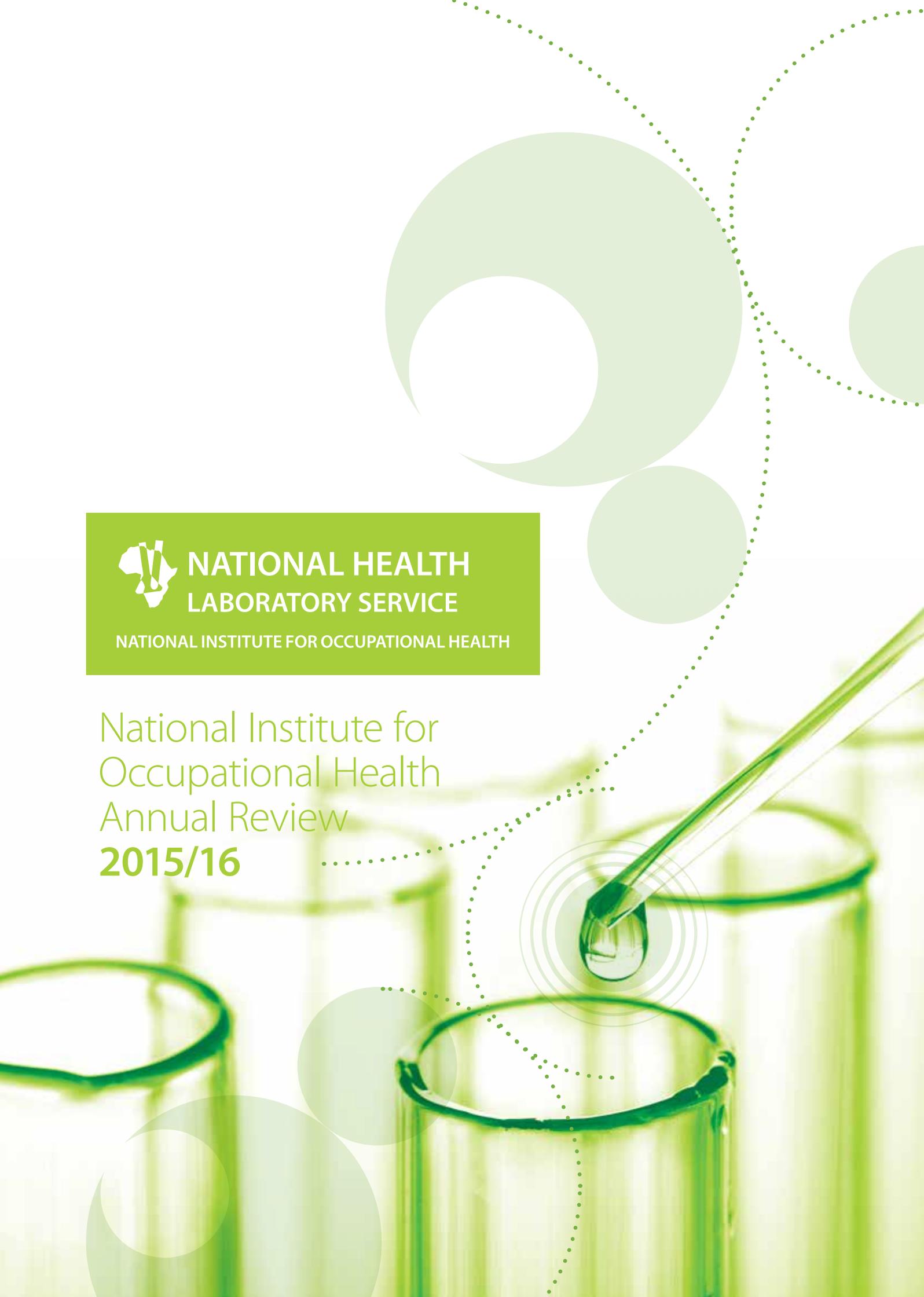




**NATIONAL HEALTH
LABORATORY SERVICE**

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

National Institute for
Occupational Health
Annual Review
2015/16





NATIONAL HEALTH
LABORATORY SERVICE



The NHLS is a proud recipient of the
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LABORATORY SERVICE**

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Occupational Health
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Abbreviations

AAS	Atomic Absorption Spectrometry
ABSA	American Biological Safety Association Conference
AFRICA	Asbestos Fibre Regular Informal Counting Arrangement
AIA	Approved Inspection Authority
AIDS	Acquired Immunodeficiency Syndrome
AIMS	Asbestos in Materials
AIR	Airborne Infection Research
ALK	Anaplastic Lymphoma Kinase
AMRC	Asia Monitor Resource Centre
ARAOH	African Regional Association for Occupational Health
ARB	Amoebal Resistant Bacteria
ART	Antiretroviral Therapy
ART	Asbestos Relief Trust
ASR	Age-Standardised Incidence Rate
ATR	Attenuated Total Reflectance
BCNet	Biobank Cohort Network
CDC	Centers for Disease Control
CM	Chamber of Mines
CPD	Continuing Professional Development
CRA	Chemical Risk Assessment
CSIR	Centre for Scientific and Industrial Research
DAFF	Department of Agriculture Forestry and Fisheries
DID	Department of Infrastructure and Development
DOH	Diploma in Occupational Health
DoH	Department of Health
DOHM	Diploma in Occupational Health and Medicine
DST	Department of Science and Technology
EGFR	Epidermal Growth Factor Receptors
EMRO	Eastern Mediterranean Regional Office
EQA	External Quality Assurance
ESBB	European, Middle Eastern and African Society for Biopreservation and Biobanking
FIOH	Finnish Institute for Occupational Health
FLA	Free-Living Amoebae
FTIR	Fourier Transform Infrared Spectroscopy
GEMP	Graduate Entry Medical Programme
G-EQUAS	German External Quality Assessment Scheme
GLP	Good Laboratory Practice
HBA	Hazardous Biological Agents
HBV	Hepatitis B Virus
HCT	HIV Counselling and Testing
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HL	Hodgkin Lymphoma

HPCSA	Health Professions Council of South Africa
HSL	Health and Safety Laboratory
HSR	Health and Safety Representative
HWSETA	Health and Welfare Sector Education and Training Authority
IAEA	International Atomic Energy Agency
IARC	International Agency for Research on Cancer
IC	Infection Control
ICOH	International Commission on Occupational Health
ICPMS	Inductively-Coupled Plasma Mass Spectrometry
IEUBK	Integrated Exposure Uptake Biokinetic
ILO	International Labour Organization
IOD	Injury on Duty
IOM	Institute for Occupational Medicine
IOM	International Organization for Migration
IP	Intellectual Property
ISBER	International Society of Biobanking and Biorepositories
ISO	International Organization for Standardization
IUTOX	International Union of Toxicology
JCS	Johannesburg Cancer Case Control Study
KEIT	Korea Evaluation Institute of Industrial Technology
KRT	Kgalagadi Relief Trust
KS	Kaposi's Sarcoma
MBOD	Medical Bureau for Occupational Diseases
MHSC	Mine Health and Safety Council
MMed	Master of Medicine
MMPA	Mine Medical Professionals Association
MPH	Master's in Public Health
NAPHISA	National Public Health Institutes of South Africa
NCR	National Cancer Registry
NGO	Non-governmental Organisation
NHL	Non-Hodgkin Lymphoma
NHLS	National Health Laboratory Service
NICD	National Institute for Communicable Diseases
NIOH	National Institute of Occupational Health
NIOSH	National Institute for Occupational Safety and Health
NRF	National Research Foundation
NUM	National Union of Mineworkers
OECD	Organisation for Economic Co-operation and Development
OEHS	Occupational and Environmental Health and Safety
OHASIS	Occupational Health and Safety Surveillance System
OHN	Occupational Health Nurse
OHP	Occupational Health Professional
OHSS	Occupational Health and Safety Systems
OMP	Occupational Medicine Practitioner
PBCR	Population-Based Cancer Surveillance

