NIOH sections contributed to meeting the NHLS Annual Performance Plan target. The overall target was exceeded with a positive variance.

The Occupational Hygiene's XRD laboratory provided accredited analytical services directly supporting the Approved Inspection Authority's (AIA) operational functions. The laboratory's excellent output and consistently receiving satisfactory ratings for all methods in international performance testing schemes enhanced the quality of its services.

The Quality Assurance Section conducts internal audits for all different standards (ISO 15189, 17025, 17020, 9001) and assists the NHLS with pre-SANAS audits, including training NHLS quality management system (QMS) auditors and monitoring their competence. The Section also assisted with the KwaZulu-Natal public health laboratory maintenance of accreditation and extension of scope.

The SHE Department's mandate is to provide occupational health, safety, and environmental services to the NHLS. This is achieved by locating a team in six strategic areas nationwide. The coordination of services and communication between NHLS staff as our clients and SHE staff utilises various engagement methods, including the online Occupational Health and Safety Information System (OHASIS). OHASIS is used to monitor and react to incidents and occupational diseases within the NHLS workplace. Outside of the NHLS, the system has been implemented at other organisations to generate revenue. For example, an installation for the Western Cape Department of Health is being finalised, and progress has been made towards an installation for 14 departments in the Gauteng provincial government.

The Toxicology and Biochemistry Section boasts of one of the country's few CytoViva Hyperspectral Imaging (HSI) systems. The CytoViva platform identifies particles based on their unique spectral properties without using dyes/labels. The Section offers CytoViva HSI analysis system to occupational medical practitioners, occupational hygienists, pharmaceutical companies and universities. It has extended its services to include the United Nations Globally Harmonized System (GHS) of Classification and Labelling of Chemicals. In line with the newly revised Regulations for Hazardous Chemicals that require GHS compliance, the Section has started providing awareness sessions within the NHLS and will be rolling out the service externally.

The Occupational Medicine Specialist Referral Clinic assessed patients from different industries, 63% of whom were from the non-mining sector, while 37% were from the mining sector, the majority of whom suffer from respiratory problems. For musculoskeletal conditions, a collaborative effort was undertaken between the Clinic and the Ergonomics Unit, focusing on workers suspected of work-related upper limb disorders (WRULDs).

The Ergonomics Unit conducted several comprehensive ergonomics assessments in various workplaces, identifying ergonomic hazards and affected persons while highlighting the analysis and evaluation of risks associated with these factors. A quarter (25%) of the assessments were conducted for internal stakeholders within the NHLS, while the majority (75%) were for external stakeholders. Common issues noted from these assessments include factors relating to organisational, cognitive and physical ergonomics. A recommended approach to addressing these factors is an all-encompassing intervention, recognising and integrating ergonomics principles in all occupational health and safety strategic planning, work systems design and continuous reviews.

The Immunology and Microbiology Section's Waterborne Pathogens Unit tested 590 water samples, including potable (tap, borehole, spring, and bottled) and non-potable (raw wastewater, treated wastewater, greywater, harvested rainwater, stormwater, and river water) samples, in several workplaces including municipalities and healthcare facilities. The aim is to determine if the water quality is suitable for its purpose, monitor water treatment effectiveness, prevent waterborne infections in workers and the public, and develop mitigation strategies.

Research

New knowledge generation is a mandate of the Institute, and the focus for the year under review included contributing to the Department of Employment and Labour's strategy to eliminate silicosis in the non-mining sector by 2030. Several sections within the NIOH collaborated to evaluate silica exposure levels, assess workers for silicosis, and develop training material for employees, employers and occupational health practitioners to prevent and control silica exposure. This project involved external collaborators and was completed in February 2024.

Ongoing research is investigating the impact of load shedding on indoor air quality, fungal contamination in Forensic Pathology Services, and health risks associated with wastewater treatment plants. In addition, some applicable research aims to provide solutions in different workplaces. The NIOH three-year intervention study has been concluded to assess occupational exposures, oxidative stress, and the impact on health among petrol attendants in Johannesburg, South Africa.

The NIOH Research Committee's efforts in supporting emerging researchers and strengthening the research process have borne fruit, with 30 publications produced for the period under review. Of these, 28 were peer-reviewed journal articles and two book chapters. A unique research thrust is to build capacity for evaluating wellness and disease using SANAS standards to improve the quality of services.

Local and international partnerships

The Institute maintained strategic partnerships by participating in technical committees and fora that influence policy and legislative reforms at national and international levels. NIOH Staff participated in various influential technical committees, such as the National Economic Development and Labour Council (NEDLAC), the Regional Biosafety and Biosecurity Technical Working Group – Southern Africa, the South African Society of Occupational Medicine (SASOM), the South African Society of Occupational Health Nursing Practitioners (SASOHN), and the Southern African Institute for Occupational Hygiene (SAIOH), among others.

The NIOH is the secretariat for the national Department of Health-led Steering Committee for health workers' occupational health, which aims to provide policy, health services and programmes, including surveillance and funding for health workers' occupational health and safety. In collaboration with the Department of Employment and Labour, the NIOH has been appointed the secretariat and partner in a newly developed agricultural sector occupational health and safety committee, which aims to promote occupational health and safety in the farming sector.

The NIOH hosted an internationally renowned professor in histopathology from the University of Pennsylvania (USA), accompanied by pathology registrars from the USA and Botswana. This visit allowed the Pathology Division an opportunity to showcase its unique histopathology laboratory and forge new partnerships.

To create awareness about the cardiorespiratory organ examination process for miners and ex-miners for possible occupational lung disease (in adherence to the Occupational Diseases in Mines and Works Act), the Pathology Division carries out outreach activities. During the review period, the outreach team visited companies during their health and wellness days and supported the Mine Health and Safety Council's 6th Occupational Health Dialogue. These visits have created more networking opportunities, and the NIOH has subsequently been invited to attend future stakeholder events.

The NIOH has been re-designated the WHO Collaborating Centre for Occupational Health. The primary objective of the Global Network of WHO Collaborating Centres is to facilitate collaboration and networking among participating institutions and international partners to make a significant contribution towards the overarching goal of WHO.

Capacity building

As part of capacity building, the NIOH, in partnership with NEDLAC supported by the Compensation Fund, continued the NEDLAC/NIOH COVID-19 legacy programme project, launched in the third quarter of 2022 to produce COVID-19-related occupational health and safety information material that workplaces can use to educate and inform at all organisational levels. These products were developed with concise messaging emphasising practical applications and were distributed using easily accessible formats – webinars, infographics and short videos. The Training Unit facilitated the delivery of eight occupational health and safety webinars, eight fact sheets/infographics and six short videos for the year under review. This programme has added significant value in ensuring that workplaces are fully equipped with the knowledge to provide healthy and safer workplaces. All NIOH sections contributed to the programme in various ways, including partaking in webinars, providing content for infographics, and video content.

The NIOH further provided various capacity-building activities and training, including workshops targeting different workplace populations, namely domestic workers, academic staff, medical inspectors, occupational medical practitioners, and health and safety committees. In addition, NIOH staff actively engaged in teaching and training initiatives through participation in formal academic programmes offered by institutions of higher learning in the form of lectures, coordination and moderating/examining in the undergraduate and postgraduate programmes in occupational health. The NIOH also trains street reclaimers on the health and safety aspects of their jobs. The training increases awareness of hazards in their work environment and on how to protect themselves from these. This is important for the growing informal industry in the country.

Additionally, several NIOH staff members supervise undergraduate and postgraduate programmes at various academic institutions in South Africa. These include the Diploma in Occupational Health at the University of Pretoria and the University of Witwatersrand, the Field Epidemiology programme, and the Masters in Public Health at the University of Johannesburg. Staff also supervise MSc, MPH, and PhD students, are examiners for dissertations from multiple South African institutions, and associate editors and reviewers for national and international journals.

The NIOH maintained its registration as a training provider for the internationally recognised Occupational Hygiene Training Association (OHTA) training modules and delivered the OHTA 201 module in a hybrid format, which was successfully completed by all candidates. These courses promoted collaborations within the NIOH and inculcated team collaboration.

Surveillance

Surveillance activities have increased over this reporting period. We have exceeded our Annual Performance Plan target of four surveillance reports by one, and we continue to put more effort into adding more surveillance platforms using data from external sources like Statistics South Africa. The Pathology Division's Pathology Disease Surveillance Database (PATHAUT) database, which has been maintained since 1975, and continues to be a source of rich data for surveillance and research, addressing occupational health questions within the mining industry.

Support to the NHLS

In addition to the services offered by the SHE department that covers all staff members, the NIOH continues to assist the NHLS with pre-SANAS audits, trains NHLS QMS auditors, guides the Forensic Labs on occupational health audits and assists in the closure of non-conformances and develops short courses in epidemiology and biostatistics for NHLS staff.

The NIOH also fills in the gap by providing general surgical pathology within the NHLS, particularly to the Limpopo Province, while supporting Limpopo in building further capacity. This has resulted in improved pathology service for the province.

Every organisation is legally obligated to conduct occupational hygiene assessments every two years to comply with the Department of Employment and Labour legislation. The Occupational Hygiene Section maintained its registration with the Department of Employment and Labour (DoEL) as an Approved Inspection Authority (AIA). It continued to provide the AIA functions, including an accredited scope under ISO/IEC 17020 in its capacity as a Type C Inspection Body, allowing it to provide impartial service to its parent institution and external clients.

The collection and storage of biological specimens for different objectives, including research, has become more regularised in response to the national demand. The Biobank has a capacity to store four million samples. It currently stores 1,6 million samples from the NHLS and other organisations for a fee, bolstering the Institute's revenue while offering quality services.

Appreciation

I want to extend my heartfelt gratitude to the NHLS and the NIOH management teams for their outstanding strategic guidance, enabling the NIOH to achieve remarkable feats despite resource constraints. The dedication of the NIOH staff towards excellence in their roles is truly commendable, and I sincerely appreciate their relentless efforts in fostering healthy, safe, and sustainable workplaces. Additionally, I am immensely grateful to our partners, funders, collaborators, and stakeholders whose invaluable contributions have significantly contributed to the success of the Institute.

PATHOLOGY **DIVISION**

PATHOLOGY DIVISION

Dr Deepna Govind Lakhoo
Head of Section

The Division has become a referral centre for lung biopsies through the expertise gained in lung pathology. Due to a general shortage of histopathologists nationally, the Division has been assisting with diagnostic surgical pathology services for the Limpopo Province.

INTRODUCTION

The work of the Pathology Division has traditionally focused on occupational lung disease and continues to provide an autopsy service to assist with the compensation of the families of deceased mine workers. The Division has become a referral centre for lung biopsies through the expertise gained in lung pathology. Due to a general shortage of histopathologists nationally, the Division has been assisting with diagnostic surgical pathology services for the Limpopo Province. In addition to pathology services, the Division offers analytical electron microscopy services, and the diagnostic service work provides data and material for teaching, research and surveillance purposes.

DIAGNOSTIC SERVICES

Autopsies

The Division continues to carry out the statutory requirement of examining the cardio-respiratory organs of deceased miners as stipulated in the Occupational Diseases in Mines and Works Act, Act No. 78 of 1973. A pathology report of this examination is shared with the Mines Medical Bureau for Occupational Diseases to assist with the compensation process for families of deceased mine workers.

The Division conducts an outreach programme targeted at all relevant stakeholders, creating awareness about the cardiorespiratory autopsy process and compensation for possible occupational lung disease. Outreach activities for the financial year under review included visits to Arcelor Mittal (Vanderbijlpark and Vereeniging plants) health and wellness days and participation at the Mine Health and Safety Council 6th Occupational Health Dialogue.

These visits have created more networking opportunities which have led to subsequent invites to future stakeholder events.

The autopsy service plays a crucial role in workers' compensation and generates a great deal of information about the lungs that are examined at the Division. Pathologists carefully record approximately 200 variables into the PATHAUT database. The PATHAUT database is a national resource and contains unique information about diseases in the mining industry. The database has been maintained since 1975 and continues to be used extensively for policy decisions, show disease trends in the mining industry and research in collaboration with local and international collaborators. It is an important tool for disease surveillance that informs policy and other interventions that contribute to the improvement of work exposures in various workplaces. Detailed disease surveillance reports compiled from PATHAUT data, giving demographic data and disease rates, are produced annually.

These reports are available on the NIOH website: https://www.nioh.ac.za/pathology-division-surveillance-reports/

Surgical pathology

The Division has extensive experience in pulmonary pathology. A diagnostic service is offered to satisfy the demand for opinions on lung biopsies, fine needle aspirates and bronchial washings. Since 2017, the Division has been providing specialised pathology services to the Centre of Pulmonary Excellence in Johannesburg. As of March 2023, the Division has been assisting the City of Gqeberha in the Eastern Cape with reporting their lung biopsy specimens. As part of efforts to become a centre of excellence in diagnostic cardiothoracic pathology, the Division has made significant progress in opening its PCR laboratory, and preliminary validation and testing of molecular targets for lung cancer is underway.

The Division also fills in the gap by providing general surgical pathology diagnostic services to the Limpopo Province while supporting the province to build further capacity. This has resulted in an improved pathology service to the province. The general surgical pathology specimens received from the Limpopo Province provide an opportunity for the NIOH pathologists to examine a broad range of general pathology and offer a broader training platform for registrars.

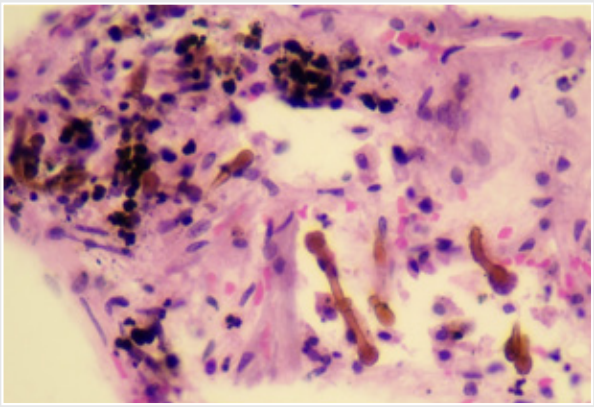


Image 1: *Asbestos bodies identified in the lung parenchyma of a deceased miner (H&E 400X). These have a characteristic translucent core and are beaded with dumbbell-shaped ends.*

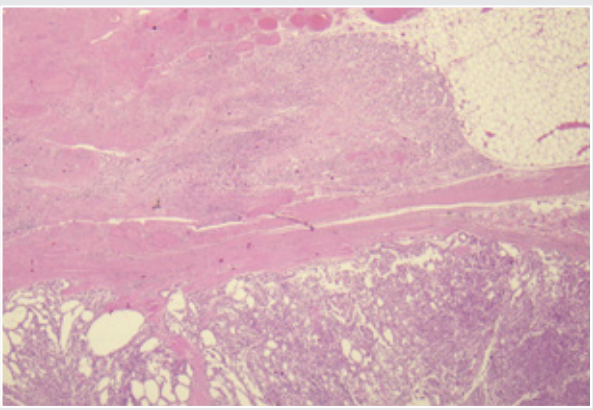


Image 2: *Pleural malignant epithelioid mesothelioma invading the chest wall (H&E 20x). This fatal disease is caused by exposure to asbestos fibres.*

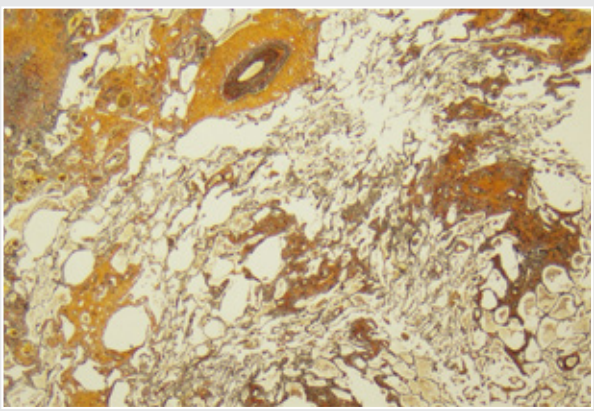


Image 3: *Heavy exposure to asbestos fibres can also cause asbestosis. This disease is characterised by peribronchiolar interstitial fibrosis of the lung (Reticulin 20x).*