PCM	Phase Contrast Microscope
PCR	Polymerase Chain Reaction
PEP	Post-Exposure Prevention
PHC	Primary Healthcare
PLM	Polarised Light Microscope
PPE	Personal Protective Equipment
PRISA	Public Relations Institute for South Africa
PSP	Personal Skills Plans
QA	Quality Assurance
RSR	Railway Safety Regulator
SA	South African
SACNASP	South African Council for Natural Scientific Professions
SADC	Southern African Development Community
SAFETP	South African Field Epidemiology Training Programme
SAIOH	South African Institute for Occupational Hygiene
SAMA	South African Medical Association
SANAS	South African National Accreditation System
SANDF	South African National Defence Force
SAQA	South African Qualification Authority
SASOHN	South African Society of Occupational Health Nurses
SASOM	South African Society of Occupational Medicine
SDG	Sustainable Development Goal
SED	Safety Engineered Devices
SEWA	Self-employed Women's Association
SHE	Safety, Health and Environment
SNP	Single Nucleotide Polymorphism
TB	Tuberculosis
ToxSA	Toxicology Society of South Africa
UBC	University of British Columbia
UNAIDS	United Nations Programme on HIV/AIDS
UNITAR	United Nations Institute for Training and Research
UVGI	Ultraviolet Germicidal Irradiation
WMA	World Medical Association
WPMN	Working Party on Manufactured Nanomaterials
WSP	Workplace Skills Plan
XRD	X-ray Diffraction
XRF	X-ray Fluorescence
ZEMA	Zambia Environmental Management Agency



Dr Sophia Kisting

NIOH Director's Overview

The National Institute for Occupational Health (NIOH) celebrated 60 years of operations during the reporting period. It is therefore an opportune time to reflect on past achievements, but more importantly to confidently look ahead to a future of decent work, of reducing absenteeism and of contributing to more sustainable, more equal and more productive workplaces. In the current challenging global economic and financial climate there are major challenges faced by the world of work and by the institute itself. However, the world of work is continually changing nationally, regionally and internationally and with advanced technology is presenting golden opportunities for the implementation of sustainable preventive practices in occupational and environmental health and safety (OEHS) and the greater preservation of workers overall health.

In the year under review the NIOH co-ordinated the writing of the all-important OHS Concept Paper. This document reviews the character of occupational health and safety systems (OHSS) around the world to determine what could be considered as international best practice. Due consideration is given to the role of the NIOH, since in the poorly resourced area of OEHS, the multi-disciplinary institute constitutes an important component for the development of effective OEHS systems. The NIOH and the broader OEHS community contributed to the consultative process towards the establishment of the National Public Health Institute of South Africa (NAPHISA), and is in the process of becoming part of NAPHISA. In addition, the NIOH facilitated contributions from the broader OEHS fraternity for the inclusion of OEHS in the National Health Insurance (NHI) consultative process. This process will continue in the next financial years.

In our review of OEHS systems, we identified an important gap with regards to gender concerns in the world of work. In order to find appropriate solutions, the NIOH embarked on an inclusive participatory gender audit supported by national and international gender experts. With support from government departments, trade unions, employer organisations and international agencies, we launched the NIOH Gender@Work Programme on 16 March 2016. We are deeply appreciative of the great support the NIOH has received from Mrs Joyce Mogale, the NHLS CEO, who participated in the launching ceremony and emphasised the great importance of working towards greater equity and skills development in workplaces.

Despite ongoing efforts by many workplace role players to improve access to OEHS services large numbers of workers in South Africa in many industrial sectors remain inadequately protected from workplace hazards. Aspects of OEHS services, designed to prevent occupational diseases and injuries, are often underdeveloped or at times totally lacking. Consequently, the need for OEHS services, including the specialised services provided by the NIOH, is substantial across industrial sectors, as well as in the informal economy. The NIOH, along with partners in and out of government, again undertook a very wide range of activities to address OEHS needs in many industrial sectors. These activities covered OEHS policy advice, teaching and training, as well as technical support to a steadily increasing number of government departments, trade unions and employers; research and different aspects of OEHS surveillance; teaching and training; information services; and the provision of specialised laboratory services. The NIOH initiated activities concerned with enabling workplace ethics for OEHS professionals and endeavoured to find ways to translate good OEHS research findings to positive OEHS outcomes at workplaces. The engagement with governments, trade unions, employer organisations and the informal economy was strengthened mainly through collective teaching and training programmes and service delivery.

The NIOH supports the aspirational Sustainable Development Goals (SDGs) adopted by the United Nations in September 2015. The SDGs include decent work, health, gender equity, youth employment, sustainable economies and sustainable environments. All of these are of great importance for sustainable and productive workplaces. The SDGs are intended to promote human rights, engender greater equity and peaceful and inclusive societies, create decent and sustainable jobs and address the enormous environmental challenges of our time, including climate change. Environmental pollution, secondary to industrial and other workplace activities, contributes enormously to the burden of non-communicable diseases in many countries, including our own. This should further encourage all workplace stakeholders to greater compliance with OEHS legislation and with effective and efficient preventive interventions at workplaces.

RESEARCH

The NIOH aims to generate new knowledge through the rigour of good scientific research on key OEHS issues, especially those facing South Africa and the rest of the African continent. Taken together, the research projects of each division described in this Annual Report are testimony to the many OEHS issues requiring new knowledge, but also to the growing scope of the institute's research efforts and the strategic and greater engagement of younger researchers. It is notable that the research focus of the NIOH continues to broaden to include aspects of environmental health and health problems related to climate change, as well as important policy concerns. The scientific publications listed in the NIOH Annual Report demonstrate a focus on many of the priority OEHS issues facing our country. Among the topics covered were asbestos in brake dust, preventing tuberculosis in individuals with silicosis, tuberculosis prevention in healthcare workers, noise induced hearing loss and hearing conservation, occupations and lung cancer, water quality in hospitals, health effects in populations living around gold mine tailings, pesticides, and nanoparticles and health.

SPECIALISED AND OTHER SERVICES

The NIOH continues to provide laboratory-based, discipline-specific information services to many industrial sectors and government departments. Its laboratory services include asbestos identification and counting; diagnostic lung pathology; analytical chemistry (e.g. for biological monitoring specimens); the identification of components of dusts (respirable crystalline silica in particular); microbial air sampling; allergy diagnostics; nanoparticles and in vitro risk assessments. Discipline-specific services include occupational medicine, occupational hygiene, occupational toxicology, immunology and microbiology and occupational epidemiology. Information services are a core service of many national institutes of health around the world, partly because there is a scarcity of sources of information elsewhere, as is the case in South Africa. The extent and diversity of information services offered by the NIOH, many of them with limited availability elsewhere in the country, is obvious from this report. The unique occupational health library continues to provide support and information well beyond the borders of South Africa.

The Biobank that is housed within the NIOH has grown significantly in the year under review, and is successfully housing thousands of specimens. The NIOH HIV and TB Programme made important contributions to both scientific research and service delivery, especially in the mining and health sectors in the past year. The Marketing and Communications Section has done particularly well in profiling the history of the institute and in strengthening engagement with OEHS programmes nationally and internationally. The Finance and General Services Section has made us all proud by maintaining the historic nature of the old building and making it a special home to the NIOH. At the same time, they continue to upgrade the building strategically and carefully and it has become a pleasure to work in it.

The Safety Health and Environment (SHE) and IT Programmes made significant strides with regards to the pioneering Occupational Health and Safety Information System (OHASIS). This user-friendly information system supports compliance with OEHS legislation, enables online training and provides information for research analysis. OHASIS has gone from strength to strength and is increasingly being rolled out to centres beyond the NHLS and NIOH. This bodes extremely well for the much needed strengthening of OEHS information systems and for research and evidence informed workplace interventions.

Looking to 2017 and beyond, the NIOH will continue to help reduce the decent work deficit in our country, and to support ongoing efforts to reduce workplace inequality and strengthen the protection of human rights. Given our heavy burden of disease, it is incumbent on the institute to help nurture a culture of greater prevention of OEHS diseases and injuries, as well as health challenges, such as hypertension, diabetes, TB and stress that are very often exacerbated by poor conditions of work. Important areas that will require more attention relates to OEHS gender concerns; OEHS for migrant workers, subcontracted workers, young workers and workers with disabilities. Concerted efforts were made throughout the year to provide subcontracted workers in the fields of security, cleaning and gardening services with training in various skills, but more strategic efforts are needed to reach more workers in precarious work.

The NIOH Choir has gone from strength over the last year and has provided the most beautiful renditions of national, regional and international songs at our major public events. We are proud of the contribution of each and every member of the choir and trust that they will continue to grow.

RETIREMENTS

Mrs Inakshi Naik left the NIOH in 2015 after 23 years of service. She joined the NIOH in 1992 working in the Analytical Services Section as a senior Medical Technologist. In 1998 she was appointed as the head of the Analytical Services Section, where she remained as the head until November 2011. She was actively involved in developing analytical capacity in environmental and biological

monitoring in occupational and environmental health in South Africa. From December 2011 Mrs Naik was appointed as the OHS Training Manager where she was involved in developing capacity in occupational health through training occupational health professionals. She developed training materials and conducted courses, workshops and seminars in topics such as fundamentals in occupational hygiene, recognition of occupational exposure related diseases and the management of chemical exposures in the workplace. Ina is especially missed for the wonderful teaching and training sessions she organised with such commitment.

Mr Gopolang Sekobe retired from the NIOH in September 2015, after five years as the Head of the Occupational Hygiene Division. He has a rich working life spanning a total of 40 years, which included work in provincial hospitals, the South African Institute for Medical Research as well as senior professional management positions in the Urban Training Project, a workers' education organisation associated with the National Council of Trade Unions (NACTU). As Chief Director: Occupational and Environmental Health, Department of Health, Mr Sekobe made a significant contribution to the development of occupational health capacity at provincial level. He represented the NDOH on the Parliamentary Asbestos Committee that was instrumental in organising the National Parliamentary Asbestos Summit. This summit brought together government departments, worker organisations and communities affected by asbestos from our different provinces. We will remember Mr Sekobe for the dignified manner in which he dedicated his skills to the furthering of the health of workers.

Ms Estelle Alma Garton retired in December 2015. Estelle began her career at the SAIMR in 1969 in the Cytology Department. In 1972 she gained her registration as a Medical Technician (Cytology). Estelle joined the NIOH in 1981 and worked in the Electron Microscopy Section where she continued to prepare and screen cytology specimens. Estelle became an expert in the identification of asbestos fibres using electron microscopy for service and research work. She was a co-author of five publications and took the first prize for the best poster at an eGoli branch meeting of the Medical Technologists Society of South Africa. During her career, Estelle demonstrated to and taught many healthcare professionals. Estelle is currently in Cape Town recovering from surgery. We wish her a speedy recovery.

The Immunology and Microbiology Section experienced a great loss in the current year with the retirement of specialist scientist, **Dr Cathleen Bartie**. Dr Bartie dedicated 32 years to waterborne pathogens and was a renowned expert in Legionella and amoeba-resistant pathogens. Her scientific rigour and commitment to water research provide the NIOH with an excellent foundation to strengthen preventive interventions. Dr Bartie played an important role in the research publications of the NIOH for its 50th anniversary. We therefore fondly remember her important contributions in this 60th year of the NIOH.

ACKNOWLEDGEMENTS AND APPRECIATION

In this 60th year of the NIOH, we wish to acknowledge the significant contribution of so many towards the ongoing success of the OEHS interventions of the NIOH. We wish to acknowledge the significant and strategic support from the NHLS and from our government departments, in particular the departments of Health, Labour, Mineral Resources, Science and Technology, Environmental Affairs, Defence, Agriculture and the Correctional Services.

We further wish to acknowledge all the employer organisations and the growing number of trade unions who continue to challenge us to greater engagement for a positive impact on workplaces and better worker health.

Our appreciation goes to the many professional OEHS organisations including the South African Society for Occupational Medicine (SASOM), South African Society of Occupational Health Nursing Practitioners (SASOHN) and South African Society for Occupational Hygiene (SAIOH), as well as international organisations such as WHO, ILO, UN Women and UNAIDS for their collegial support and great collaboration. We are particularly appreciative of the collaborative support from our sister OEHS institutes in Africa and throughout the globe.

We owe a particular gratitude to current and former staff of the NIOH, both academic and non-academic, for making and maintaining the institute as an internationally recognised, accessible centre of excellence in OEHS research, teaching and training and service delivery.

CONCLUSION

We invite the actors of the world of work and the broader South African public to join us on our journey of building on our collective strength to more optimally utilise the potential of all workplaces for better health and safety, for decent jobs and happier workplaces and for the protection of human rights, for greater productivity and ultimately for sustainable economies.



PATHOLOGY
DIVISION



Head: Dr Naseema Vorajee

The origins of the Pathology Division lie in the Pneumoconiosis Research Unit that was founded 60 years ago. Its focus remains on occupational lung disease and the service work of the division provides material for teaching, research and surveillance. The service work includes an autopsy service, a referral centre for lung biopsies obtained at surgery and analytical electron microscopy services. In 2015, all the laboratories within the Pathology Division maintained their accreditation status with the South African National Accreditation System (SANAS) in accordance with the recognised international standard, ISO 15189:2007.

DIAGNOSTIC SERVICES

Autopsies

As required in terms of the Occupational Diseases in Mines and Works Act, 1973 (Act No. 78 of 1973), the Pathology Division continues to examine the cardio-respiratory organs of deceased miners. The pathology reports from these examinations are sent to the Mines Medical Bureau for Occupational

Diseases to assist with the compensation process for the families of deceased mine workers.

In 2015, 904 autopsies were carried out in terms of the Act. This is a decrease from the 1 066 autopsies performed in 2014/15. Since the division tests only the cardio-respiratory organs of those miners who die in service, the decline is attributed directly to the decreasing number of miners employed in the industry.

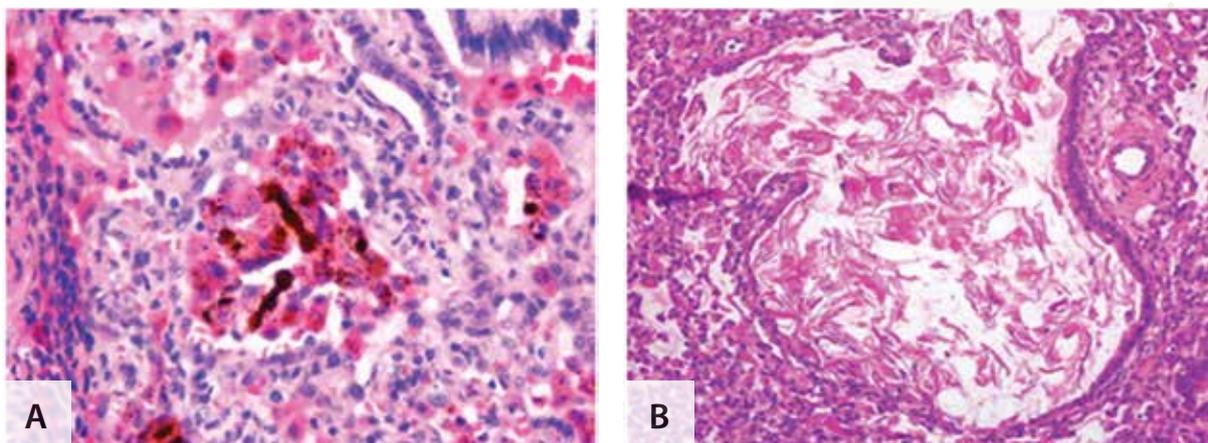
The National Institute of Occupational Health (NIOH) does not have the capacity to conduct regular outreach programmes. However, active promotion of the autopsy service by public health professionals and one-stop service sites is needed throughout the mining sector, so that mine workers are encouraged to inform and discuss the autopsy service with their families and reach agreement about utilising (and potentially benefiting from) the service in the event of their death. Even when a family does request an autopsy, the removal of the heart and lungs is problematic. Healthcare professionals in the vicinity of the each case need to be contracted, but are reluctant to assist due to the low fees paid and the extended delay in payment. The former needs to be revised and the efficiency and effectiveness of the payment system improved.

To promote the use of the autopsy service, presentations were made and workshops conducted for stakeholders who requested them. Dr Vorajee met with representatives from the Compensation Commissioner for Occupational Diseases, the Mines Bureau for Occupational Diseases, Sasol Management, Human Resources, Occupational Medicine Practitioners, and trade union representatives to raise awareness about the services provided by the NIOH. To assist the compensation process itself, a team from the Pathology Division visited various sites in Gauteng and North West to undertake the removal of lungs from deceased mine workers.