Electron Microscopy

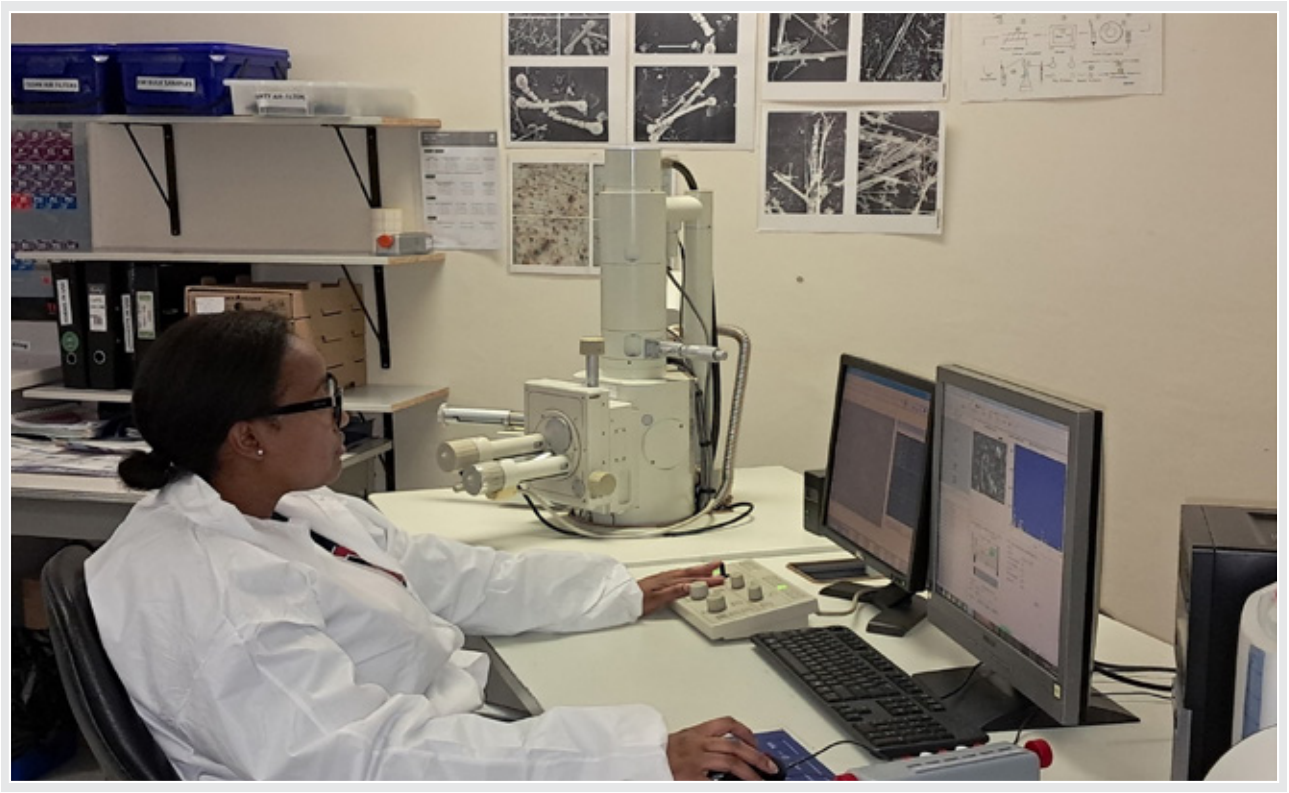


Image 4: *The Pathology Division's scanning electron microscope with energy-dispersive X-ray spectroscopy.*

The Electron Microscopy Unit is an essential component in the Pathology Division, and its function is to assist in service delivery, research and training. The Unit is equipped with a Scanning Electron Microscope (SEM). The microscope is linked to an analyser for Energy Dispersive Spectroscopy (EDS), which analyses the chemical composition of asbestos and other various molecules. Its function is to determine the type of asbestos fibre and asbestos fibre concentration in the lung tissue of deceased miners, to assist with the diagnoses of asbestos-related diseases and to determine environmental and occupational asbestos exposure. The NIOH is the only institute in the public service that offers this service. Samples are analysed to identify asbestos in building materials and enumerate asbestos fibres in the air. These analyses are performed for internal and external clients including national, provincial and local government, non-governmental organisations, universities and private businesses.

The Electron Microscopy Unit participates in an external quality assurance scheme and has maintained its satisfactory rating in the Asbestos in Materials international quality assurance scheme that is coordinated by the Health and Safety Laboratory, United Kingdom. Its database is unique in South Africa and provides information about the legacy of asbestos in the country. The information from the database has been used to produce the annual asbestos surveillance report.

The reports are available on the NIOH's website: https://www.nioh.ac.za/asbestos-surveillance-reports/

RESEARCH AND/OR SPECIAL PROJECTS

The Pathology Division conducts research relevant to the health of South African workers. Material and data from the service work of the Division provides information for research projects. Current areas of interest centre around lung diseases in mineworkers, which are caused by exposure to silica dust or asbestos fibres, as well as some aspects of the surgical pathology cases received from Limpopo Province. A list of the current projects is presented below:

Minimally invasive post-mortem tissue sampling for diagnosis of occupational lung diseases.

Study team: R Manenzhe[1], and D Govind Lakhoo[1,2].

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand.[2]

Immunophenotypic and molecular features of TP53 in Diffuse large B-cell lymphoma (DLBCL).

Study team: T Mashele[1], P Magangane[1,2], and S Pather[1,2].

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[2].

Histologically confirmed invasive fungal infections before and during the COVID-19 pandemic in South Africa (1 September 2018 -31 August 2021).

Study team: C Sriruttan[1], N Govender[1], D Govind Lakhoo[1,2], and D van der Byl[1,2].

National Institute for Communicable Diseases (NICD), a division of the National Health Laboratory Service [1], National Institute for Occupational Health, a division of the National Health Laboratory Service[2], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[3].

Evaluation of the possibility of asbestos environmental contamination and exposure resulting from laboratory processing of probable asbestos contaminated samples.

Study team: L Mhlongo[1], Z Ngcobo[1], G Mizan[1,2], and D Govind Lakhoo[1,3].

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Public Health, Faculty of Health Sciences, University of the Witwatersrand[2], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[3].

Validation of PDL-1 22C3 clone using Bond III to effectively identify patients in the public sector for Anti PDL-1 immunotherapy.

Study Team: T Mayeza[1], S Naidoo[1], and D Govind Lakhoo[1,2].

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[2].

Diagnostic value of lymph node silicosis for pulmonary silicosis.

Study team: N Ndlovu[1], D Rees[1], J Murray[1], and D Govind Lakhoo[2,3].

School of Public Health, University of Witwatersrand[1]. National Institute for Occupational Health, a division of the National Health Laboratory Service[2], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[3].

The prevalence of anaplastic lymphoma kinase (ALK) and c-ROS oncogene 1(ROS1) mutations in non-small cell lung carcinoma (NSCLC) in the public sector of South Africa.

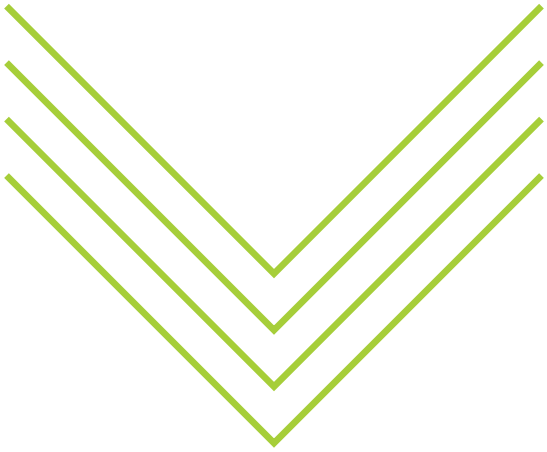
Study team: WJ Bloem[1,2], and D Govind Lakhoo[1,2].

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Pathology, Faculty of Health Sciences, University of the Witwatersrand[2].

TEACHING AND TRAINING

The Division provides teaching and training through workshops, presentations and formal lectures to professional bodies, universities and teaching hospitals. Staff members participate in the mentoring, teaching and supervision of various students. The pathologists are actively involved in the undergraduate teaching of medical, dental and allied health care students at the University of the Witwatersrand, as well as postgraduate anatomical pathology registrar training. Additionally, the pathologists actively participate in and present cases at regular clinical pathology meetings with pulmonologists from the Johannesburg teaching hospitals.

The Division is actively involved in teaching and training of the intern medical scientists. There is currently one medical scientist intern in training. The Division is also accredited by the HPCSA for the training of student medical technologists and technicians. Currently, two medical technologists are training within the Division.



OCCUPATIONAL **MEDICINE**

OCCUPATIONAL MEDICINE

Dr Mpho Makwela-Rakgoale

Head of Section

Research is conducted to inform occupational health policy and practice while specialised services such as diagnosis of referred workers through clinical assessments and ergonomic services are provided to support workplaces.

INTRODUCTION

The Occupational Medicine Section plays an important role in the development of occupational health in South Africa. Teaching and training are performed to produce and increase the number of qualified occupational health professionals. Research is conducted to inform occupational health policy and practice while specialised services such as diagnosis of referred workers through clinical assessments and ergonomic services are provided to support workplaces in their responsibilities to maintain work environments that are safe and without risk to the health of the workforce. The Occupational Medicine Section welcomed the new Head of the Section, Dr Mpho Makwela-Rakgoale.

SURVEILLANCE AND SPECIALISED SERVICES

The Occupational Medicine Section is comprised of the Ergonomics Unit and Occupational Medicine Clinic. The Clinic provides services to current and former workers referred for clinical assessments and workup for occupational disease and compensation purposes. The Ergonomics Unit assess workers with musculoskeletal disorders (MSDs), with particular emphasis on work-related upper limb disorders (WRULDs). In addition, workplace ergonomic risk assessments are conducted. Workers were seen at the Occupational Medicine Clinic from the period of April 2023 – March 2024. Approximately 87% of all the cases reviewed were new cases, and 13% were for review. The majority of consultations were comprised of 83% of male. The mean age of client consultation was 48 years, with ages ranging from 24-71 years. The mining industry accounted for almost 40% of all clinical cases referred to the Occupational Health Clinic.

DIAGNOSTIC AND SPECIALISED SERVICES

Occupational Medicine Specialist referral clinic

Clinic staff work collaboratively with the Ergonomics Unit when assessing patients with musculoskeletal conditions. These collaborative assessments focus on workers suspected of MSDs, with a particular emphasis on WRULDs – hand and shoulder related. During the year under review, more focus was dedicated to reviewing the Clinic's processes, namely, the alignment of systems with NHLS's quality management strategy, referral system, data management, patient report writing, and newly updated NHLS tariffs.

The Clinic assessed patients from different industries, 63% of which were from the non-mining sector, while 37% were from the mining sector, the majority of whom suffer from respiratory problems.

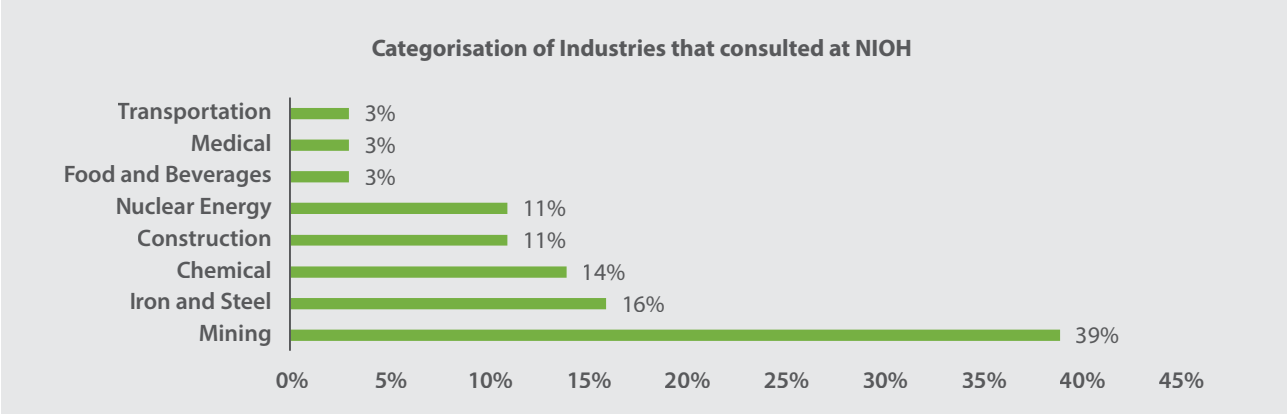


Figure 1: *Referring industry sector by percentage*

The majority of workers assessed at the NIOH Occupational medicine clinic presented with a respiratory system complaint (57%) predominantly Occupational Asthma, followed by work related musculoskeletal disorders (18%), and pneumoconiosis related complaints (21%). There was 4% of cases that were categorised as other ; which was comprised of occupational dermatitis, Noise induced hearing loss and eye irritation in nature. These cases were assessed for attribution to the workplace and assisted with submission for compensation. The job categories that were referred to the clinic were predominantly operators (26%), followed by spray painters (11%), technicians (10%), mechanics (10%) and timber workers (7%).

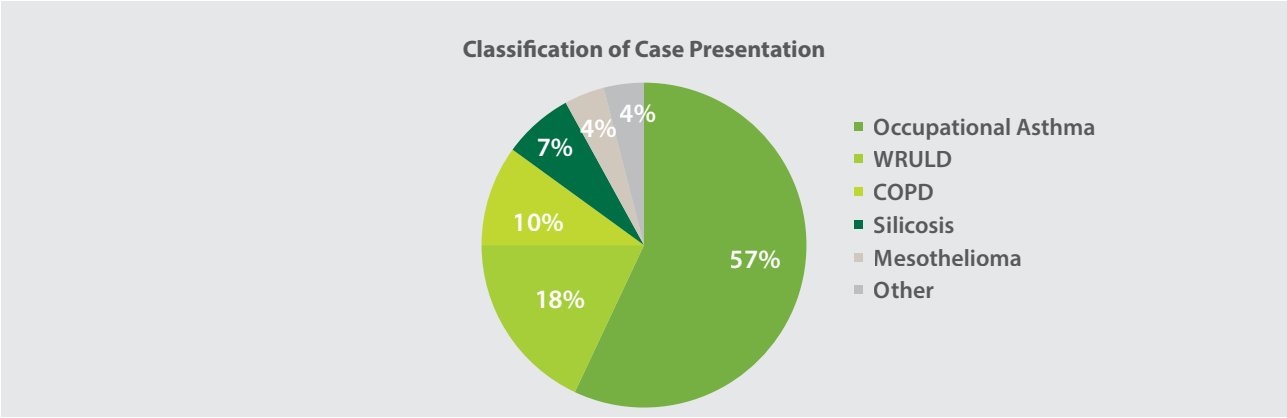


Figure 2: *Health outcome of cases presented at the Occupational Health Clinic*

ERGONOMICS UNIT

Ergonomics aims to match work demands to the capabilities and limitations of workers. The Unit conducted an ergonomics assessment, which entailed the identification of ergonomic hazards and affected persons in the workplace, while highlighting the analysis and evaluation of risks associated with these factors. A quarter (25%) of the assessments were conducted for internal stakeholders within the NHLS, while the majority (75%) of the assessments were for external stakeholders. Common issues noted from these assessments include factors relating to organisational, cognitive and physical ergonomics perspectives.

Organisational ergonomics perspective		**Recommendations**
Organisational policies and practices unsupportive of adequate work-rest cycles for workers engaging in highly repetitive and labour-intensive work tasks.	A risk of early onset of fatigue, further leading to the development and/or exacerbation of musculoskeletal conditions by the workers.	Formal and informal spaces of work should consider an all-encompassing approach in integrating ergonomics principles in all governance and productivity practices.
Cognitive ergonomics perspective		
Lack of appropriate training provided to workers re-accommodated within the workplace (performing different tasks).	A high mental workload and work stress may be perceived by workers performing unfamiliar tasks, and this might affect their performance.	
Physical ergonomics perspective		
Poor task, workstation design, and setup in line with desired output.	Likelihood of inappropriate work postures, and fatigability from unbalanced exertional forces associated with adverse health conditions (e.g. musculoskeletal disorders - MSDs).	

RESEARCH AND/OR SPECIAL PROJECTS

The Occupational Medicine Section was involved in collaborative research project activities, including silicosis elimination in the South African non-mining sector. The section was responsible for conducting workplace surveys to determine the prevalence of silicosis across industries from 2012 to 2023. The surveys were conducted from 2022 to the end of 2023 and enrolled 250 workers thus limited to enterprises in the Gauteng province. Worker were interviewed and there were chest x-ray reporting for the workers exposed for more than 10-years in selected industries. This study was completed in December 2023. The main outcome- was low prevalence of silicosis in non-mining industry.

Additional research included a collaboration with the mining industry to assess musculoskeletal disorders and associated risk factors among mineworkers on a man-riding conveyor belt in the gold mine in South Africa. This project aims to investigate the musculoskeletal disorders associated with the use of a unique underground transportation system in the mines and other associated risk factors.