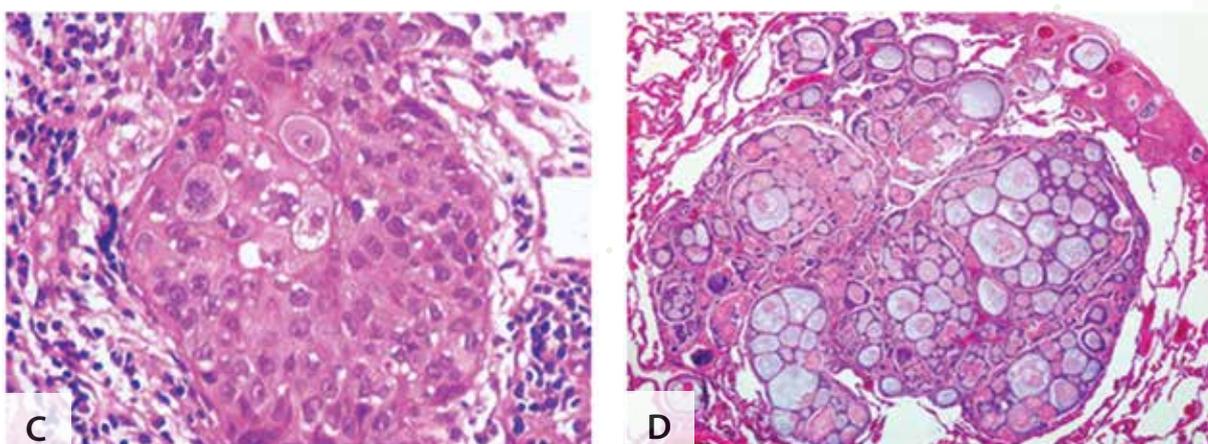
The autopsy service generates a great deal of information regarding the lungs that are examined. Approximately 200 items of information are carefully recorded by the examining pathologists and entered into the Pathology Disease Surveillance Reports (PATHAUT) database. The database is a national resource and contains unique information about disease in the mining industry. It has been and continues to be used extensively for research in partnership with local and international collaborators, and more than 150 peer reviewed publications have been produced using the data. The database has been maintained since 1975 and is used to show disease trends in the mining industry. It is also an important tool for disease surveillance. Detailed disease surveillance reports, giving demographic data and disease rates, are compiled and produced annually from the PATHAUT database. These are available in the public domain through the NIOH website, at http://www.nioh.ac.za/?page=pathology_disease_surveillance_reports&id=162

Surgical Pathology

The section has vast experience in lung pathology and is recognised as a centre of excellence. A diagnostic service is offered to satisfy the demand for opinions on lung, pleural and mediastinal biopsies, fine needle aspirates and bronchial washings. Diagnostic requests and consultations are received from clinicians at academic hospitals served by the NHLS and from the private sector. The demand for this service is increasing, and in 2015/16, 853 surgical specimens were received compared to 743 in the previous financial year.



Colour photomicrographs (A and B – L-R) of non-neoplastic conditions:
 A = Ferruginous bodies in an asbestos-exposed ex-miner (autopsy lung)
 B = Meconium inspersion pneumonia in a 23 day old neonate (lobectomy)



Colour photomicrographs (C and D) of neoplastic conditions:
 C = Squamous cell carcinoma in a 57 year old male (endobronchial biopsy)
 D = Metastatic adenoid cystic carcinoma (open lung biopsy)

Electron Microscopy

The Electron Microscopy Section is headed by Prof. JI Phillips, a National Research Foundation (NRF) rated scientist. The section supplements the service work of the Pathology Division by determining the asbestos fibre concentrations in lung tissue to assist with diagnosis of asbestos-related disease.

Qualitative and quantitative analyses, conducted on bulk materials or air samples obtained from filters, are carried out for the presence of asbestos fibres. These analyses are performed for other divisions of the NIOH and external clients, including national, provincial and local government, non-governmental organisations, universities and private businesses. The section participates in an external quality assurance scheme and has maintained its satisfactory rating in the Asbestos in Materials (AIMS) international quality assurance scheme, co-ordinated by the Health and Safety Laboratory (HSL), UK.

The asbestos analysis service was first offered in 2003. Since then, data generated from the samples submitted has been entered into a database. This database is unique in South Africa and its interrogation provides information about the legacy of asbestos in the country. To date the database contains 2 500 entries with information regarding the type of sample, where it came from, the type of industrial sector and the activity that was performed, such as the renovation of an asbestos-containing structure.

RESEARCH

Research relevant to the health of South African workers is carried out by pathology staff. Material and data from the service work of the division provides a good deal of information for research projects. Current areas of interest centre on diseases of the lung – in particular with respect to dust, especially silica and asbestos. Tuberculosis is a particular problem in the mining industry and is a focus area for research. During the course of the year Prof. Murray, an Associate Professor in the School of Public Health, and Prof. Phillips, a Visiting Professor in the Faculty of Health Sciences at the University of Johannesburg, were asked by editors of scientific journals to be peer reviewers for research articles.

Staff in the division co-authored three articles in peer reviewed journals. Prof. Phillips chairs the NIOH Research Forum and is a member of both the NHLS Research Development Committee and the NHLS Research Subcommittee.

Dr Naseema Vorajee is registered for her Master of Medicine Degree (Anatomical Pathology) with the University of the Witwatersrand. Her study, which has received ethics approval, involves the use of immunohistochemical techniques to study epidermal growth factor receptors (EGFR) and anaplastic lymphoma kinase (ALK) mutations in adenocarcinomas of the lung in South African patients.

The division collaborates with other sections within the NIOH and assists with projects that involve the enumeration and identification of asbestos. Links are fostered with local and international institutions, which currently include the Centre for Scientific and Industrial Research (CSIR); University of the Witwatersrand: Schools of Pathology, Public Health, Clinical Medicine and Archaeology; University of Johannesburg: Faculty of Health Sciences; Health and Safety Laboratory, UK; Occupational and Environmental Lung Injury Centre, Sheffield University, UK; University of Wales, UK; Harlan Laboratories, Switzerland; Dokkyo University School of Medicine, Japan; London School of Hygiene and Tropical Medicine, University College, London, UK; and Brooklyn College, City University of New York, USA; Sciences Po University of Paris, France and Avicenne University Hospital, Bobigny, France.

The division also receives visitors from these local and international institutions. In this reporting year, international visitors included Prof. K Honma (Dokkyo University, Japan), Prof. B Racette (University of Washington in St Louis, MO, USA), Dr Marianne Kambouchner (Department of Pathology of the Avicenne University Hospital, Bobigny, France) and Ms Odile Macchi (Sciences Po University, Paris, France).

TEACHING AND TRAINING

The division plays a role in teaching and training through formal lecturing to professional bodies, universities and teaching hospitals. Staff members participate in the mentoring, teaching and supervision of Master's students at the University of the Witwatersrand and the University of Johannesburg. Teaching is also provided to Diploma in Occupational Health (DOH) students, medical students and allied healthcare students from the University of the Witwatersrand. Prof. Phillips moderates examinations and chairs the Faculty of Health Sciences Academic Advisory Committee of the University of Johannesburg. Dr Vorajee actively participates in and presents cases at regular clinical pathology meetings with doctors from the Johannesburg teaching hospitals. Registrars in pathology rotated through the division as part of their specialist training. Specialised small group training was given to healthcare professionals, organised labour, and mortuary and funeral parlour staff. In collaboration with trade unions, members of the Pathology Division also conducted workshops focusing on lung disease.

PROFESSIONAL DEVELOPMENT

One Master's Degree of Medicine in Anatomical Pathology, research report, enrolled at the University of the Witwatersrand.



Prosectors training at Doves Funeral Services



OCCUPATIONAL
MEDICINE AND
EPIDEMIOLOGY
DIVISION



Head: Prof. David Rees

The division comprises three sections, namely Occupational Medicine, Immunology and Microbiology, and Epidemiology and Surveillance. Their reports follow this brief introduction.

Dr Spo Kgalamono's report on the Occupational Medicine Section is notable for its description of the substantial teaching and training activities and the profile of the patients seen at the Occupational Medicine Clinic. Among its teaching and training activities, the section contributes to formal degree programmes at a number of universities. Diplomas in Occupational Health constitute a large part of this work, but undergraduate teaching and Master's in Public Health (MPH) programmes also featured. The section is an important training platform for public health medicine and occupational medicine registrars, and hence the registrars from three universities are rotated between facilities to maximise their learning experience. Courses are also developed for specific needs, for example a tailored occupational health course was developed and piloted for the Railway Safety Regulator. More than in the recent past, skills development training courses were provided for doctors in the reading of radiographs

of pneumoconiosis and lung function testing. To a very large extent, the patients seen at the clinic have respiratory conditions, as is evident in Table 1. This predominance does develop special expertise in occupational respiratory disorders, but the narrow disease profile is problematic in terms of service provision (unmet needs), providing limited experience for registrars. An effort will be made in 2016 to expand the patient profile.

The Immunology and Microbiology Section is active in a large number of fields of work, despite the small staff complement. Bioaerosols, occupational allergy, occupational skin disorders and water quality are prominent fields of work, but infection prevention and control has been prioritised by Dr Singh in her report, correctly so, given its importance in South Africa. The projects on ultraviolet germicidal irradiation (UVGI) in controlling transmission of *Mycobacterium tuberculosis* (TB) in healthcare settings and the effect of hand washing and scrubbing on bacterial flora and skin irritation in healthcare workers, are examples of the section's significant contribution to knowledge that can inform prevention and control. Participation in standards setting activities and the services rendered during the reporting year reflect the section's commitment to this topic. Unfortunately, we had to wish Dr Delene Bartie farewell as she retired after 32 years of high quality service to the NIOH.

The research projects described in the Epidemiology and Surveillance Section report are notable for their focus on vulnerable groups and healthcare workers – groups that receive little attention relative to sectors such as mining. The projects include a review of methodology for measuring health and safety in informal work; occupational health and safety of waste pickers at a municipal dump; a tuberculosis strategic review, which covers high risk occupations, healthcare among them; and the cost effectiveness of safety engineered devices and training versus non-safety engineered devices in reducing needlestick injuries in South African healthcare workers. Congratulations to Dr Kerry Wilson, the acting head of Epidemiology and Surveillance, who obtained her PhD during the reporting year.

Occupational Medicine Section

The Occupational Medicine Section has two primary functions, namely Occupational Medicine Services (including a referral clinic) and the Ergonomics Unit. Occupational Medicine Services provides support to public and private enterprises in the form of advice, assistance with policy development, and a clinical assessment of cases suspected of suffering from occupational diseases. It also contributes to patient management to prevent occupational diseases, and to control occupational hazards. The Ergonomics Unit studies how workplace factors and people can interact efficiently to maximise productivity and reduce discomfort.

The referral clinic, being the largest of the three specialist referral clinics in the country, provides a clinical service for private and public entities within South Africa and the Southern African Development Community (SADC) region. This service includes response to complaints by employees on control of unsafe working conditions and assistance with submission for compensation for those with compensable diseases.

All cases assessed are seen as sentinel events, resulting in a thorough investigation at the workplace to assess possible causes of the diseases and advise on workplace modification to prevent further exposure to other employees.

In collaboration with other sections within the NIOH, the section's staff members provide support to other service components, such as technical reports for government departments and occupational health services within the NHLS, and support for the provision of occupational health services at the provincial level. The need for assistance to the trade unions regarding members who require a second medical opinion, or for assistance with disputes between employers and employees regarding exposures and ill health, continued to grow.

Occupational lung diseases still form the bulk of cases assessed at the clinic. However, there is a rise in the cases of musculo-skeletal disorders and those due to occupational health and safety risks associated with organisation of work and workplace psychosocial stressors. Those with musculo-skeletal disorders from vibration exposure go through a vigorous investigation process within the Ergonomics Unit, using special equipment to assess the presence of hand-arm vibration syndrome. The unit is the only centre of its kind to do so in southern Africa.

Mental health in the workplace was identified as one of the key areas in which a gap exists in addressing the growing burden of mental illness in South African workers. This led to the establishment of a Workplace Mental Health Unit within the NIOH, which will contribute to research the development of psychosocial tools to identify organisational risk factors for occupational stress in South African workplaces and to recommend the necessary interventions.

OCCUPATIONAL MEDICINE SERVICES

Occupational medicine doctors continue to provide occupational medicine services for the NHLS. The service includes advice as well as technical support on occupational health matters, including:

- Drafting of new health and safety policies
- Revision of health and safety policies annually and as and when needed
- Handling of individual queries around employees suspected of having contracted occupational diseases from any exposure within the NHLS
- Support to occupational health nurses and safety officers in all regions
- Clinical management and follow-up of confirmed cases
- Assessment of requirements for accommodation back into the workplace
- Medical surveillance for special groups, e.g. South African Field Epidemiology Training Programme (SAFETP) students.



Head: Dr Spo Kgalamono

An important area of focus was tuberculosis (TB) in laboratory workers. A TB questionnaire was developed to assess medical surveillance practices around TB within the NHLS and statistics were collected on confirmed TB cases which were then followed up for medical management, prevention and compensation.

Extra support was offered to the Medical Bureau for Occupational Diseases (MBOD) in various activities that include participation in the Medical Reviewing Authority and the Joint Committee for the Certification of Cases of Occupational Disease. Training and technical support were provided for the staff at the one-stop service sites. Knowledge gaps were addressed by encouraging staff members to enrol for relevant courses. The medical practitioner at the Carletonville site is now currently registered for the Post-graduate Diploma in Occupational Health programme at the University of the Witwatersrand.

Apart from conducting clinical assessments of workers referred for suspected occupational diseases and possible compensation, the section also provided professional consultation and advisory services on occupational health to the national and provincial Departments of Health, Correctional Services, Transport, Minerals and Labour, the Defence and the Gauteng Forensic Pathology Services.

In addition, health hazard evaluations were done in response to requests to investigate the impact of several companies' operational emissions on nearby communities, following complaints by employees or members of the community.



Staff members at a site visit accompanied by the company's occupational medicine practitioner

Trade union support increased in the year under review. The services sought ranged from in-depth investigations of health hazards, to medical assistance for members exposed to various hazards within workplaces, including those in the mines. Doctors mediated conflicts between management and employees, conducted medical assessments to establish an occupational cause and collaborated with other NIOH sections to recommend measures to mitigate risks for a healthier work environment.

Clinical services remain a major focus for the section. Altogether 245 workers were assessed during the reporting year (Table 1), most of whom for occupational respiratory diseases. All workers assessed were seen as sentinel events, provoking a thorough investigation at the workplace to assess the possible causes of diseases and offer advice on workplace modification to prevent further exposure of all workers. Workers with compensable diseases were assisted with applications for compensation.

Table 1: Cases assessed at the clinic in the 2015/16 financial year

Occupational Diseases	Total Number
Occupational asthma, work aggravated asthma	68
Chronic obstructive pulmonary disease	48
Asbestos pleural diseases, asbestosis	20
Silicosis and silica TB	28
Allergic rhinitis, bakers rhinitis	18
Work-related upper limb disorder	2
Degeneration of L5/s1 with narrowing of disc space	1
NHLS medical surveillance	7
Non-occupational diseases	20
Cases under review	33
Grand total	245

RESEARCH

A number of research projects are under way, with the following new research projects having been proposed:

- Non-Hodgkin's Lymphoma in patients with glyphosate exposure
- MesoAmerican nephropathy in South African sugar cane workers.

Dr Kgalamono attended the 31st International Commission on Occupational Health (ICOH) Congress in Seoul, South Korea, from 31 May–6 June 2015 where she presented a poster on *Occupational Stress in a South African Workforce: Instrument Testing, Prevalence Measurement and Risk Factor Analysis*.

She also represented the NIOH at the WHO Collaborating Centres meeting in Jeju Island in Korea, where she facilitated a session under the theme *Creation, dissemination and evaluation of training and education to support occupational health in health systems*. She presented on the five-day curriculum developed for primary healthcare nurses in South Africa to train them in the recognition of occupational diseases and injuries in line with the NHI. She further held discussions with the Eastern Mediterranean Regional Office (EMRO) around innovative ways for training primary care givers that can be shared with the African Regional Office. Thus far, the NIOH has held a meeting with the Department of Health (DoH) to discuss piloting the training within NHI pilot sites and establishing referral pathways. The DoH suggested that a start should be made with community health workers because the primary healthcare nurses are over-burdened. A training programme has been drafted for presentation to the DoH.

TEACHING AND TRAINING

Both formal and informal training activities have been used to strengthen capacity development and create awareness of occupational health amongst employers, workers and trade unions, health professionals, government departments and other stakeholders. In addition, senior staff members were examiners in specialist examinations for the College of Medicine.