Elimination of silicosis in the South African non mining sector

The study was commisioned by DOEL and Primary Investigator was CSRI and they collaborated with NIOH (Occ Med, Epidemiology, Occ Hygiene,) Wits University, Wits Health Consortium.

Musculoskeletal disorders and associated risk factors among mineworkers on a man-riding conveyor belt gold mine in South Africa

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1]; Wits School of Public Health[2]

TEACHING AND TRAINING

The Occupational Medicine Section actively engaged in teaching and training initiatives aimed at building capacity and promoting awareness of occupational health and safety principles among various stakeholders. The Section participates in formal academic programmes offered by academic institutions in the form of lectures, coordination and serving as moderator/external examiner in the undergraduate and postgraduate programmes. In addition, the Section contributed to the planning, coordinating and presenting in the NIOH webinars under the NEDLAC COVID-19 Legacy programme in the workplaces.

Other training outputs from the Section include workshops that target different workplace populations, namely domestic workers, support and academic staff in academic institutions, medical inspectorate and occupational medicine staff of the mining regulator (Department of Mineral Resources and Energy), occupational medical practitioners from various industries as well as internal stakeholders.

Image 5: *The Occupational Medicine section team at the work-related upper limb disorders training workshop: Ms Zandile Hoyi, Dr Edward Spirwa, Dr Nompumelelo Ndaba, Dr Mmuso Ramantsi from Eskom, Dr Hloniphle Maso and Ms Buyisiwe Nkosi.*

IMMUNOLOGY AND **MICRIOBIOLOGY**

IMMUNOLOGY AND MICROBIOLOGY

Ms Edith Ratshikhopha
Acting Head of Section

The Section provides diagnostic services such as consultations, allergy testing, water and air sample testing, and efficacy testing of devices aimed at reducing microbial transmission in various settings.

INTRODUCTION

The Immunology and Microbiology Section provides research, education, and laboratory services related to occupational health through its three units: Bioaerosol, Waterborne Pathogens, and Occupational Allergy. The Section provides diagnostic services such as consultations, allergy testing, water and air sample testing, and efficacy testing of devices aimed at reducing microbial transmission in various settings. The teaching and training programmes include postgraduate and competency training, workshops, and industry-based ad hoc training. The research activities of the Section are focused on studying the impact of biological agents and allergens in different workplaces. The Section also disseminates knowledge through fact sheets, videos on social media, scientific briefs, scientific reports, and peer-reviewed publications. Staff members engage with stakeholders to build long-term relationships with those who are affected by the research outcomes and its implementation. The Section is also involved in the surveillance of occupational allergies in collaboration with other NIOH sections.

DIAGNOSTIC SERVICES

For the year under review, the Bioaerosol Unit tested four ceiling light devices for their effectiveness in reducing airborne Mycobacterium tuberculosis. Additionally, they validated the air sampling of Escherichia coli in an aerogen test room using the bio sampler and quantification by culture, expanding the scope of testing the effectiveness of UVGI fixtures and other air cleaning devices against airborne E.coli to prevent and control infections.

The Waterborne Pathogens Unit tested water from sewage plants, health facilities, water cooling units, farming, cooling towers, mines, and hospitals. One client has extended its contract for water quality testing for a further three years, which includes testing of drinking water and wastewater from different municipalities.

Images 6 and 7:
Team students collecting wastewater samples.

Image 8: *Immunology Section staff and members of the African Reclaimers Organisation.*

The Section maintained its high-quality standards, with the Occupational Allergy Unit being accredited for 16 consecutive years by SANAS. This Unit is unique as it provides processes and uses workplace agents relevant to the South African setting in case investigations to help link substances found in the workplace with workers' symptoms.

RESEARCH AND/OR SPECIAL PROJECTS

Assessing the risks of microbial exposure and associated infectious diseases among street reclaimers in Johannesburg, pre- and post-training intervention study

Study team: Z Kirsten[1], T Singh[2], and N Naicker[3].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1], Department of Environmental Health, University of Johannesburg[2]

Adverse occupational skin reactions associated with personal protective equipment (PPE) use among South African healthcare workers during the COVID-19 pandemic

Study team: A Fourie[1], T Singh[1,2,3], N Naicker[1,3], Z Kirsten[1], and P Moloi[4].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service1, Department of Clinical Microbiology and Infectious Diseases, University of the Witwatersrand[2], Department of Environmental Health, University of Johannesburg[3], Department of Health,

Health risk assessment in an occupational setting during non-potable use of roof-harvested rainwater

Study team: L Singh [1], T Singh[2], and A Gomba[1].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1], Department of Environmental Health, University of Johannesburg[2]

Evaluation of health risks associated with occupational exposures to microbiological and chemical contaminants at wastewater treatment plants and reuse sites

Study team: A Gomba[1], L Singh[1], D Jambo, E. Poopedi[1], N Mhlangu[1], P Matatiele[1], T Marageni[1] and T Singh[2].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1], Department of Environmental Health, University of Johannesburg[2]

Characterisation of bioaerosol, volatile organic compounds, odour emissions in wastewater treatment plants and assessment of the associated emerging epidemiological, occupational, and public health risks.

Study Team: D Mmereki[1], D Masekameni[1], G Keretetse[1], A Gomba[2], L Singh[2], T Duba[2] and T Singh[3].

Wits School of Public Health[1], National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[2], Department of Environmental Health, University of Johannesburg[3]

Evaluating the impact of load shedding on the bacterial fingerprint of Gauteng forensic pathology services and the risk to workers

Study team: G Motsatsi[1] D Matuka[1], Z T Duba[1] Kirsten[1], A Bilankulu[1] and T Singh[2]

National Institute for Occupational Health[1] (NIOH), a division of the National Health Laboratory Service,[1], Department of Environmental Health, University of Johannesburg[2]

Investigating the impact of power outages on fungal contamination in Forensic Pathology facilities and the risk of exposure to workers in Gauteng, South Africa.

Study team: P Setlhodi[1], D. Matuka[1], L Muleba[1], A Bilankulu[1], Z Kirsten[1], and T Singh[2].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1], Department of Environmental Health, University of Johannesburg[2].

Investigating the Impact of Load Shedding on Microbial Indoor Air Quality: Implications for Occupational Health Services and Infection Prevention and Control in Healthcare Facilities in Gauteng

Study team: R Mojapelo[1], D Matuka[1], T Duba, L Muleba[1], A Bilankulu[1], Z Kirsten[1], T Singh[2].

National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service[1], Department of Environmental Health, University of Johannesburg[2].

EPIDEMIOLOGY AND **SURVEILLANCE**

EPIDEMIOLOGY AND SURVEILLANCE

Prof. Nisha Naicker
Head of Section

In 2023/24, the Epidemiology team supported the Gauteng Department of Health in several projects. The Gauteng Staff Satisfaction Survey is an annual survey conducted by the Employee Health and Wellness Programme (EHWP) Directorate. The Epidemiology Section designed the survey and produced reports per health facility for the Directorate.

INTRODUCTION

The Epidemiology and Surveillance Section studies and analyses the patterns, causes, and effects of occupational exposures on morbidity and mortality in occupational settings. The Section supports internal and external Occupational Health and Safety stakeholders in research methodology and analyses of data to understand the risk factors and health outcomes associated with occupational and environmental exposures. This is important in establishing the burden of occupationally related diseases over time and allows for the planning and management of occupational diseases and injuries in South Africa.

SERVICES

Technical research support is provided to all the NIOH sections and external clients in the public sector (national, provincial departments, parastatal departments and science councils) and the private sector. Assistance is provided for study design, sample size determination, project management, data collection, data entry, data analyses and scientific writing.

The Epidemiology Section provided guidance on protocol development and data collection for the Harmony Gold mining on a research project "Profiling high-performing teams within mines". The Section, together with Occupational Medicine and HIV/TB in the Workplace Sections, provided advice on data collection for the project.

In this study, physical, functional and psychosocial parameters of production teams in mining workers are assessed to understand factors that influence and may be associated with work performance among team members identified as high-performing and low-performing within two mining operations in Gauteng.

The Epidemiology Section provided support to the Minerals Council South Africa. The Minerals Council South Africa Annual Milestone reports were compiled, and a three-year contract was signed with remuneration for the analysis and production of the reports. The Annual Reports were compiled for the 2023 year for three key indicators: The Masoyise Health Programme (MHP) report includes the Occupational medicine report for compliance and reporting of occupational lung diseases (Silicosis and pneumoconiosis) and the Occupational hygiene milestone performance report on targets on noise, coal dust, silica dust and platinum dust exposure measurement. The MHP report for compliance monitoring, treatment and prevention of TB, HIV and NCDs across mining companies was completed by the HIV and TB in the Workplace Section.

The Epidemiology Section provided support to the NIOH sections in analysing data and completing the surveillance reports for the NIOH internal surveillance programmes: the PATHAUT – the autopsy database on occupational respiratory diseases in miners, the Annual Pathology Asbestos Analysis Report, the Occupational Medicine annual surveillance report on occupational diseases diagnosed in the Occupational Medicine Clinic and the Annual Occupational Allergies Report on skin and respiratory allergies diagnosed by the Immunology Allergy Clinic.

SURVEILLANCE PROGRAMMES

Occupational health surveillance is a priority for the NIOH. However, there is limited publicly accessible data available on occupational status and health outcomes. The Section will continue working with various stakeholders to develop occupational health surveillance programmes to assist in the planning and implementation of occupational health programmes and control of work-related ill health and injuries and the protection and promotion of workers' health. Currently, surveillance programmes include the following:

National occupational mortality South Africa surveillance

Study team: KS Wilson[1],V Ntlebi[1], A Mkulisi[1], MJ Ramodike[1], D Kwenda[1], and A Chitaka[1]

National Institute for Occupational Health a division of the National Health Laboratory Service, South Africa[1]

The AIA Occupational Hygiene 2022-2023, South Africa and the Occupational Hazards and Trends report and Occupational Hazard Surveillance and Trends Report: AIA Occupational Hygiene 2018-2023 South Africa

Study team: KS Wilson[1], and N Naicker[1]

National Institute for Occupational Health, a division of the National Health Laboratory Service, South Africa[1]

RESEARCH AND/OR SPECIAL PROJECTS

The Section conducts primary research, research commissioned by governmental, parastatal and private organisations as well as secondary data analyses.

The Harmony/NUM/NIOH project: Musculoskeletal disorders and associated risk factors among mineworkers on a man-riding conveyor belt gold mine in South Africa

Study team: Ndaba N[1], Ntlebi V[1], Wilson KS[1], Maso H[1], and Hoyi Z[1]

[1]National Institute for Occupational Health a division of the National Health Laboratory Service, South Africa

Funding: Harmony Gold Mining Company Limited

Reduction of silicosis in the non-mining sector

Study team: Naicker N[1], Rees D[1], Wilson KS [1], Ndaba N[1], Manganyi J[1], Bouwer D[2], Ndlovu Z[2], Musenge E[2], Kgalamono S[1], Magweregwede F[3], and Pelders J[3]

National Institute for Occupational Health, a division of the National Health Laboratory Services, Johannesburg, South Africa[1], School of Public Health, University of Witwatersrand[2], Council for Scientific and Industrial Research[3]

Occupational exposures, oxidative stress and the impact on health among petrol attendants in Johannesburg, South Africa: An intervention study

Study team: N Naicker[1],K Wilson[1],N Tlotleng[1],C Kufe[1], A Mkulisi[1],J Ramodike[1],J Joseph[2], J Manganyi [3], JL Marnewick[4], and T Msgati[5],

Epidemiology and Surveillance Section, National Institute for Occupational Health a division of the National Health Laboratory Service, South Africa[1], Toxicology Section, National Institute for Occupational Health a division of the National Health Laboratory Service, South Africa[2], Occupational Hygiene section, National Institute for Occupational Health, a Division of the National Health Laboratory Service, South Africa[3], Applied Microbial and Health Biotechnology Institute (AMHBI), Cape Peninsula University of Technology, South Africa[4], Institute for Nanotechnology and Water Sustainability, University of South Africa[5].

Occupational risk factors for Lung cancer among newly diagnosed patients in a population based cancer registry in South Africa

Study team: N Naicker[1], K Wilson[1], N Tlotleng[1], M Muchengati[2], B Ndlovu[2], L Fritschi[3], K Rosser[4], D Rees[1], and J Feary[5]

Epidemiology and Surveillance Section, National Institute for Occupational Health, a division of the National Health Laboratory Service, South Africa[1],National Cancer Registry, National Health Laboratory Services, South Africa[2], School of Public Health, Currin University, Australia[3],Epidemiology and Public Health, University of Lucerne, Switzerland[4], National Heart and Lung Institute, Imperial College, London, United Kingdom[5]

TEACHING AND TRAINING

The Section continues its teaching and training on undergraduate and postgraduate academic programmes within the NIOH and at the universities of Witwatersrand, Johannesburg, Pretoria and Nelson Mandela. All researchers in the Section are reviewers for international and national peer-reviewed indexed journals such as BMC Public Health, IJERPH, PLOS One, Environmental Research etc. and a few serve as editors for PLOS ONE, BMC Public Health and Frontiers of Public Health. In addition to serving as supervisors to postgraduate students, the staff also are examiners of Masters and PhD dissertations at academic institutions across South Africa.

In the 2023/ 2024 financial year, we contributed to the following programmes:

Postgraduate

- Currently hosting one FELTP student, a PhD candidate and two interns.
- Provision of lectures in the Field Epidemiology Training Programme (SAFETP) for NICD and the University of Pretoria; Diploma of Occupational Health at the University of Pretoria.
- Dr N Tlotleng presented a lecture titled "Responding to a Call for Funding Application" at a workshop at the PathReD Grant writing workshop at the Walter Sisulu University in the Eastern Cape as part of the NHLS Research and Development committee from 26-28 July 2023.
- Dr K Wilson and Prof N Naicker form part of the postgraduate (Masters and PhD) assessor's committee at the School of Public Health, University of Witwatersrand.
- The Section was invited as a coordinator during a Research development module to MSc students at the School of Public Health, University of the Witwatersrand.

- Prof Naicker facilitated the Master of Public Health online modules in Epidemiology and Biostatistics Research Methodology and the Minor Dissertation Modules A to I for the University of Johannesburg.
- Epidemiology staff also support students from the NIOH with their project development and data cleaning and analyses.

Training for Occupational Health Stakeholders

- The Epidemiology staff conducted the training on "Introduction to Epidemiology and Biostatistics" online course 10-14 July 2023 for all NHLS staff and external stakeholders.
- Dr K Wilson presented "Surveillance of work-related upper limb disorders" at the Work-related Upper Limb Disorders workshop on 13 July 2023.
- Ms A Mkulisi presented "Managing Risks" on 25 May 2023 to the staff at the NIOH Pathology section.
- Mr V Ntlebi conducted multiple sessions on REDCap training for internal staff and the Gauteng Department of Health.

OCCUPATIONAL **HYGIENE**

OCCUPATIONAL HYGIENE

Dr Jeanneth Manganyi
Head of Section

The Section conducted noise assessments resulting from the operation of generators. The reliability of the functions provided by the Section is supported by ongoing efforts to maintain the quality management systems.

INTRODUCTION

The Occupational Hygiene Section focuses on addressing occupational hazards while promoting the health and well-being of employees within the NHLS and external clients. The Section's preventative efforts are achieved through workplace exposure assessments and the recommendation of practical and cost-effective exposure control measures to assist employers in reducing the exposure of employees. Most exposure assessments were conducted within the NHLS as part of routine assessments mandated by the Department of Employment and Labour.

After loadshedding hit the country, most businesses sought alternative power sources, such as power generators. Using generators introduced new hazards, such as exposure to noise and diesel particulate matter. The Section conducted noise assessments resulting from the operation of generators. The reliability of the functions provided by the Section is supported by ongoing efforts to maintain the quality management systems.

In addition, the Section provided training and research to align its functions with the institute's deliverables. The Section's training aims to offer OHS professionals basic occupational hygiene principles and required skills for professional certification. The research activities focused on workplace hazards and control interventions. Staff provided advisory support services through various platforms, including a query handling system and participation in professional and technical committees.

SERVICES

The Occupational Hygiene Section maintained its registration with the Department of Employment and Labour (DoEL) as an Approved Inspection Authority (AIA) and continued to provide the AIA functions, including accredited scope under ISO/IEC 17020 in its capacity as a Type C Inspection Body allowing it to provide a service to its parent institution (the NHLS) and external clients with impartiality.

The XRD Laboratory continued to provide accurate and reliable gravimetric and respirable crystalline silica test results, as evidenced by their maintained ISO/IEC17025 accreditation and satisfactory performance in the Air and Stack Emissions Proficiency Testing Scheme for all analytical methods. No appeals, complaints or questionable results were raised by clients.