Informal training

Informal training was conducted for small groups of workers, union members, occupational health nurses and occupational medicine practitioners on specific topics. The staff also contributed to other NIOH courses by facilitating sessions, assisting with conceptualisation of programmes and topics for seminars and workshops.

Formal training

Undergraduate Medical Programme

Staff contributed to the Graduate Entry Medical Programme (GEMP) at the University of the Witwatersrand, lecturing on principles of occupational health and occupational hazards specific to certain organs or systems relevant to a specific module.

Postgraduate Programmes

The Occupational Medicine Subsection offers opportunities for practical training of public health and occupational medicine registrars, as well as clinical skills refinement for other healthcare workers. Each year, public health registrars from the universities of Pretoria, Witwatersrand and Limpopo rotate through the clinical services for experiential learning in occupational health.

Other postgraduate teaching activities were the formal diploma and master's courses in the Schools of Public Health at the universities of the Free State, Pretoria and the Witwatersrand. Teaching commitments included the selection of students, planning of specific courses, lecturing, marking assignments, setting examinations and general support to students. In the year under review, 21 students graduated with the post-graduate Diploma in Occupational Health from the University of the Witwatersrand.

Senior members of staff also provided oversight over and teaching on the Master's in Public Health (MPH) curriculum in the field of occupational hygiene. Three PhDs, two MMed and two MPH research reports were supervised.

Additional training

A short course on occupational health within the railway sector was developed for the Railway Safety Regulator as per their request. The course is aimed at addressing gaps in specific medical knowledge of nurses and doctors offering their services to this sector. The occupational medicine staff members, in collaboration with the occupational hygiene section, developed the curriculum after extensive research, site visits and consultation with occupational health experts in the railway sector. The course has been successfully piloted and is ready to be delivered.

The section offered several one-day training sessions on the International Labour Organization (ILO) Classification of Radiographs of Pneumoconioses and interpretation of spirometry for medical practitioners, mainly in the mining sector but also within other mineral dust-producing companies. About 20 practitioners were trained in this financial year. The plan for the coming year is to host an intense five-day train-the-trainer x-ray reading course, targeted at practitioners in neighbouring countries and those in rural parts of South Africa without access to academic institutions or radiologists. This technology transfer is aimed at empowering practitioners in making preliminary decisions on cases they see, without unnecessary delays.

A training programme has been developed to train primary healthcare nurses in the recognition of occupational diseases and related issues, and appropriate referral to the next level of care. The training has been modified to include community health workers, to align itself with the ward-based outreach team concept within the National Health Insurance System.

PROFESSIONAL DEVELOPMENT

Currently, four Registrars (MMed) are being trained in Occupational Medicine. Two are fulltime employees at the NHLS, in their first year of training, and two are Supernumerary Registrars in their final years.

Ergonomics Unit

The Ergonomics Unit, which forms part of the Occupational Medicine Section, is one of the few entities that deals with ergonomic issues in South Africa. It offers ergonomic services to South African (SA) workplaces through specialised laboratory tests and ergonomic risk assessments. Teaching and training of ergonomics is high on the agenda of the unit to build the capacity of occupational health professionals to address poor ergonomic conditions in SA workplaces. The unit is involved in research and participates in collaborative research with other sections at the NIOH and with international organisations.

SERVICES

Ergonomic risk assessments, which involve the identification of risk factors for musculo-skeletal disorders in the work environments of SA workers, constitute the main service offered by the Unit. This service covers both the private and public sectors, with the NHLS making use of the service more often than other public sector organisations. Most of the assessments are of a reactive nature where workers have complained of musculo-skeletal pain before the assessment is conducted.

In the year under review, the target number of ergonomic risk assessments, namely six, was achieved. Two assessments were requested by private companies, one was from a state-owned company and three were from the NHLS. The workers had developed upper limb musculo-skeletal disorders and lower back pain from various exposures to ergonomic risk factors in their workplaces. Comprehensive reports of findings and recommendations were compiled to assist the companies to mitigate the exposures.

TEACHING AND TRAINING

Teaching and training of ergonomics is a priority for the unit, to raise the profile of ergonomics, which is a scarce skill in South Africa with limited training opportunities. Teaching and training are conducted through formal postgraduate courses and informal workshops.

In the year under review, the unit collaborated with other NIOH sections to develop a railway-specific occupational health training course for doctors and nurses working in the railway sector. The course is the first of its kind in Africa and is intended to be made compulsory for doctors and nurses wanting to work in the railway sector in South Africa. The course material is currently being revised based on the results of pilot training, in preparation for the actual training of the doctors and nurses.

Formal teaching and training of ergonomics to occupational health professionals occurred at different universities. This covered doctors pursuing the Diploma in Occupational Health at the universities of the Witwatersrand, Pretoria and Free State; and occupational hygienists doing a Master's Degree in Public Health (Industrial Hygiene) at the University of the Witwatersrand. Informal training on ergonomics was presented through a workshop organised by the Department of Labour for healthcare workers employed in the KwaZulu-Natal region. The public health registrars doing their rotation in the Occupational Medicine Section and the medical scientist who joined the unit at the beginning of 2016 also received training in ergonomics.

RESEARCH

The unit has been involved in a number of research activities, including supervising MSc student research projects, reviewing research protocol, participating in the editorial board of the *Curationis Journal*, co-ordinating a research methodology course for nurses, and participating in a research project conducted by the Epidemiology Section on the *Cost effectiveness of safety engineered devices and training vs non-safety engineered devices in reducing needlestick injuries in South African healthcare workers*.

PERFORMANCE TARGETS

The unit met the performance targets set for the year under review (Figure 1). Service and research activities were on target, while teaching and training exceeded the target by 50%.

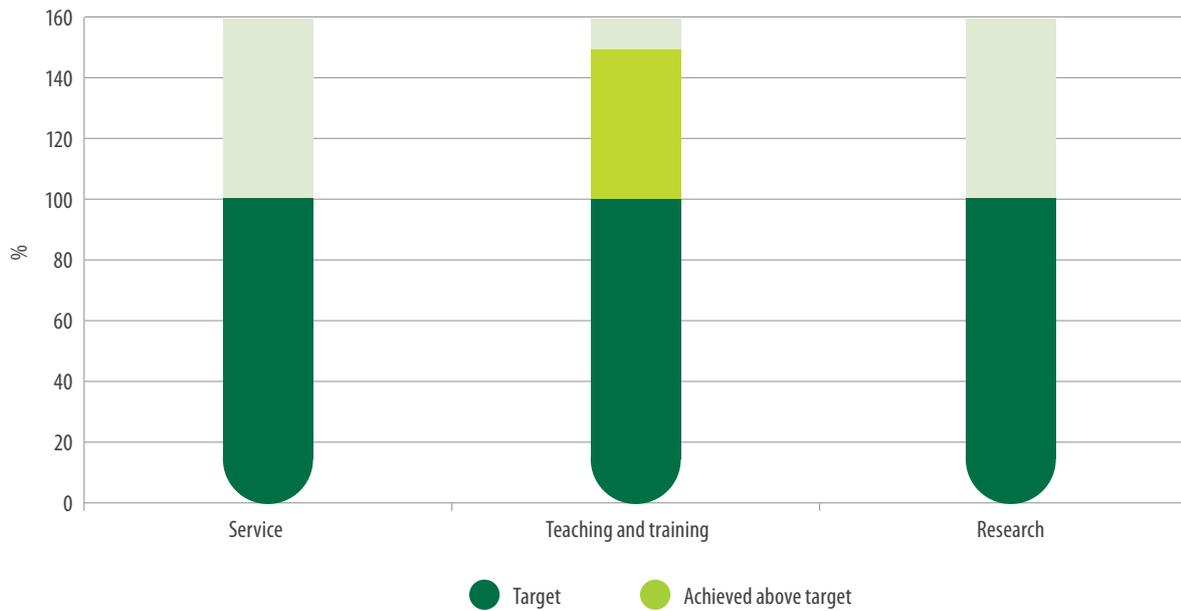


Figure 1: Ergonomics Unit performance in 2015/16

PLANS FOR THE FUTURE

The unit will increase its performance targets as a further medical scientist was employed at the beginning of 2016.