The Asbestos Laboratory also provides critical analytical support for asbestos monitoring, which is included in the Section's scope of accreditation. The laboratory participated in two rounds of the Asbestos Fibre Regular Informal Counting Arrangement (AFRICA) proficiency testing scheme run by the Institute for Occupational Medicine (IOM) in Edinburg, United Kingdom and performed excellently in both rounds. Asbestos fibre counting is performed by competent staff who are evaluated and monitored using the proficiency testing scheme results. The staff expertise reassured clients that the Section's asbestos analysis is credible and can be used as part of exposure assessments for health and safety compliance purposes.

Exposure Assessment

The Section continued to address occupational health hazards in line with its mandate of promoting the health and well-being of employees at workplaces. The majority of exposure assessments were conducted at the NHLS Laboratories as part of the DoEL's legal requirement for routine monitoring of hazardous chemical agents (HCA). The assessment reports include recommended controls to help the employer reduce employees' potential exposure to HCA as part of continuous OHS improvement. These assessments and those from other NIOH sections (Occupational Medicine, Immunology and Microbiology, HIV and TB in the Workplace Unit, and SHE Department) contributed to meeting the NHLS Annual Performance Plan target. The overall target was exceeded with a positive variance.

Image 9: *Personnel monitoring of hazardous chemical agents at the NHLS laboratory.*

Sample Analyses

The Section's XRD Laboratory provided accredited analytical services directly supporting the AIA's operational functions. The laboratory analysed samples to address the need for research and workplace exposure assessments. A large percentage of the samples were in response to the need to analyse samples for the DoEL Silicosis study, demonstrating the value of having accredited in-house analytical support for ease of access and quick turnaround time. The laboratory's excellent output and consistently received satisfactory ratings for all methods in international performance testing schemes, enhance the quality of its services.

Image 10: *Asbestos analysis using a Phase Contrast Microscopy in the Asbestos Laboratory.*

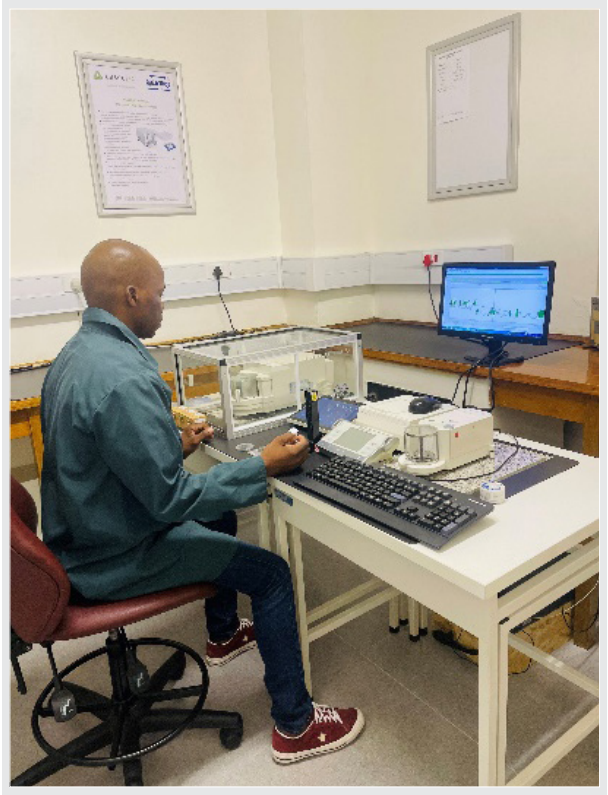


Image 11*: Conducting gravimetric filter weighing in the Balance Room.*

Respirator fit testing

The Section responded to requests for respirator fit testing to improve the use of respiratory protective equipment in workplaces. Respirator fit testing is currently regarded as the best practice in South Africa because it is not yet a legal requirement, however, its role remains vital in guiding users in selecting a respirator that will best protect them. Due to the need for personal expertise and equipment, this is a specialised service provided by a few institutions, including the NIOH. Respirator fit testing was performed on the NIOH respirator users as part of their routine testing before respirator use and for external clients to generate revenue. The Section continued to promote awareness of this service among diverse delegates who visited the institute to help workplaces improve the use of their RPEs.

Advisory support service

Occupational Hygiene staff handled many queries, including requests for training information, asbestos-related issues, and occupational hygiene services. This indicates that many workplaces appreciate the NIOH's role in providing these services and as a reference platform for OHS information. The Section continued to influence OHS practice through various professional or technical platforms, such as the NIOH Task Team, SANAS, DoEL, SAIOH, and Workplace Health Without Borders (WHWB). Staff activities on these platforms included legislative review, technical material development, and expert advice, reflecting the NHLS's active participation and support towards OHS deliverables.

RESEARCH AND/OR SPECIAL PROJECTS

Several previously reported research projects progressed well during the reporting period, including three completed projects that formed part of academic research studies.

In collaboration with other stakeholders, the Occupational Hygiene Section conducted a study on eliminating silicosis in non-mining sectors by the DoEL. The Section evaluated respirable crystalline silica exposure levels in selected non-mining subsectors in Gauteng. More than ten workplaces were assessed for respirable crystalline silica exposure, and control measures were

recommended to help reduce the exposure levels. The scientific report was compiled using the findings from all assessed workplaces, which contributed to the DoEL's proposed strategy for eliminating silicosis by 2030.

In addition, three academic projects were completed during the reporting year, resulting in qualifications obtained.ie, two MPHs and one PhD.

Image 12: *Monitoring of respirable crystalline silica using a direct-reading instrument.*

Image 13: *Collecting a dust sample at a gold mine tailing dump.*

TEACHING AND TRAINING

The Occupational Hygiene Section maintained its registration as a training provider for the internationally accepted Occupational Hygiene Training Association (OHTA) training modules. The Section continued to be recognised as SAIOH registered training provider for the AP101 module: The analysis of airborne asbestos fibres using phase contrast microscopy. The AP101 module is aimed at individuals who want to work towards mastering the skill or art of asbestos analysis by phase contrast microscopy.

The Section delivered the OHTA 201 module in a hybrid format (in-person or online via Zoom). The target audience for the OHTA 201: Basic Principles in Occupational Hygiene module is any person who requires an introduction and basic understanding of occupational hygiene principles and practices in the workplace. All candidates passed the exam with an overall pass rate of 79%. These courses promoted collaborations within the NIOH, including content that other sections, such as Occupational Medicine (including the Ergonomics Unit) and Toxicology, presented.

Other academic activities included guest lecturing, student supervision, protocol, and research day abstract review at the universities of Witwatersrand, Pretoria, and Johannesburg. Five students supervised by Occupational Hygiene staff completed their qualifications during the reporting year. The NIOH Occupational Hygiene team provided several training sessions to public health registrars on occupational hygiene-related topics to supplement the curricula prepared for their academic rotations at various institutions.

The Section also participated in teaching and training activities at NIOH webinars, SAIOH Professional Development courses, and OHS awareness activities for government OHS staff. Topics covered included the legacy of asbestos in South Africa, an evaluation of classic asbestos monitoring methods in the modern era, and the importance of occupational hygiene.

Image 14: *Presenting to the government officials at the City of Johannesburg during its OHS day.*

QUALITY **ASSURANCE**

QUALITY ASSURANCE

Bonginkosi Duma
Head of Section

The Section is responsible for the improvement and maintenance of quality management systems within the NIOH and for monitoring quality management systems

INTRODUCTION

The Section is responsible for the improvement and maintenance of quality management systems within the NIOH and for monitoring quality management systems on an ongoing basis by conducting internal audits within the NIOH and at selected NHLS laboratories. These audits range from ISO15189 to ISO 17025 for public health laboratories. The Section further provides support to the NHLS laboratories nationally by conducting pre-assessments for SANAS audits and SLIPTA, gap analyses, internal audits and involvement in the Committee for Evaluations and Technical Function (CEFT), quality assurance workshops and training. Additionally, Section supports the KwaZulu-Natal Public Health Laboratory and the NICD for ISO 17025 and ISO 9001 implementation, respectively.

SERVICES

Internal Audits

The NIOH continues to maintain all four SANAS accreditation standards. These standards are ISO 15189 for medical laboratories, ISO 17025 for testing laboratories, ISO 17020, which provides accreditation to the Occupational Hygiene Section, and ISO 9001:2015, which provides accreditation to the Biobank. ISO 15189:2012 has changed to ISO15189:2022, and preparation to transition the NIOH to the new standard is ongoing. The services rendered under ISO 17020 are hazard identification, risk assessment, monitoring, and risk reduction recommendations. The NIOH also has non-medical laboratories that are accredited such as an analytical service water testing laboratory, X-ray Diffraction Unit (XRD) and FTIR, and a Microbiology PCR laboratory for environmental testing.

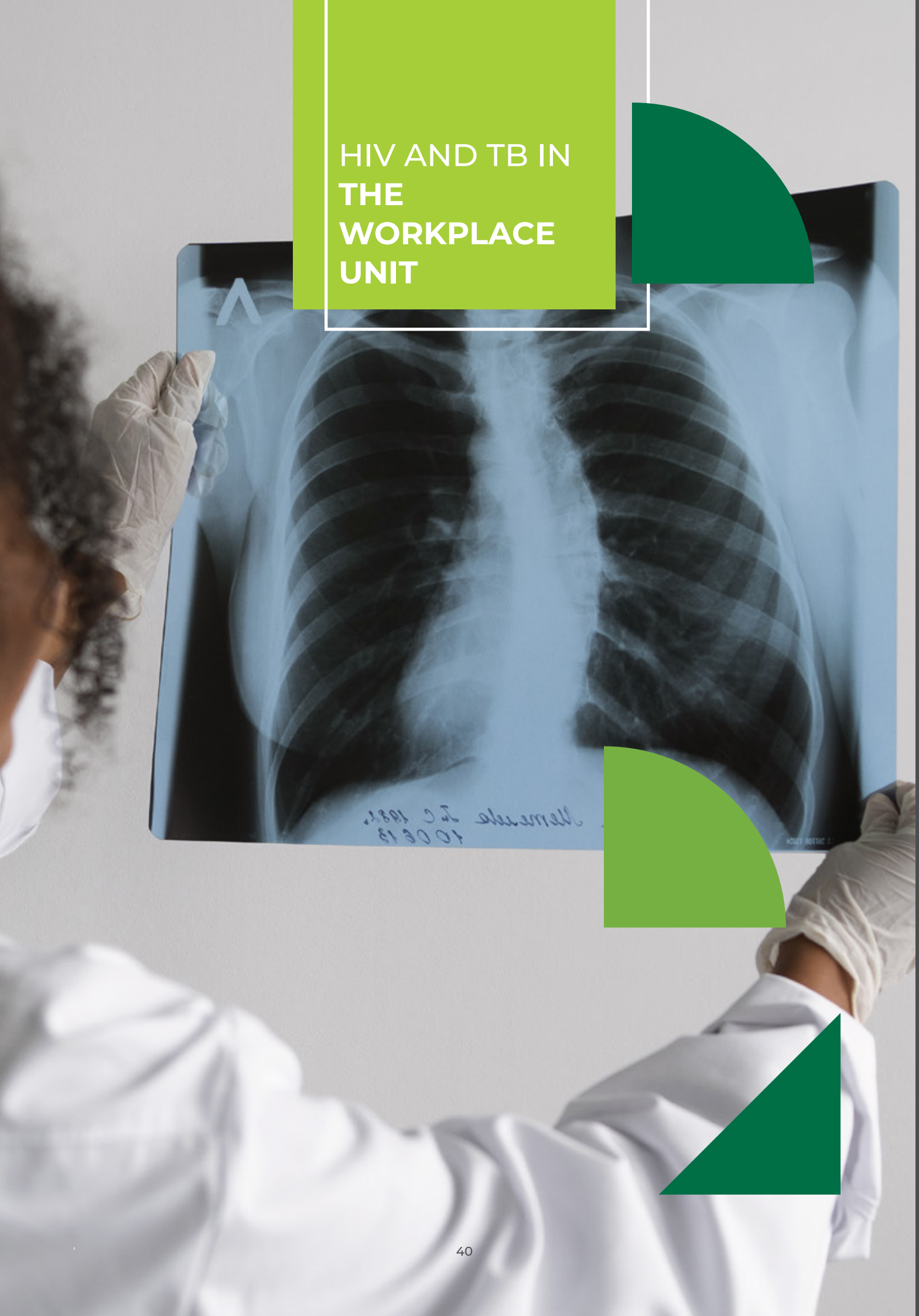
DEVELOPMENT AND TRAINING

The Section conducts internal training to strengthen the quality management systems. Training conducted during the period under review included the following:

- ISO 15189 transition Training
- Document Control
- Risk management
- Identification of non-conformities
- Root cause analysis
- ISO TC Meetings
- TR28
- Monitoring quality indicators
- Validations

Accreditation	Region	Lab No	Laboratory name	Discipline/Scope
ISO5189	NIOH	M0276	Analytical Services	Inorganic Chemistry
		M0276	Analytical Services	Organic Chemistry
		M0276	Immunology/Microbiology	Immunology
		M0276	Pathology	Histology
		M0276	Pathology	Cytology
ISO17025	NIOH	T0660	Analytical Services	Water testing: mercury
		T0660	Analytical Services	Water testing: aluminium
		T0660	Occupational Hygiene	Environmental methods:
		T0660	Immunology/Microbiology	Microbiology: MTB
ISO17020	NIOH	OH0079	Occupational Hygiene	Asbestos
		OH0079	Occupational Hygiene	Lead
		OH0079	Occupational Hygiene	Noise-Induced-Hearing-Loss
		OH0079	Occupational Hygiene	Hazardous Chemical Agents
ISO9001	NHLS-NIOH	Z19/21021	National Biobank	Collection, storage of biomaterial and research

HIV AND TB IN **THE WORKPLACE UNIT**



HIV AND TB IN THE WORKPLACE UNIT

Prof. Muzimkhulu Zungu
Head of Section

Economic recovery, especially in low- and middle-income countries, has been slow and uneven, with more vulnerable workers as a result of informal contracts in the world of work, thus negatively impacting the provision and access to workplace health, safety and well-being services.

INTRODUCTION

The Unit was formed to respond to the burden of disease and its impact on workers as a result of the Human Immunodeficiency Virus (HIV) and Tuberculosis (TB). With the understanding that these issues require a strong and efficient health system, the Unit adopted a health systems approach. Post-COVID-19, many economies, including South Africa, had efforts focused on returning the economy to pre-COVID-19 levels, if not better. However, economic recovery, especially in low- and middle-income countries, has been slow and uneven, with more vulnerable workers as a result of informal contracts in the world of work, thus negatively impacting the provision and access to workplace health, safety and well-being services. Thus, the NIOH, through the HIV TB in the Workplace Unit, continues its pursuit of workplace social justice and promotion of decent work through the promotion of occupational health policy, systems, services and programmes using workplace HIV TB to highlight best practice.

In this Annual Review, we share some of the projects that the Unit participated in the pursuit of workplace social justice and promotion of decent work in workplaces, including government. Even though, the Unit's reach to industries and government services is limited by resources, through collaborative work, the Unit was able to reach further than anticipated.

SERVICES

Occupational Health policy, systems, programmes, including HIV TB in the workplace

Health sector:

- The Unit provides advisory occupational policy, systems and programmes expertise to the Gauteng Department of Health (GDoH), the Mpumalanga Department of Health (MDoH) and the North West Department of Health (NWDoH). In both GDoH and MDoH, the Unit continues to support the implementation of the WHO and the International Labour Organization's (ILO) HealthWISE Tool, as well as the introduction, implementation and utilisation of the Occupational Health and Safety Information System (OHASIS).
- The Unit participated in several projects that support strengthening of the health and safety committees within GDoH (Dr George Mukhari Academic and Chris Hani Baragwanath Academic Hospitals) and MDoH (Rob Ferreira and Witbank hospitals).
- The Unit is the secretariat for the newly formed National Department of Health-led Steering Committee for Health Workers' Occupational Health, which aims to provide policy, health services and programmes, including surveillance and funding for health workers' occupational health and safety.

Mining industry

- The Unit is one of several technical advisors to the Masoyise Health Programme, whose goal is to reduce the impact of TB, HIV, occupational lung diseases and non-communicable diseases as occupational health threats in the mining sector. We also supported the writing of the Masoyise Health Programme annual reports (TB and HIV).
- Further, the Unit has been appointed to a newly formed and specialised committee of the Minerals Council South Africa known as TB in gold mines working group. Which aims to assist the gold mines in particular with TB control.

Construction industry

- The Unit serves on an advisory basis in the OHS meetings of the construction industry with Master Builders Association North. Our role in these quarterly meetings is to provide support on occupational health issues pertinent to the industry and, where appropriate, advice on new developments related to occupational health for the sector. Further, we have now started formal collaborations with the mother body, Master Builders South Africa, to support OHS initiatives nationwide.
- The Unit, in collaboration with Master Builders Association North, organised and presented at the 2023 World AIDS Day commemoration (see picture below). In the event attended by the Department of Employment and Labour, construction industry companies and organised labour, a pledge was signed to commit to the elimination of HIV in the workplace, and all participants participated in candle lighting.
- The Unit further produced a poster for the industry on 'Construction industry taking the lead on HIV'.

Image 15: *MBA North, NIOH and Department of Employment and Labour teams participating in World AIDS Day commemoration on 1 December 2023.*

Informal economy

- TB continues to be a public health issue globally and in South Africa. While TB is a threat to all, some working populations have a higher risk of TB infection and TB-related mortality due to the nature of the work and/or the living and working conditions. Agricultural work is one of the TB high-risk occupations, due to several socio-economic factors, and challenges of accessing health services. Thus, in commemoration of the 2024 World TB Day, the Unit collaborated with the Centre for Positive Care (POSICARE), a non-governmental organisation (NGO), and the Musina Health District Mobile Service in rendering a TB Awareness Campaign at the Hayoma farm, in the Limpopo Province. The commemoration was held on 27 March 2024 at Hayoma farm, in the Tshipise farming area, Musina Local Municipality (see pictures below).

Image 16: *NIOH team in discussions with the NGO community health workers.*

Image 17: *Some of the farm workers participating in the event.*

- In collaboration with the DoEL, the NIOH has been appointed the secretariat and partner in a newly developed agricultural sector occupational health and safety committee, which aims to promote occupational health and safety in the agricultural sector.

Eastern Cape Department of Health

- Participated as a collaborator and part of the writing team with Eastern Cape Universities and the Eastern Cape Department of Health in an application for South African Population Research Infrastructure Network (SAPRIN): A National Research Infrastructure of Health and Demographic Surveillance System (HDSS) Node for Eastern Cape.

Gauteng Provincial Government

- The NIOH and the Gauteng Provincial Government have agreed to collaborate on evaluating and building capacity for the evaluation of wellness and disease and or occupational health programmes using two standards:
- SANS 16001:2013 – Wellness and disease (including HIV and TB) management system; and
- SANS 45001:2018 Occupational health and safety management system – requirements with guidance for use.

Gavi, the Vaccine Alliance

The Unit is also part of an expert committee for GAVI, which aimed to:

- Provide guidance on strategic questions, methodology and processes concerning immunisation platforms.
- To provide guidance on the Gavi Secretariat proposed evaluation framework, criteria, and weightings of immunisation platforms.
- To validate assumptions and outputs of analyses and models for immunisation platforms.
- To provide guidance on the synthesis of analytic outputs about immunisation platforms.

- To facilitate buy-in on emerging recommendations.
- Through our registrar in Public Health Medicine, we have participated in numerous activities at Dr George Mukhari Academic Hospital (DGMAH) as a clinical manager, and at the South African Medical Association (SAMA) research associate, strengthening the health system.

RESEARCH AND/OR SPECIAL PROJECTS

The Unit had several completed and ongoing research projects, including:

Implementing the ILO WHO HealthWISE tool – an occupational health services intervention for health workers during the COVID-19 pandemic

Study Team: M Zungu[1, 2, 3], K Voyi[2], J Spiegel[4], J Ramodike[1, 2], S Barker[4], and A Yassi[4]

National Institute for Occupational Health, a division of the National Health Laboratory Service,[1] School of Health Systems and Public Health, Faculty of Health Sciences, University of Pretoria,[2] Department of Public Health, Faculty of Health Sciences, Walter Sisulu University,[3]

Occupational health barriers in South Africa: A call for Ubuntu

Study Team: M Zungu[1, 2, 3], J Spiegel[4], A Yassi[4], D Moyo[5,6], and K Voyi[2]

National Institute for Occupational Health, a division of the National Health Laboratory Service,[1] School of Health Systems and Public Health, Faculty of Health Sciences, University of Pretoria,[2] Department of Public Health, Faculty of Health Sciences, Walter Sisulu University[3], School of Population and Public Health, University of British Columbia,[4] School of Public Health, University of the Witwatersrand, Johannesburg, South Africa[5], Faculty of Community Medicine, National University of Science and Technology[6]

Assessing progress on tuberculosis in mining: Results from a comprehensive, collaborative occupational health programme

Study team: M Zungu[1], S Barker[2], J Spiegel[2], K Lockhart[2], and A Yassi[2]

National Institute for Occupational Health, a division of the National Health Laboratory Service,[1] School of Population and Public Health, University of British Columbia.[2]

Prevalence and molecular characterization of drug-resistant patterns in Mycobacterium tuberculosis at an Academic Laboratory in Tshwane

Study team: O Onwuegbuna[1], C Nyukyi[2], S Mohammed[1], V Ntlebi[2], and M Zungu[2]

School of Health Systems and Public Health, Faculty of Health Sciences, University of Pretoria, [1] National Institute for Occupational Health, a division of the National Health Laboratory Service.[2]

Awareness and assessment of the HIV and TB workplace health programme in the City of Tshwane Metropolitan Municipality, Gauteng Province, South Africa.

Study team: M Malotle[1], M Zungu[1, 2], Chelule P[3], M Huma[3], and M Rammopo[3]

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa[2] Sefako Makgatho Health Sciences University[3]

Development of the workplace HIV and TB Health Promotion Program for Academic Hospitals in Gauteng province, South Africa.

Study team: Malotle M, Y Lekan[2], and N Tlotleng[3]

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa[2] Mine Health and Safety Council.[3]

Evaluation of an HIV TB workplace program for health workers in a laboratory

Study team: S Ramahlo[1] M Malotle[1], M Zungu[1,2], and M Mutava[3]

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa[2], University of Johannesburg.[3]

Occupational Risks and Challenges: A Rapid Review of HIV and TB Exposure among Laboratory Workers in Sub-Saharan Africa

Study team: S Ramahlo[1], N Mlangeni[1], and M Zungu[1,2]

National Institute for Occupational Health, a division of the National Health Laboratory Service[1], School of Health Systems and Public Health, University of Pretoria.[2]

Structural barriers and facilitators to HIV services for marginalised working populations: Insights from farm workers in South Africa.

Study Team: N Mlangeni[1,2], M Lembani[3], O Adetokunboh[2], and P Nyasulu[2]

National Institute for Occupational Health, Division of National Health Laboratory Services[1], Stellenbosch University, Division of Epidemiology and Biostatistics, Department of Global Health, Faculty of Medicine and Health Sciences, Cape Town, South Africa[2], University of Western Cape, School of Public Health, Cape Town, South Africa[3]

Key informants' perspectives on HIV prevention and treatment programs and policies for farm workers in rural South Africa

Study team: Mlangeni N[1,2], Lembani M[3], Adetokunboh O[2], and Nyasulu P[2]

National Institute for Occupational Health, Division of National Health Laboratory Services[1], Stellenbosch University, Division of Epidemiology and Biostatistics, Department of Global Health, Faculty of Medicine and Health Sciences[2], University of Western Cape, School of Public Health, [3]

TEACHING AND TRAINING

Academic qualifications in Public and/or Occupational Health

The Unit coordinates the Diploma in Occupational Medicine and Health (DOMH) and teaches Occupational Health to undergraduate and postgraduate students on behalf of the School of Health Systems and Public Health (SHSPH), University of Pretoria. The Unit was a rotation site for practical training to Public Health Medicine Registrars from the University of Limpopo. The unit contributes to the on-going training of public health medicine registrars from the Sefako Makgatho Health Sciences University.

Public health postgraduate research supervision

The Unit is supervising five Master of Public Health (MPH) and co-supervises three MPH students from universities of Pretoria, Johannesburg and Walter Sisulu. A total of 17 DOMH students from the SHSPH University of Pretoria graduated.

Examination and publication reviews

- The Unit has examined dissertation for the Sefako Makgatho Health Sciences University for MMed Public Health Medicine, two MPHs from the University of Johannesburg.
- The Unit was an examiner for the College of Public Health Medicine (CPHM) for the 2023 first semester oral examinations. These are national exams under the College of Medicine South Africa.
- The Unit reviewed at least six manuscripts for publication in peer-reviewed journals.

Undergraduate training

- The Unit is giving public health lectures to second (MBCHBII) and fourth year (MBCHBIV) medical students at Sefako Makgatho Health Sciences University.
- Occupational Health teaching to University of Pretoria second year medical students.

Training of workers and management in occupational health and safety short courses

- The Unit conducted one-day workshops on OHS for health and safety committees in Gauteng and Mpumalanga Departments of Health. These workshops aimed to sensitise the health and safety representatives within public sector hospitals on their responsibilities as per the Occupational Health and Safety Act 85 of 1993.
- The Unit participated and led two, one-day training workshops for the South African National Defence College on "Disease and effects on stability, security and prosperity". The target was senior military personnel, including visitors from India, Nigeria, Eswatini, India and Botswana.

ANALYTICAL **SERVICES**

ANALYTICAL SERVICES

Dr Boitumelo Kgarebe
Head of Section

The Section has continued to respond to the need for the provision of specialised laboratory tests, advisory services, and the support of private industries, government departments, and academic institutions in occupational and environmental health.

INTRODUCTION

The Analytical Services Section continues to cover the two units, organics and metals (inorganics), which, together, drive its mandate on the analysis of hazardous substances in biological and environmental media as a means of strengthening the assessment of workplace exposures to comply with the Regulations of Hazardous Chemical Substances. The Section has continued to respond to the need for the provision of specialised laboratory tests, advisory services, and the support of private industries, government departments, and academic institutions in occupational and environmental health. Participation in Proficiency Testing Schemes (PTS) External Quality Assurance (EQA) remains key in monitoring analytical performance and competence in analysing and quantifying biomarkers in specimens.

DIAGNOSTIC SERVICES AND SPECIALISED LABORATORY TESTING

Some 2 736 tests (for diagnostic, surveillance and research purposes) were completed during the reporting period, with an average of 85% of tests within the requisite turn-around time. The different tests in various matrices are summarised in the graphs below, as well as the monthly breakdown of tests performed.

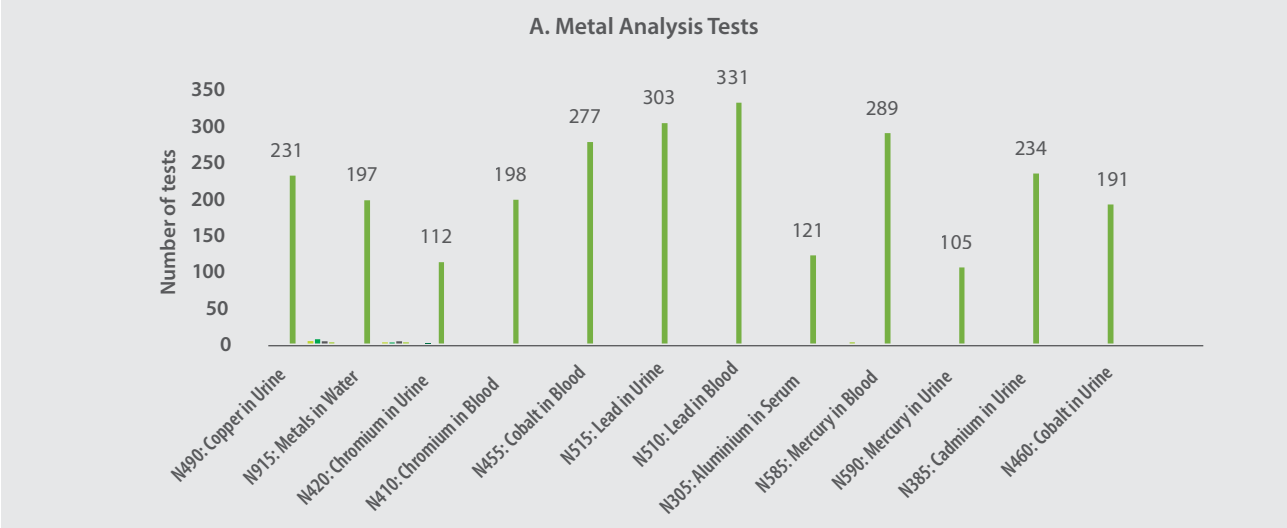


Figure 3: *Metal analysis tests conducted for the year under review.*

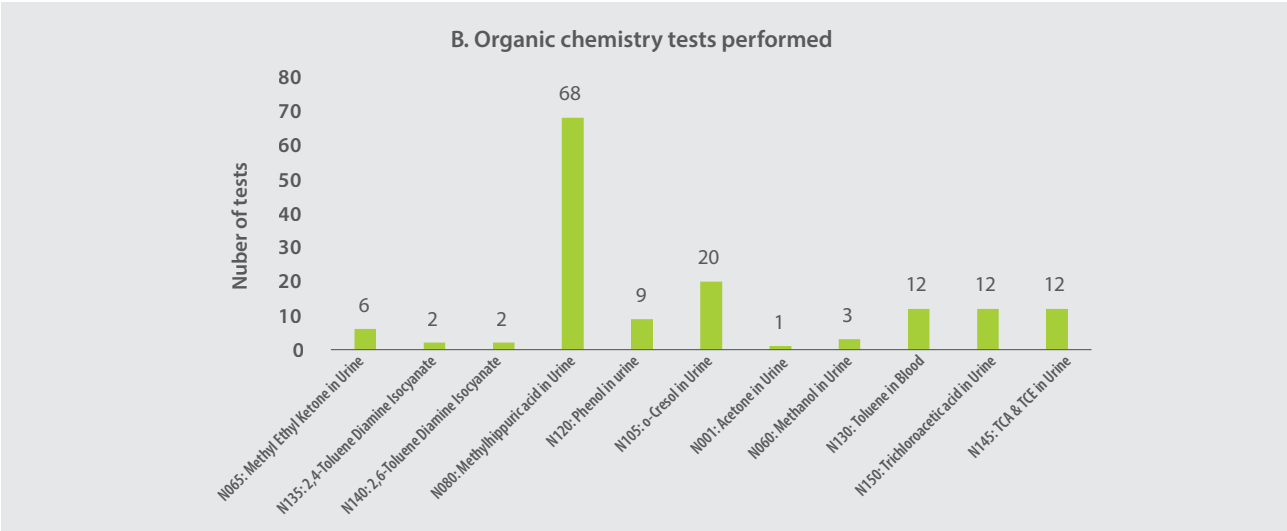


Figure 4: *Organic test performed for the period under review.*

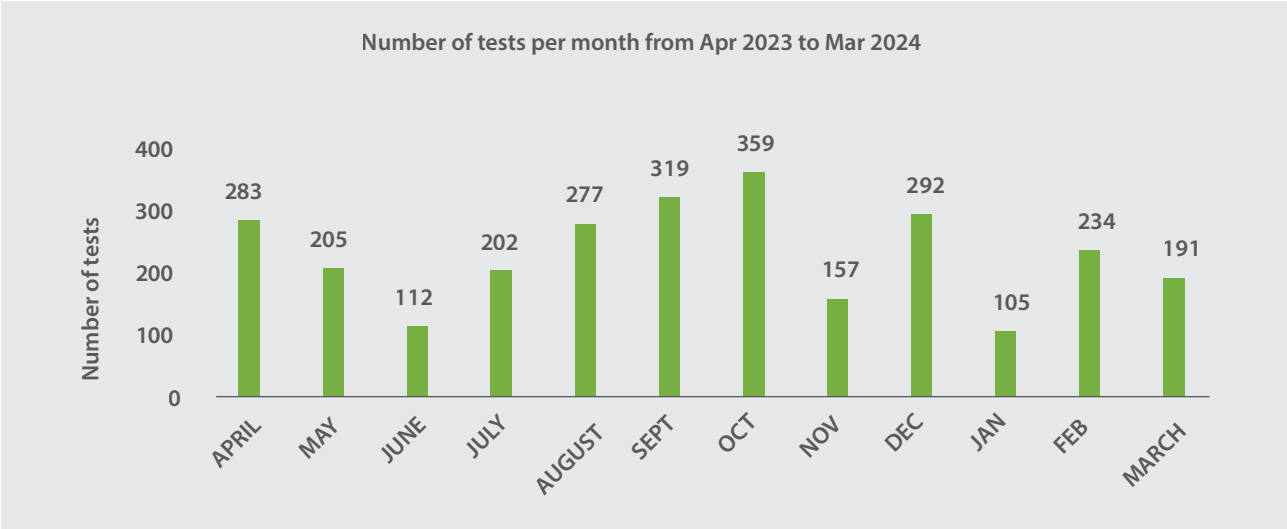


Figure 5: *Number of tests per month from April to March 2024.*

ADVISORY SERVICES

In addition to the routine specialised tests conducted, the Section met its obligations to render advice and testing services to its clients. These included a cohort study of the analysis of multi-elements in blood, hair, nails, urine, and water, as well as mercury in blood and urine, for the Department of Occupational and Environmental Health at one of the Universities. Further studies of urine tests for benzene, toluene, ethyl benzene and xylene (BTEX) metabolites, as well as lead in blood, were undertaken for the NIOH Surveillance and Epidemiology Section for their project with Petrol Attendants.