PROFESSIONAL DEVELOPMENT

1 PhD enrolled at the University of the Witwatersrand

Immunology and Microbiology

Infection prevention and control was the priority focus in the year under review as contaminated water sources and surfaces, and poor air quality still plague many workplaces. The section also focuses on allergies, providing tailored diagnostics to clinically manage the worker, since while allergies may not be debilitating, they can affect the quality of life of workers. Enormous efforts are being made towards understanding airborne infection control, but implementation and sustainability are poor. The increasing number of hospital-acquired infections attests to this and begs the need for early detection, rapid testing, and environmental monitoring in reducing biological and other contaminants.

The section continues evolving its mission to promote and prevent hazardous biological exposures through the services rendered, teaching and training programme and research activities. This success is dependent on collaboration and partnerships with various stakeholders. The section supported the strengthening of such relationships both nationally and provincially in the period under review.



Head: Dr Tanusha Singh

SECTION HIGHLIGHTS

Dr D Bartie was a member of the Legionella Standards Working Group for the South African Bureau of Standards commenting on Standard SANS 893:2 Legionella: Part 2. Dr T Singh participated in the National Strategic TB Infection Control (IC) seminar at the Council for Scientific and Industrial Research (CSIR). A multi-stakeholder forum was formed, including the NIOH, to co-ordinate a process that will culminate in a common policy, and programmatic and technical platform and approach to TB IC risk management.

Dr T Singh and Ms O Matuka attended the re-launch of the Airborne Infection Research (AIR) facility in Witbank, which was chaired by Prof. A Stoltz from the University of Pretoria. Guest speakers included Prof. E Nardell (Harvard Medical School), Dr P Jensen (Centers for Disease Control [CDC]), Dr N Ndjeka (DoH) and Ms P de Jager (CSIR). The purpose of the re-launch was to recognise the importance of such facilities in the country and their contribution to efforts to reduce TB transmission. Dr T Singh also participated in the Ultraviolet Germicidal Irradiation (UVGI) and Personal Protective Equipment (PPE) summits hosted by the CSIR to raise awareness of airborne infection control. These were important meetings involving various stakeholders including national and provincial DoH, Department of Infrastructure and Development (DID), UVGI and PPE suppliers, and the National Regulator for Compulsory Specifications.

The new draft guideline (yet to be adopted by the DoH) and the two SABS technical standards pertaining to UVGI design, installation, maintenance, and decommissioning were discussed and SANS 50149 for respirators was debated. As a result of the concerns and challenges raised at the PPE summit, a respiratory protection equipment handbook for healthcare workers at risk of TB exposure will be developed by the CSIR, NIOH Immunology and Microbiology Section and Occupational Hygiene Section. Ms O Matuka gave a presentation on *Cross-contamination and infection control* at the Hazardous Biological Agents (HBAs) workshop organised by the national Department of Labour in KwaZulu-Natal. The section also participated in the Mine Health and Safety Council (MHSC) capacity audit.

DIAGNOSTIC SERVICES

The section played a vital role in investigating occupationally-related respiratory and skin diseases. For the most part the section represents the sole capacity locally to diagnose non-commercial allergens. Three new methods were established for measurement of Immunoglobulin E (IgE) to ortho-phthalaldehyde for obeche and meranti wood. The mobile skin allergy service was extended to include testing in Pretoria. The number of new dermatologists referring patients illustrates the increasing awareness of occupational dermatitis and the role of patch testing. The test method for photo patch testing was set up as there is a growing need for such diagnosis due to increasing temperatures as a result of climate change and its impact on the skin of outdoor workers. The mobile skin prick testing service was extended to mining companies to test for sensitivity to platinum and chromium.

Indoor air quality simulation experiments for airborne TB were conducted to assess the efficacy of disinfection devices. The section conducts bioaerosol experiments, placing it both strategically and critically in a position to assist in airborne detection and prevention control interventions that are aligned with DoH TB reduction initiatives. The laboratory also provides sterility testing of nanoparticle samples and amoebal resistant bacteria (ARB) test coupled with risk assessments of water distribution systems and associated risks to workers.

The section has been successfully ISO 15189:2007 accredited by SANAS for nine consecutive years. During the review period 99% of turnaround times were met and a 91% positive customer satisfaction rating was achieved, reinforcing the quality of the testing service provided to clients. In addition, the section obtained a 98.6% compliance rating during its Health and Safety Audit.

RESEARCH

The section has strong collaborative ties with principal investigator, Prof. M Jeebhay, from University of Cape Town and research areas include: work-related allergic respiratory disease and asthma in spice mill workers; the relationship between pesticide metabolites, asthma outcomes and cytokine patterns in rural farm populations; and work-related asthma among workers in Mozambique wood processing industry.

Research activities are profiled in both national and international journals and scientific forums. These involve self-initiated research projects and collaborative projects in the areas of occupational allergies, bioaerosols and waterborne pathogens. A summary of the key projects is presented below.

Effect of hand washing and scrubbing on bacterial flora and skin irritation in HCWs

Study team: A Fourie¹, O Matuka¹, B Binta¹, Z Kirsten¹, H Carman², A Mayekiso², C Nattey¹, T Singh¹

¹National Institute for Occupational Health, ²Private Dermatology consultant

This study showed that the total bacterial concentrations before washing hands ranged from 0-4.3 x 10⁵ and 0-1.44.3 x 10⁵ for pre- and post-cleaning. Comparing different job titles, the percentage reduction of hand contamination was high in professional sisters (99.2%), followed by surgeons (89.4%) and medical trainees (89.0%) who showed similar results. The hand hygiene techniques demonstrated that there was no difference when washing with a scrub or scrub and brush, whereas social washing showed almost half the percentage efficacy (48.1) when compared with the latter (86.2; 85.6 respectively). The use of Chlorhexidine by healthcare workers showed significant bacterial count reduction in comparison with Betadine. Results indicate that frequent hand washing and longer employment duration reduces bacterial levels in the hands and this may be attributed to repeated wash and the experience of healthcare workers. A fact sheet on glove selection was produced and will be distributed to healthcare facilities.

Allergic sensitisation and work-related asthma among poultry workers in South Africa

Study team: T Singh¹, DO Matuka¹, E Ratshikhopha¹, C Nattey¹, P Daya², M Jeebhay³, R Baatjies³, A Lopata⁴, K Renton¹

¹NIOH, ²University of the Witwatersrand, ³University of Cape Town, ⁴Royal Melbourne Institute of Technology

All samples were analysed and data captured. The 232 respiratory questionnaires, lung function and NIOX questionnaires were double captured and validated. The data was shared with UCT collaborators for analysis. A draft report has been produced and a fact sheet entitled *Protect yourself from harmful poultry dust* was produced and will be distributed to poultry farms to raise awareness among workers.

Ultraviolet germicidal irradiation (UVGI) in controlling transmission of Mycobacterium tuberculosis (TB) in healthcare settings

Collaborative study team: T Singh¹, O Matuka¹, P de Jager², T van Rensburg², W Leuschner³, M Poluta⁴, M Mphathele⁵, O Kgasha¹, B Binta¹, R Stolper², D Meyer⁶, M Zungu¹, B Kistnasamy¹, G Sekobe¹

¹National Institute for Occupational Health, ²CSIR, ³University of Pretoria, ⁴University of Cape Town, ⁵Medical Research Council, ⁶Private consultant

Several health facilities participated in the mapping study to obtain information on the number of UVGI devices installed, type of device, model, date installed and whether functioning. The information will be used to develop a sampling plan to assess the efficacy of devices on site to determine the effectiveness of interventions in place.

Free-living amoebae isolated from a hospital water system in South Africa: a potential source of nosocomial and occupational infection

Collaborative study team: *P Muchesa², M Leifels³, L Jurzik³, TG Barnard² and C Bartie¹*

¹NIOH, ²University of Johannesburg, ³Ruhr-University Bochum

This study investigated the occurrence of free-living amoebae (FLA) in a public hospital in South Africa. A total of 97 water and biofilm samples from the municipal water inlet of the hospital, theatres, theatre sterilisation service unit, central sterilisation service unit, endoscopy/gastroscopy unit, intensive care unit and the renal unit were collected and examined for the presence of FLA, using an amoebal co-culture and molecular techniques. Of the 97, 77 (79.4%), 40 (52%) water and 37 (48.1%) biofilm, contained FLA. The genera *Acanthamoeba*, *Vermamoeba* (formerly *Hartmanella*) and *Naegleria* were detected by morphology, 18S rRNA polymerase chain reaction (PCR) and sequence analyses. These results show a potential health risk to immuno-compromised patients and healthcare workers as some of the species detected are pathogenic and may harbour potential intracellular bacteria responsible for nosocomial infections.