TEACHING AND TRAINING

The Section met its annual teaching and training obligations for the year under review. The annual training of University of Witwatersrand post-graduate students on Health and Safety Practices in Medical Laboratories, Good Laboratory Practice (GLP), analytical techniques, and research methodology, as applied in chemical contaminants detection in the workplace and for biological monitoring, were provided. The Section has continued to host University of Witwatersrand students to familiarise them with various practical aspects of an accredited laboratory. In the year under review, the training of Intern Medical Scientists for HPCSA registration in Clinical Biochemistry continued with the admission of one new intern scientist.

The delivery of the seventh edition of the course "Introduction to Applied Chemistry in Occupational and Environmental Health" for second-year undergraduate students (the University of the Witwatersrand) in Applied Chemistry was again updated and delivered in full face-to-face interactive mode, with the practical aspect of the course also delivered in full interactive mode.

ACCREDITATION AND QUALITY ASSURANCE

The Metals and Organics Units maintained the annual ISO Code 15189 accreditation status on 12 July 2023.

Regular internal audits were conducted throughout the year to maintain safety, quality and competence in the laboratory.

In terms of Proficiency Testing Schemes for monitoring laboratory analytical performance and competence in analysing and quantifying biomarkers in specimens, the Section continued with its participation in the following External Quality Assurance (EQA) programmes:

- New York State Department of Health for arsenic, cadmium, chromium, lead, manganese and mercury in blood and urine and aluminium in serum and water.
- The German EQA programme for mandelic acid, phenol, *o*-cresol and hexanedione.
- The South African Bureau of Standards, SABS-Water Check Scheme.
- The National Metrology Institute of South Africa (NMISA) Proficiency Testing Scheme for the analysis of ethanol (alcohol).

The Organics Unit of the Analytical Services Section successfully passed the Inter-comparison programme 71 and 72 in 2023 for toxicological analyses of hexane exposure in biological materials as a reference laboratory. The programme is conducted by the German Institute and Outpatient Clinic for Occupational, Social and Environmental Medicine (GEQUAS). This marks the 12th consecutive year that Analytical Services has maintained its status as a reference laboratory for the analysis of urine for exposure to hexane.

SAFETY, HEALTH AND **ENVIRONMENT (SHE) DEPARTMENT**

SAFETY, HEALTH AND ENVIRONMENT (SHE) DEPARTMENT

David Jones
Head of Department

Dr Graham Chin
Head of Department

The year under review has moved the SHE Department into a post-COVID-19 era and has resulted in a refocusing and reprioritising of occupational health, safety and environment services.

INTRODUCTION

The NIOH SHE Department was established to provide nationwide safety, health and environmental services to the NHLS. The Department comprises the following sections: Safety, Occupational Health and Waste Assurance. The scope of the Department's services include, but are not limited to: SHE policy, standards and procedure formulation, facilitating risk assessments, health and safety audits, incident management and investigations, SHE training, occupational health surveillance, facilitating cradle-to-grave management of hazardous waste and implementation of OHASIS (an occupational health and safety information system).

The year under review has moved the SHE Department into a post-COVID-19 era and has resulted in a refocusing and reprioritising of occupational health, safety and environment services.

OCCUPATIONAL HEALTH

Under the leadership of the NHLS Occupational Medicine Practitioner, the Department continued to provide guidance and expert medical support to specific cases and incidents, and of particular note were:

- Possible exposures to Brucella.
- Possible exposure to Congo Fever.
- Employees diagnosed with TB.
- Employees with Hepatitis B.
- Ergonomic incidents and issues.

- Glove related allergies.
- Exposure or possible exposure to other biological agents as well as chemicals and noise.

Medical surveillance programme of checking the levels of compliance with regard to Hepatitis B immunisation and surveillance for tuberculosis is ongoing. The information collected is being captured into the OHASIS Workforce Health module. A formaldehyde medical surveillance programme has been developed and implemented to complement the occupational hygiene chemical exposure surveys conducted over the year under review.

As the DoEL updated legislation and the Department of Health issued new guidelines, the NHLS policies were continuously aligned.

SPECIAL INVESTIGATIONS

The programme of monitoring exposure levels of NHLS employees to formaldehyde and xylene is ongoing and, in line with a decision taken at EXCO, the assessments for "Inland" Regions were done by the NIOH and the "Coastal" Regions assessments were outsourced. Since the introduction of the project, every cytology and histology laboratory has had at least one occupational hygiene exposure assessment.

The Department's success also rests upon continued expert support from the various sections of the NIOH, including Occupational Hygiene, Occupational Medicine, Immunology, IT, HR and Finance. Examples of expert opinion and guidance related to:

Case management for occupational incidents and disease investigations.

- Compliance with legal requirements regarding medical surveillance.
- Consulting with employees and their treating healthcare professionals who have specific occupational medical concerns.
- Ergonomic assessments.
- Immunology testing and advice.
- Ongoing development of OHASIS.
- Recruiting of staff.

OCCUPATIONAL HEALTH AND SAFETY INFORMATION SYSTEM (OHASIS)

OHASIS has continued to prove itself to be an invaluable tool during the year under review. OHASIS has been used to provide monthly statistics for the NHLS EXCO for high-level decision-making.

OHASIS has been used to:

- Conduct health and safety audits of facilities.
- Report all health and safety incidents.
- Investigate all health and safety incidents.
- Perform COVID-19 staff symptom reporting.
- TB staff symptom screening.
- Record COVID-19 and other vaccinations.
- Record results of chest X-Rays and COVID-19 tests
- Record hazardous and health care risk waste generated, treated and disposed of.

The number of incidents reported into OHASIS has fallen back to pre-COVID-19 levels.

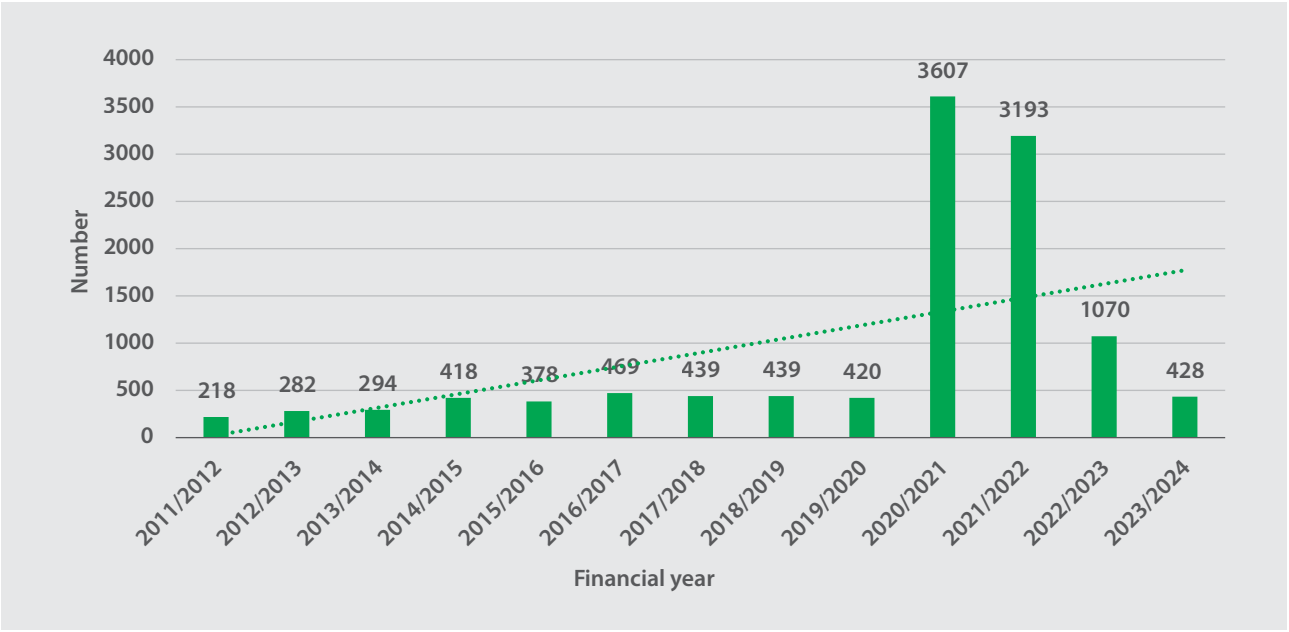


Figure 6: *Year on year reporting of all incidents in OHASIS from 2011/12 to 2023/24 financial years.*

Employees are encouraged to report every incident, no matter how small or insignificant they may think it to be, and OHASIS allows for this. The rational for this approach is to encourage a culture of reporting and correction rather than covering over and punishment.

The OHASIS system continues to be requested by other organisations, and the SHE Department is in the final stages of completing the installation of OHASIS for the Western Cape Department of Health, and progress is being made towards an installation for the Gauteng Province.

SHE AUDITS

Compliance with legislation is important to measure the extent to which laws, regulations and standards are followed, thereby measuring OHS compliance in the workplace. Audits are conducted annually at all NHLS workplaces to monitor compliance with OHS guidelines, i.e. the Occupational Health and Safety Act 85 of 1993, and NHLS SHE policies and procedures. The SHE Officers, under the supervision of the Deputy SHE Manager, continued with onsite SHE audits for this financial year. The standard operating procedure "GPS0048 – SHE Audit Procedure" serves as a guide document for this process. As at the end of this financial year, 100% of all scheduled SHE audits were completed in the NHLS.

RISK ASSESSMENTS (RA)

The Occupational Health and Safety Act (OHS Act 85 of 1993) stipulates that all employers must establish what hazards to health or safety of persons are attached to any work performed and establish what precautionary measures should be taken with respect to such work in order to protect the persons, and he shall provide the means to apply such measures. In order to comply, NHLS facilities conduct risk assessments once every two years with a team comprising trained and experienced staff. The standard operating procedure "GPS0039 - NHLS Risk Assessment" serves as a guide for this process. Regional SHE teams evaluate, facilitate and approve risk assessments. As at the end of the financial year 92% of all NHLS facilities had satisfactory and valid health and safety risk assessments.

HEALTH AND SAFETY REPRESENTATIVES (HSR) AND HEALTH AND SAFETY COMMITTEE (HSC) MEETINGS

In order to ensure legal compliance, the Regional SHE Officers of the SHE Department coordinate and monitor the appointment of health and safety representatives. Regional SHE Officers receive and mark all HSR training modules and compile and issue training certificates to successful candidates. Regional SHE teams attend HSC meetings in an advisory capacity. Where they are unable to attend, they send input in writing to the committee.

The NHLS has 511 active health and safety representatives of which 503 are trained and serving in 38 health and safety committees, all of which are active.

HAZARDOUS WASTE

The Waste Assurance Manager is constantly revising the NHLS waste management procedures to ensure that they are in accordance with the terms of the national waste management policy. NHLS facilities are being audited to monitor compliance and waste management training is conducted to improve waste management standards in the NHLS.

Details of generated hazardous waste continue to be captured into OHASIS by each of the facilities.

Table 2: Quantities of hazardous waste generated in the NHLS by Region over the past three financial years.

Region	Quantities of health care risk waste reported on OHASIS from 01 April 2021 to 31 March 2022 per area	Quantities of health care risk waste reported on OHASIS from 01 April 2022 to 31 March 2023 per area	Quantities of health care risk waste reported on OHASIS from 01 April 2023 to 31 March 2024 per area
Eastern Cape	257 127,95 kg	245 957,35 kg	259 350,25 kg
Free State and North West	207 272,36 kg	210 119,37 kg	200 068,57 kg
Gauteng	621 247,63 kg	562 278,67 kg	505 658,79 kg
Institutes and Corporate	72 071,05 kg	47 038,39 kg	58 288,95 kg
KwaZulu-Natal	605 286,48 kg	584 462,90 kg	620 388,24 kg
Limpopo and Mpumalanga	366 877,19 kg	491 770,12 kg	393 302,37 kg
Western and Northern Cape	330 714,23 kg	271 929,26 kg	296 378,80 kg
Total	**2 445 518,41 kg**	**2 413 556,05 kg**	**2 333 435,96 kg**

The Waste Assurance Unit continues to engage with the relevant authorities and service providers to ensure that the facilities comply with the provisions of legislation in order to keep up to date with new developments in the waste management sector.

TEACHING AND TRAINING

The SHE Department had training on the new model PortaCount respirator fit testing device and the amended Asbestos Regulations. The SHE Department also continued to contribute to the SABS Technical Committee TC48 and TC1087.

The SHE Department was represented by the SHE Department Manager at the 2023 American Biological Safety Association Conference, where a poster was presented. Four members of the SHE Department attended the International Federation Association of Bio-safety Associations training "Mitigating Cyber Security Risks in Biological Laboratories: Professional Certification Training and achieved accreditation".

TOXICOLOGY **AND BIOCHEMISTRY**

TOXICOLOGY AND BIOCHEMISTRY

Dr Jitcy Joseph
Acting Head of Section

The Section is involved in teaching and training undergraduate students as well as supervising postgraduate students, including MSc and PhD, within the NHLS and in national institutions of learning.

INTRODUCTION

The Biochemistry and Toxicology Section is committed to promoting research in collaboration with national and international scientific institutions, providing specialised services and contributing to capacity development through teaching and training. The Section also offers consultation services to governmental departments and industry in Occupational Toxicology. The delivery of the aforementioned functions in the section is achieved through the five specialised units, namely: Toxicity Assessment Unit, Genotoxicity Unit, Molecular Biology Unit, Ambient Particle Assessment Unit and Toxicological and Chemical Risk Assessment Unit.

The resources available in the Section find applications in various fields, including biomedical research, microbiology, environmental science, food safety and quality control, pharmaceutical development, medical diagnostics, genetic research, agriculture, forensics and biotechnology. The Section is involved in teaching and training undergraduate students as well as supervising postgraduate students, including MSc and PhD, within the NHLS and in national institutions of learning.

The Section continued to meet its toxicology and biochemistry-related targets in occupational and environmental health. The Section also maintained its established collaborations with local and international institutions, especially in the areas of training and capacity development.

SERVICES

CytoViva Hyperspectral Imaging System (HIS) with 3D module.

The Section utilises CytoViva's patented technology, which integrates with a standard microscope to provide high-resolution, darkfield images to assess if compounds enter cells, potentially increasing their harmful effects. This technology requires virtually no specialised sample preparation allowing rapid observation of a wide range of compounds within unlabelled or fluorescently labelled cells and tissues. This system is further enhanced by CytoViva hyperspectral imaging technology, which can identify specific compounds in the nano- and micro-range within unknown samples. This instrument is also fitted with a 3D module, enabling the creation of three-dimensional representations of samples and allowing identification of the location of compounds within cells and even organelles.

United Nations (UN) Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

In 2023, the Section laid a foundation to start offering services on GHS, a system that provides specifications for the classifications, prevention, management and communication of hazards to users in the form of hazard pictograms, hazard statements on labels and Safety Data Sheets (SDSs). In line with the newly revised Regulations for Hazardous Chemicals that require GHS compliance, the Section plans to start providing GHS-related services such as preparation and review of SDSs, preparation of GHS-compliant labels and training in GHS.

Risk assessment for major hazard installations

The number of fatal incidents involving the release of toxic substances appears to be increasing in South Africa, despite the existence of Major Hazard Installation Regulations (2019), which falls under the Occupational Health and Safety Act, 1993 (Act 85 of 1993). Among other things, employers in major hazard installations are required to carry out a risk assessment, which, *inter alia*, includes an estimation of concentrations and effects of such toxic releases.

xCELLigence Real-Time Cell Analysis (RTCA)

The xCELLigence RTCA system is a powerful tool for real-time, label-free monitoring of cell behaviour and function. It uses electrical impedance to measure changes in cell number, morphology, and adhesion, providing continuous data on cell health and response to treatments. This technology enables researchers to gain valuable insights into various biological processes, from cell proliferation and migration to drug efficacy and toxicity testing.

RESEARCH AND/OR SPECIAL PROJECTS

The Toxicology and Biochemistry Department produced seven publications, one conference proceedings and one peer-reviewed book chapter. Furthermore, members of staff presented their research findings at both international and national conferences, as well as in local research days and workshops. Staff also participated in various scientific public engagements, including serving as reviewers for international journals, funding applications (National Research Foundation-NRF) examiners for PhD and Masters Theses and Dissertations.

TEACHING AND TRAINING

The Section was involved in teaching and training as well as supervision of postgraduate students within the NHLS and in local institutions of learning.

Training within the NHLS

The Section offered a three-day NHLS-wide webinar on the UN-GHS. This webinar was designed to train individuals within the NHLS who handle hazardous chemicals in their workplaces to identify and handle chemical hazards in accordance with GHS classification and labelling criteria. The Section was also involved in the NIOH/NEDLAC COVID-19 Legacy Programme.

Training in local institutions of learning

Members of the Section delivered lectures at various universities in their areas of specialisation. The lectures varied including exposure modelling, a short course on xCELLigence, pesticide toxicology and risk assessment and basic principles of radon and health effects.

Image 18: *Ms M Magogotya training postgraduate students at UNISA.*

Postgraduate student supervision

Staff members in the Section supervised six PhD, six Masters and one BSc (honours) students.

NHLS
BIOBANK

NHLS BIOBANK

Bonginkosi Duma
Head of Section

The Biobank has new clients who store and collect samples for short and long-term research and preservation purposes.

INTRODUCTION

The NHLS Biobank collects and stores different specimens from NHLS clients, various government entities and private clients. It operates as a non-profit organisation, utilising a cost-recovery model. The Biobank has new clients who store and collect samples for short and long-term research and preservation purposes.

SERVICES

Its services have grown during the last fiscal year, and as a result, some projects have been put on hold due to staff shortages. The Biobank has seen an increase in cost recovery as well as requests for using the facility this financial year.

The services provided by the National Biobank include the following:

- Sample collection, processing and short-term or long-term storage.
- Material transfer agreements that comply with ethical and legal requirements.
- The provision of a wide variety of samples.
- Sample logistics and preparation.
- Research activities and collaboration.

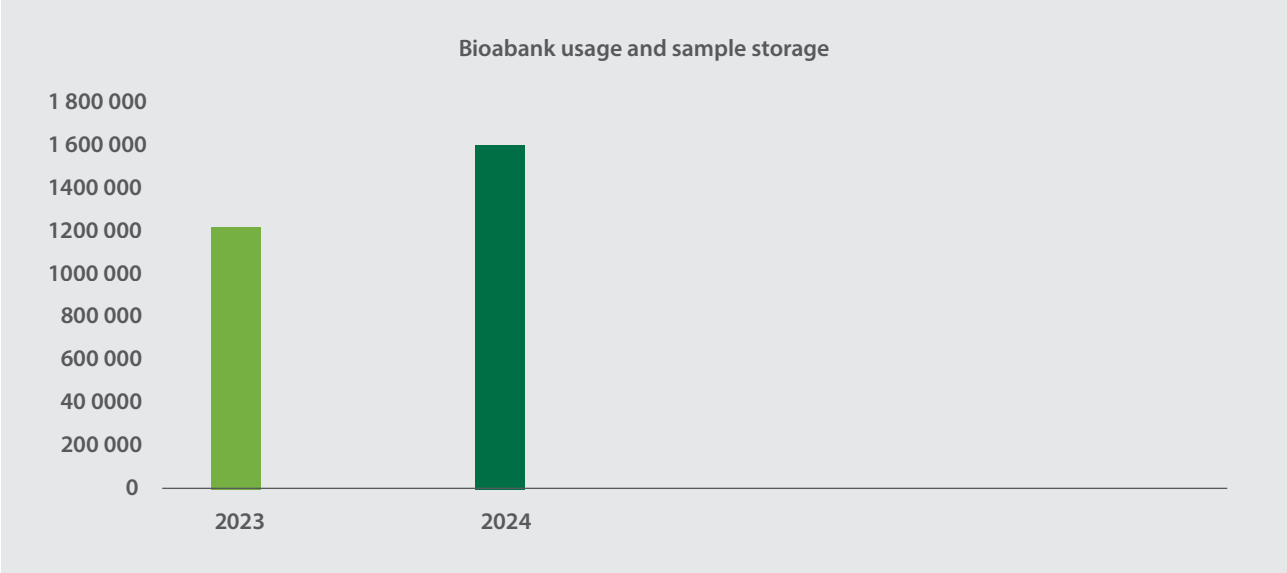


Figure 7: *Biobank usage and sample storage.*

Sample storage

The storage temperature ranges from minus 80 degrees celsius ultra-freezers to liquid nitrogen at 156 degrees Celsius used for storing samples. Minus 20 freezers are used for storing vaccines and samples waiting for analysis by the laboratories. The Biobank has a backup power supply, which ensures an appropriate storage capacity is maintained during load shedding or power interruption. Health technology assessment projects are also using the Biobank for the collection and storage of specimens that are used during technology assessment within NHLS. The Biobank has Service Level Agreements with various institutions of higher learning, research units and governmental entities.

Image 19: *NHLS Biobank freezers.*

The Biobank implemented an IT system that allows for the coding and tracking of samples. This two-dimensional bar-coded system assists with the storage and location of samples and easy retrieval of specimens from ultra-freezers.

Biobank QMS

The Biobank maintained its ISO 9001:2015 accreditation during the period under review, making the only Biobank in Africa to be accredited with this standard.

It is important for biorepositories to have quality management systems and adhere to a set of standard operating procedures (SOP), as well as ethical and legal considerations. A quality management system enables the long-term preservation of specimens, stability, quality and confidence in the data of the stored specimens.

The benefits of maintaining quality standards include the following:

- Saving time and money.
- Maintaining high-quality samples and adding value.
- Ensuring the necessary biosafety and biosecurity standards.
- The ability to map population flows, evolution of disease and sources of epidemics.
- Promoting the early development of prevention and treatment strategies through the application of modern technology.

The WHO recognises the pivotal role that biobanking plays in society and has proposed a global governance framework for biobanks. The framework encompasses elements of participant confidentiality, ethics, safety, sample and data quality for biobanks.

Africa CDC Biobank training facilitator

Mr Bonginkosi Duma was appointed by Africa CDC and ASLM to be a facilitator for the Biobank workshop in Addis Ababa, Ethiopia, from 16-20 October 2023 for the main purpose of building biobanking capacity in Africa by:

- Contribute to developing or modifying existing training curriculum to make it more relevant to the context of the planned training.
- Developing a training agenda and coaching participants.
- Evaluating participant's skills.

Image 20: *NHLS training facilitators from left to right: Dr Mantombi Maseme, Mr Bonginkosi Duma and Mr Henry Julius.*

Biobank Networks

The Department of Science and Innovation has established a new network for non-medical biobanks called Biodiversity Biobanks. Ms Mandile Thobile presented on behalf of NHLS.

Biobank membership

National Society for Research Platforms – NSCR

MBirSA
Medical Biorepositories of South Africa

The Department of Science and Innovation has started a biobank network committee that will look at helping with the funding of research platforms under medical research. Development of terms of reference and regulations and completion of the MBirSA website are ongoing.

To ensure that its operations are aligned with international standards, the NHLS' Biobank continues to maintain its membership of the International Society for Biobanking (ISBER) and the European, Middle Eastern and African Society for Biopreservation and Biobanking (ESBB). Staff in the department continue to participate as a member of the ISBER Standards Committee, which recently developed a new biobanking standard, ISO 20387. This standard will help international biobanks to be audited and get accreditation.

The Biobank's website can be accessed at www.nationalbiobank.nhls.ac.za.

isber
INTERNATIONAL SOCIETY FOR BIOLOGICAL AND ENVIRONMENTAL REPOSITORIES

ESBB
European, Middle Eastern & African Society for Biopreservation and Biobanking

NHLS represented by Mr Duma belongs to the standards committee currently working on the ISBER best practices 5th edition that was implemented in June 2023.

The best practice document is available on the website for downloading.

INFORMATION **SERVICES AND TRAINING**

INFORMATION SERVICES AND TRAINING

Ms Angel Mzoneli
Head of Section

Information Services serves as a support service to the NIOH and the NHLS, and acts as a gateway to occupational and environmental health and safety information.

INTRODUCTION

Information Services serves as a support service to the NIOH and the NHLS, and acts as a gateway to occupational and environmental health and safety information, to the organisation, and to external patrons throughout South Africa and the SADC region. The Section also houses the Training Unit that coordinates training activities for practitioners, employers, employees, and governmental entities. The Unit plays an integral part in the NIOH as it is a key function of the institute.

The Section provides support through:

- South Africa's national reference library for occupational health (AJ Orenstein Memorial Library), the only specialist reference library in Southern Africa dealing exclusively with Occupational Health topics, housing an extensive collection of information resources in occupational health both in print and electronic formats.
- A query-handling service which is aimed at responding and facilitating access to technical and scientific occupational health (OH) information, guidance and expert advisory services offered within the institute.
- An archive, which is aimed at comprehensively collecting, documenting and preserving the character and identity of the organisation and providing evidence of the historical development and changes of the organisation over time.

- The institutional repository, which is a digital collection of the organisation's intellectual output.
- The Training Unit aimed at providing technical OHS training for NIOH stakeholders.

Moreover, the Section serves the information needs of all NHLS staff throughout the country, including those located in laboratories, and the eight medical schools throughout South Africa as well as the NICD. Library collections serving the communities of both the NHLS and NICD are housed in the library located in Braamfontein (formally known as the SAIMR Library). Similarly, NICD library collections are housed at the NIOH resource centre with an extensive remote information service provided to the NICD community.

SERVICES

Information Services offers its knowledge and information to all stakeholders, both internal and external, to support the promotion of good occupational health practice. The Section ensures the provision of comprehensive resources and services in support of the research, teaching and training activities of the organisation and to be a national resource and service dedicated to the collection, access to and dissemination of information on the prevention of occupational diseases and accidents in workplaces. The key objective of the service is, therefore, to collect, access and disseminate information in support of occupational health services and activities throughout South Africa and the SADC region.

The Section continued to receive and respond to requests for technical and scientific information on occupational health issues through its query-handling service. The total number of queries received for the reporting year was 189 queries, and all the queries received were fulfilled. This number includes the queries that came through the NIOH library and those that came through the Query Handling Service.

Some of the queries received in the reporting period, include but are not limited to:

- Requests for occupational hygiene and ergonomic surveys.
- Requests for training on handling of asbestos or advice on how best to handle asbestos containing materials in homes and workplaces, or risks related to asbestos containing materials in homes.
- Referrals to the NIOH clinic.
- Requests for information about the Diploma in Occupational Health and Masters in Public Health.
- Requests for advice from both employers and employees on occupational health related issues in the workplace.
- Training requests interventions.
- Pathology follow-ups, and many more.

These queries came from all provinces across South Africa, from both employers and employees, occupational health practitioners, health and safety representatives, university students, government departments, private industry, construction and mining companies, doctors, academic institutions and the public. It is also worth noting that some of the queries received originated from other African countries beyond SADC.

The Section also handled requests for scientific information through the NHLS and NICD libraries. Combined, these two libraries saw an increase in the number of requests received, from 246 to 320 requests for journal articles and books.

The Section relied on open-access resources and trial databases as a source to retrieve information for its clients, and these were added to the library collection, which researchers could access through the library page on the intranet. Information Services continued to support researchers by providing the necessary literature to carry out their research projects. Researchers also received training on how to utilise these resources with 14 information literacy-training interventions hosted. These training interventions also included training on the use of Zotero, a bibliographic reference management tool

and the development and viewing of a video on how to access open access and trial databases, eg. Biotechnology Source (EBSCO) and ProQuest Health Premium Collection and Health and Medicine e-Books.

During the reporting year, the Section hosted two students for an Experiential Learning Programme, from the University of Limpopo. The programme offers practical training to final-year information science students in a quest to balance theoretical knowledge with hands-on experience in the field of information science. The libraries further provided library induction to new employees and interns in the organisation.

TEACHING AND TRAINING

The NIOH's Training Unit, a sub-unit of the Information Services Section, coordinated and delivered funded online COVID-19 training webinars as part of the National Economic Development and Labour Council (NEDLAC)/ NIOH COVID-19 Legacy Programme, supported by the Compensation Fund. This programme was launched with the aim of producing COVID-19-related occupational health and safety information material that can be used by workplaces to educate and inform at all organisational levels, including all industries at all levels. These products were developed with concise messaging emphasising practical applications and distributed using easily accessible formats.

To deliver on this, the NIOH Training Unit facilitated the delivery of eight COVID-19-related occupational health and safety webinars. The programme fulfilled its goal by developing eight fact sheets/ infographics and 6 short videos. These webinars and materials have added great value in ensuring that workplaces are fully equipped with knowledge to ensure healthy and safer workplaces.

TRAINING INTERVENTIONS

In the year under review, eight online webinars were completed, reaching 5 124 attendees (an average of 640.5 attendees per session; 427.0 per month). These included a wide range of "legacy" topics. Additional information resources (such as webinar video and audio recordings, presentations and supporting documentation/reports) were subsequently made available on the NIOH website, YouTube channel and Twitter feed. Post-webinar online tests for continuous professional development (CPD) accreditation were circulated to those attendees with HPCSA registration.

Other OHS training conducted by NIOH Sections and coordinated by the training unit for external partners includes:

- 7 June 2023: NIOH input into the **"Asbestos: Its Global Impact and How to Eliminate It – 1. The extent of the hazard",** Conducted by the Workplace Health Without Borders (WHWB) Asbestos Work Group - Gabriel Mizan represented NIOH/South Africa.
- 21 June 2023: NIOH input into the **"Asbestos: Its Global Impact and How to Eliminate It – 2. prevention measures, controls and risk management practices, including substitution, as well as advocacy efforts towards achieving a global ban"** – Conducted by the Workplace Health Without Borders (WHWB) Asbestos Work Group – Gabriel Mizan represented NIOH/South Africa.
- 12 July 2023: NIOH input into the **"Asbestos: Its Global Impact and How to Eliminate It – 3. Technical issues, including measurement limitations and the way forward, and exploring the risks for emergency responders including firefighters"** – Conducted by the Workplace Health Without Borders (WHWB) Asbestos Work Group – Gabriel Mizan represented NIOH/South Africa.
- 12-13 July 2023: **Work-Related Upper Limb Disorders (WRULD)** – Conducted by the Ergonomics Unit of the NIOH Occupational Medicine Section.
- 27 November – 1 December 2023: **5-day "United Nations Globally Harmonized System (GHS) of Classification and Labelling of Chemicals"** – Conducted by the NIOH Toxicology and Biochemistry Section.
- 12-16 February 2024: **5-day "OHTA201 Module: "Basic principles in Occupational Hygiene"** – Conducted by the NIOH Occupational Hygiene Section.

INTERNATIONAL LIAISON

The Institute maintained strategic partnerships by participating in technical committees and fora that influence policy and legislative reforms at national and international levels.

The NIOH has been re-designated the WHO Collaborating Centre for Occupational Health. The primary objective of the Global Network of WHO Collaborating Centres is to facilitate collaboration and networking among participating institutions and international partners to make a significant contribution towards the overarching goal of (WHO).

The NIOH hosted an internationally renowned professor in histopathology from the University of Pennsylvania (USA), accompanied by pathology registrars from the USA and Botswana. This visit allowed the Pathology Division to highlight its unique histopathology laboratory and forge new partnerships.

HONOURS

- Ms Karen du Preez received an award for "Personality of the Year 2022" at the SAIOH Annual Conference in October 2023. The impact of this award is that the professional member has made a noteworthy effort nationally and/or internationally to promote occupational hygiene.
- The Analytical Services' Organics Unit successfully passed the Inter-comparison programme 71 and 72, 2023 for toxicological analyses of hexane exposure in biological materials as a reference laboratory. The programme is conducted by the German Institute and Outpatient Clinic for Occupational, Social and Environmental Medicine (GEQUAS). This is the 12th consecutive year that Analytical Services has maintained its status as a reference laboratory for the analysis of urine for exposure to hexane.

RESEARCH OUTPUT

PUBLICATIONS

Chitaka, A., Zwane, T., Kuonza, L., Naicker, N., Tlotleng, N., Wilson, K. Diabetes mellitus mortality by major occupation category in South Africa, 2009-2016. Public Health Bulletin South Africa, 2023; 20(1). https://www.phbsa.ac.za/wp-content/uploads/2023/10/Diabetes-mellitus-in-South-Africa-2009-2016-Naicker.pdf

Del Giudice, G., Serra, A., Saarimaki, L.A., Rouse, I., Sanabria, N., et al. An ancestral molecular response to nanomaterial particulates. Analysis https://doi.org/10.1038/s41565-023-01393-4

Fagbohun, O.F., Olawoye, B., Oriyomi, O.V., Joseph, J.S. Multivariate analyses of selected trace elements from Kigelia africana (Lam.) Benth. plant by ICP-OES: A chemometrics approach. Journal of Trace Elements and Minerals 5 (2023) 100081.

Fagbohun, O.F., Joseph, J.S., Oriyomi, O.V., Rupasinghe, H.P.V. Saponins of North Atlantic Sea Cucumber: Chemistry, Health Benefits, and Future Prospectives. Mar. Drugs 2023; 21, 262. https://doi.org/10.3390/md21050262

Fourie, A., Carman, H.A., Ndaba, N., Rees, D. Allergic contact hand dermatitis due to constituents of nitrile gloves. Occup Health Southern Afr. 2023; 29(4):174-179.

Gallifant, J., Zhang, J., Whebell, S., Quion, J., Escobar, B., Gichoya, J., et al. A new tool for evaluating health equity in academic journals; the Diversity Factor. PLOS Glob Public Health. 2023; 3(8): e0002252. https://doi.org/10.1371/journal. pgph.0002252

Maseme, M. Benefit sharing in international collaborative health research: The context of South African biobanks. Afr.J.Bio.Sc, 2024; 6(2): 61-73 https://www.afjbs.com/issue-content/benefit-sharing-in-international-collaborative-health-research-the-context-of-south-african-biobanks-216

Maseme, M., Gardner, J., and Mohamed, S. Broad consent for biobank research in South Africa - Towards an enabling ethico-legal framework. Glob Bioeth. 2024; 35(1): 2288331.

Matuka, D.O., Ratshikhopha, E., Singh, T. House-dust mites: Challenges with establishing causal associations in occupational health for ubiquitous agents- A retrospective study. Current Allergy & Clinical Immunology, 2023; (36)2.

Matuka, O.D., Ngajilo, D., Baatjies, R., Dayal, P., Jeebhay, M.F., Singh T.S. Occupational Bioaerosol Exposures Associated with Poultry Farming, Journal of Agromedicine, 2023; DOI: 10.1080/1059924X.2023.2206405

Matuka, O.D., Ratshikhopha, E., Muvhali, M., Muleba, L., Singh, T. Navigating the complexities of mould exposure in damp building: A case report on challenges and potential solution. Current Allergy & Clinical Immunology, 2023; (36) 4.

Mbazima, S.J. Health risk assessment of indoor and outdoor PM2.5 –bound metal (loid)s in three residential areas downwind of an active ferromanganese smelter. Air Quality, Atmosphere & Health, 2023; 16:2309–2323 https://doi.org/10.1007/s11869-023-01409-x

Mbazima, S.J., Moola, R., Joseph, J.S. Release and health outcomes of exposure to chalk particles in classrooms: a systematic literature review. International Journal of Environmental Health Research, 2024; https://doi.org/10.1080/09603123.2024.2311228

Mkulisi, A., Rathebe, P.C., Kachingwe, E., Bidassey-Manilal, S. Prevalence of chronic respiratory symptoms among cement factory workers in Gauteng Province, South Africa. Journal of Occupational Environmental Hygiene (15 Mar 2024). https://doi.org/10.1080/15459624.2024.2324601

Mlangeni, N., Adetokunboh, O., Lembani, M., Malotle, M., Ngah, V., Nyasulu, P.S. (2023) Provision of HIV prevention and care services to farmworkers in sub-Saharan African countries. Tropical Medicine & International Health, 2023; 1–10.

Molewa, M.L., Barnard, T., Naicker, N. Control strategies for domestic cockroach (B. germanica, B. orintalis and P. Americana) pests: A scoping review. Int. J. Adv. Multidiscip. Res, 2023; 10(3): 20-40; DOI: http://dx.doi.org/10.22192/ijamr.2023.10.03.003

Mphaga, K.V, Rathebe, P.C, Utembe, W. Hairdressers' knowledge, attitudes, and practices regarding occupational health and safety, Johannesburg. Occup Health Southern Afr. 2023; 29(2):75-82.

Mphaga, K.V., Utembe W., Rathebe, P.C. Radon exposure risks among residents proximal to gold mine tailings in Gauteng Province, South Africa: a cross-sectional preliminary study protocol. Front. Public Health 12:1328955. DOI: 10.3389/fpubh.2024.1328955

Mutava, E., Singh, T., Brouwer, D. Wind-driven roof turbines' effectiveness in enhancing household ventilation: A potential tool to reduce tuberculosis infection. Occup Health Southern Afr. 2023; 29(3):132-136.

Ntlailane, L., Sebola, L., Singo, D., Nthoke, T., Mizan, G. Managing the risks of an asbestos bulk storage facility at a research institute. Annals of Work Exposures and Health, 2023, 1–5 https://doi.org/10.1093/annweh/wxad028

Pega, F., Al-Emam, R., Cao, B., Davis, C.W., Edwards, S.J., et al. New global indicator for workers' health: mort rate from diseases attributable to selected occupational risk factors. Bull World Health Organ 2023;101:418–430Q | DOI http://dx.doi.org/10.2471/BLT.23.289703

Rees, D., Nelson, G. The non-use of aluminum oxide for silicosis prophylaxis in South African mines. Occup Health Southern Afr.2024; 30(1):18-21. https://doi.org/10.62380/ohsa.2024.30.1.2

Sambaza, S.S., Naicker, N. Contribution of wastewater to antimicrobial resistance: A review article. J Glob Antimicrob Resist. 2023; 34:23-29. DOI: 10.1016/j.jgar.2023.05.010. Epub ahead of print. PMID: 37285914.

Schlunssen, V., Mandrioli, D., Pega, F., Momen, N.C., Adam, B., et al. The prevalence and levels of occupational exposure to dusts and/or fibres (silica, asbestos and coal): A systemic review and meta-analysis from the WHO/ILO joint estimates of the work-related burden of disease and injury. Environment International 178 (2023) 107980.

Ssekandi, N., Tlotleng, N., Naicker, N. Sociodemographic and environmental factors associated with diarrhoeal illness in children under 5 years in Uganda, 2016: a cross-sectional study. BMC Infectious Diseases, 2023; 23:480 https://doi.org/10.1186/s12879-023-08458-8

Utembe, W., Andraos C., Gulumian, M. Immunotoxicity of engineered nanomaterials and their role in asthma. Critical Reviews in Toxicology, 2023; https://doi.org/10.1080/10408444.2023.2270519

Utembe, W., Kamng'ona, A.W. The knowns and unknowns of chemically induced lower respiratory tract microbiota dysbiosis and lung disease. Environ. Sci. Proc. 2023, (27)21: https://doi.org/10.3390/ecas2023-1634

Zungu, M., Yassi, A., Ramodike, J., Voyi, K., Lockhard, et al. Systematizing information use to address determinants of health worker health in South Africa: A cross-sectional mixed method study. Saf Health Work 2023; 14:368-374.

BOOK CHAPTERS

Utembe, W., Chirality in Nanomaterials Occurrence, Methods of Determination and Biochemical Significance. In Some Key Topics in Chemistry and Biochemistry for Biotechnologists (pp. 177-190). CRC Press: https://www.taylorfrancis.com/chapters/edit/10.1201/9781003287599-8/chirality-nanomaterials-occurrence-methods-determination-biochemical-significance-wells-utembe?context=ubx&refId=76b42c00-f6e0-4065-bb70-c2dda3a1ca0f

Maseme M. International Society for Biological and Environmental Repositories (ISBER) Best Practices: Recommendations for Repositories 5th Edition. https://www.isber.org/news/659281/ISBER-Launches-New-Best-Practices-Recommendations-for-Repositories-Fifth-Edition.htm contributed in the ISBER).

TECHNICAL REPORTS

Du Preez K, Sebola L, Manganyi J. *Hazardous chemical agents' exposure assessment conducted at the NHLS histology and cytology laboratories, Tshwane academic division*. March 2024. Report no. OH71/23.

Gumbo N, Du Preez K. *Exposure assessment of hazardous chemical agents at the NHLS histopathology laboratory at Chris Hani Baragwanath Academic Hospital.* August 2023. Report no. OH11/23.

Gumbo N, Du Preez K. *Hazardous chemical exposure assessment conducted at the NHLS - Polokwane Cytology and Histology laboratory*. March 2024. Report no. OH58/23.

Gumbo N, Du Preez K. *Noise assessment conducted at the laundry and kitchen area of Themba Hospital, Mbombela.* October 2023. Report no. OH28/22.

Gumbo N, Mizan G. *Noise annoyance assessment at the NHLS Head Office's IT Building, Sandringham.* June 2023. Report no. OH16/23.

Gumbo N, Singo D, Manganyi J. *Noise annoyance assessment conducted at the National Health Laboratory Service, Rahima Moosa Clinical Pathology new site*. November 2023. Report no. OH49/23.

Hoyi Z, Rakgoale M. *Report of an ergonomic assessment conducted at Nampak Ltd, Bevcan factory in Rosslyn.* March 2024. Report no. OM-E1/24.

Hoyi, Z, Ndaba, N. Ergonomic risk assessment conducted at the Gauteng Department of Education Sedibeng West District. Report no. 14/23.

Hoyi, Z, Ndaba, N. Ergonomic risk assessment conducted at the Gauteng Department of Education Tshwane South District. Report no. 16/23.

Hoyi, Z, Ndaba, N. Report of an ergonomic risk assessment conducted at the Helen Joseph Hospital NHLS Laboratory. Report no. 13/23.

Hoyi, Z, Ndaba, N. Report of an ergonomics assessment conducted at Glencore Wonderkop Smelter in Rustenburg. Report no. 17/23.

Hoyi, Z, Ndaba, N. Workstation assessment report for the Director General of the African Development Bank. Report no. 12/23.

Hoyi, Z, Nkosi, B, Ndaba, N. Ergonomic risk assessment conducted at the Gauteng Department of Education Gauteng West District. April 2023. Report no. 11/23.

Hoyi, Z, Rakgoale, M. Report of an ergonomics assessment conducted at Nampak Ltd. – Bevcan Factory in Rosslyn. Report no. OM-E1/24.

Jones D. Safety, health and environment assessment at PSeta. November 2023.

Muleba L, Matuka O, Ratshikhopha E. *Microbiological indoor air quality assessment at NIOH, Analytical Main*

Laboratory in Johannesburg, Gauteng. December 2023. Report no. IM16/23-24.

Nkosi, B, Hoyi, Z. Ergonomic risk assessment conducted at the Immunology/Microbiology section of the National Institute for Occupational Health. Report no. 15/23.

Nthoke T, Gumbo N, Mizan G. *Exposure assessment of hazardous chemical agents at the NHLS – CMJAH Histology Laboratory*. October 2023. Report no. OH10/23.

Ntlailane L, Mizan G. *Exposure assessment of hazardous chemical agents at the NHLS – Universitas Histopathology Laboratory*. March 2024. Report no. OH02/24.

Ntlailane L, Nthoke T, Du Preez K. *Exposure assessment of hazardous chemical agents at the NHLS- DGMAH Anatomical Pathology Laboratory*. October 2023. Report no. OH14/23.

Sebola L, Manganyi J. *Exposure assessment of hazardous chemical agents at the NHLS Braamfontein Cytology Division*. October 2023. Report no. OH12/23.

Sebola L, Ntlailane L, Manganyi J. *Exposure assessment of hazardous chemical agents at the NIOH, NHLS Pathology Division*. August 2023. Report no. OH08/23.

Singo D, Sebola L, Mizan G. *Asbestos exposure assessment conducted at the National Institute for Occupational Health (NIOH), Pathology Division*. May 2023. Report no. OH29/22.

SURVEILLANCE REPORTS

Fourie A, Muvhali M, Ratshikhopha M, Singh T, Wilson K, Ntlebi V. *Occupational Allergies, 2022*, Report No.: IM24/23-24.

M Malotle, M. Zungu. Tuberculosis Surveillance among health workers in South Africa, 2022-2023.

Occupational Medicine Clinic Surveillance Report: Demographic and Disease Data - January 2023 to December 2023. Report no**.:** 1/2023.

Wilson KS, Naicker.*The AIA Occupational Hygiene 2022-2023, South Africa and the Occupational Hazards and Trends report and Occupational Hazard Surveillance and Trends Report: AIA Occupational Hygiene 2018 - 2023 South Africa.*

Wilson KS, Ntlebi V, Mkulisi A, Ramodike MJ, Kwenda D, Chitaka. *National Occupational Mortality South Africa surveillance*

CONFERENCE PRESENTATION

ORAL PRESENTATION INTERNATIONAL

Ratshikhopha E, Muvhali M, Naicker N, Singh T. *Allergic sensitisation in adult patients tested at the NHLS laboratories*; ALLSA SAIS 2023 Congress 28 September 2023 to 01 October 2023.

Utembe, W. and Kamng'ona, A.W., 2023. *The Knowns and Unknowns of Chemically Induced Lower Respiratory Tract Microbiota Dysbiosis and Lung Disease*. 6th International Electronic Conference on Atmospheric Sciences, 15-30 October 2023.

Mbazima SJ, R. Moolla and JS Joseph. 2024. *Research on Chalk particles: A systematic review*. 7th International Conference on the History of Occupational and Environmental Health, 15-17 November 2023.

Mkulisi A. *Prevalence of Chronic Respiratory Symptoms among Workers Exposed to Cement Dust in Gauteng Province, South Africa.*16th Annual UK and Ireland Occupational and Environmental Epidemiology Conference, 9 June 2023.

Mkulisi, A. *Chronic respiratory symptoms in workers exposed to Cement Dust*. 35th International Conference of the International Society for Environmental Epidemiology, 17-21 September 2023.

ORAL PRESENTATION NATIONAL

du Preez, K. *A comparison of the amended occupational exposure limits (maximum limits) promulgated in the Regulations for Hazardous Chemical Agents with international limits.* Annual SAIOH Scientific Conference, Cape Town, 26 October 2023.

du Preez, K. *Women in Occupational Hygiene*. Annual SAIOH Scientific Conference, Cape Town, 25 October 2023.

Kufe CN, *Alcohol consumption in indigenous Fulani African populations and ethnic disparities*. Global Alcohol Policy Conference, Cape Town, 24 – 26 October 2023.

Manganyi, J. *Facial characteristics and determinants of disposable respirator fit among Black workers in Gauteng*. Wits School of Public Health Research Day and CARTA Conference, Johannesburg, 14-15 September 2023.

Manamela L, Mawela A, Poongavanum P, Moremi S, Mulaudzi A, and Kgarebe B. *Method Validation for the Routine Analysis of Copper in Urine by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)*. Society of Medical Laboratory Technology of South Africa (SMLTSA) Congress, 19 – 22 October 2023.

Manganyi, J. *Facial characteristics and determinants of disposable respirator fit among Black workers in Gauteng*. Annual SAIOH Scientific Conference, Cape Town, 26 October 2023.

Matlhogonolo M, Ildi M, Manamela M, and Kgarebe B. *Unnatural deaths profiles reported at a Medico-Legal Mortuary Facility in Johannesburg, during the first three Covid-19 Lockdown Levels*. Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Mizan, G. *Occupational health risk assessment conducted on COVID-19 mobile screening and testing laboratories*. Annual SAIOH Scientific Conference, Cape Town, 25 October 2023.

Naicker N. *Basic surveillance measures*. Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Ntlebi, V. *Basic statistics*, Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Tlotleng N. *Best practices for reporting surveillance and epidemiological data*, Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Tsotetsi KA and W Utembe, *Institutional Barriers to Effective Municipal Solid Waste Management in Ngaka Modiri Molema District Municipality, South Africa*, Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Utembe W. *Social and environmental determinants of health*. Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Maseme M. *Balancing POPIA and Progress: Adapting Health Research to Evolving Data Privacy Standards*. Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Wilson D. *Introduction to Health Surveillance and Surveillance Regulations and Ethics*, Pathred Congress, Johannesburg, 31 August – 1 September 2023.

Wilson KS. Mental Health. South African Medical Association Conference, Johannesburg, 17 February 2023.

NOTES

NOTES


portioned
2.5

CONTACT

Tel: +27 11 712 6400
Fax: +27 11 712 6545 / 6532
Email: info@nioh.ac.za

www.nioh.ac.za

Physical Address
25 Hospital Street
Constitution Hill
Johannesburg
South Africa, 2001

PO Box 4788
Johannesburg
South Africa, 2000

RP247/2024
ISBN: 978-1-77997-203-3

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service