Funding: Water Research Commission

Research remained a priority focus for the section and continues to inform standards, guidelines and policy for the country. Many staff members were involved in reviewing proposals for funders, for example the National Research Foundation (NRF), as well as reviewing manuscripts of scientific journals, examining dissertations/thesis and staff attendance at various scientific forums.

TEACHING AND TRAINING

The section contributed to capacity development of a wide array of professionals such as occupational health registrars, occupational health practitioners, occupational health nurses, occupational hygienists, students and workers. Teaching contributions were made to the Master's in Public Health, Diploma in Occupational Health, and the undergraduate Immunology syllabus of the universities of the Witwatersrand and Johannesburg. The section continued to support HPCSA medical intern scientist microbiology training, and welcomed Mr T Duba and Ms L Muleba to the programme.

The Immunology and Microbiology Section celebrated Hand Hygiene Awareness Day, which highlighted the impact of simple measures to reduce infections.

Staff attended several training courses and seminars to further develop skills and enhance productivity. Some examples include:

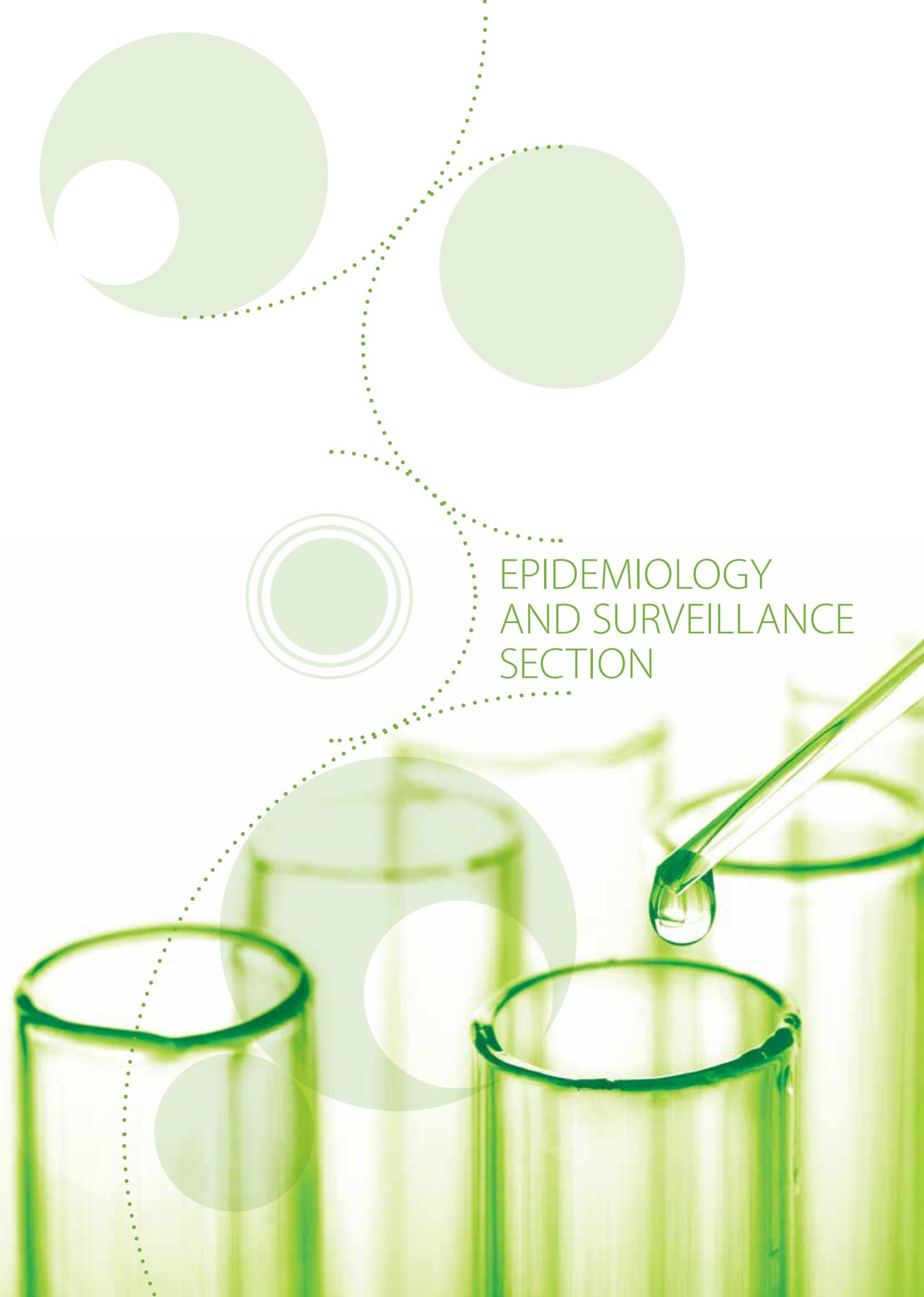
- 'Chalkboard' for lecturing
- Respiratory protective equipment and hearing protection
- Architectural and engineering approach to infection control
- Ethics
- Health technology assessment (HTA) for purchasing new equipment and reagents/kits
- Western blotting and cell imaging; Health and safety
- Excel
- Fluorescence microscopy
- Q Pulse; Molecular biology
- Leadership training.

HONOURS

Dr T Singh was appointed a member of the Scientific Committee for Indoor Air Quality of the International Commission on Occupational Health (ICOH) and a member of the Working Group for Occupational Infectious Diseases.

PROFESSIONAL DEVELOPMENT

Postgraduates enrolled: 4 (1 MSc at the University of Pretoria, 1 MPH at the University of Witwatersrand and 3 DTech at the University of Johannesburg).



EPIDEMIOLOGY
AND SURVEILLANCE
SECTION

"What is measured gets done". This is a maxim used in the work of performance management, but it is equally true in the health sector. Epidemiology and surveillance allow us to determine important information, such as the burden of disease, trends over time and risk factors for disease. These play an important role in allocating funding to the most pressing diseases and causes of disease. Without surveillance, it is difficult to determine the impact of control measures and their cost effectiveness. Epidemiology is a tool that often includes biostatistics and as such supports all work done in the research sector.

South Africa has limited surveillance on occupational health and safety and the Epidemiology Unit continues to work towards the establishment of a comprehensive surveillance system that is sensitive enough to include informal workers. In sub-Saharan Africa, it is estimated that informal employment comprises about 72% of income-generating activities. Yet this sector struggles to access basic services and is not well covered in employment policy. Due to the unregulated nature of informal work, including casual workers, little research has been done on their occupational health. This gap is one that the NIOH is attempting fill through ongoing research projects.



Acting Head: Dr Kerry Wilson

An occupational health and safety surveillance system (OHASIS) needs to collect sex disaggregated data, from which gender sensitive research, analysis, planning, implementation, monitoring and evaluation of projects can be undertaken.

With the launch of the NIOH Gender, Health and the World of Work Programme, the NIOH has worked to mainstream gender in the world of work and in occupational health and safety. Without sex-disaggregated data, research and burden of disease determination is limited. It is recognised but not always reflected in policy that there are biological differences between men and women that can play a role in different requirements for PPE and diagnostic procedures, for example, but also in socioeconomic factors and cultural practices that introduce differences in how men and women experience the world of work and occupational health and safety. The inclusion of sex and gender in the NIOH research service, and in teaching and training, will allow us to contribute meaningfully to the international aim of gender mainstreaming.

SERVICES

The Epidemiology and Surveillance Unit provides epidemiological support services to government departments in data management and analysis. Support was provided to the Medical Bureau for Occupational Diseases (MBOD) in cleaning their newly captured records for analysis. This will allow for the identification and prioritisation of unpaid claims, but will also facilitate the calculation of future funding requirements. The correct details for 90 000 claimants were captured by the section to support the cleaning of the data.

Statistical support was provided to the National Cancer Registry in the calculation of the public cancer tables for the incidence of cancer in South Africa for 2009 and 2010.

The section conducted analysis for the City of Johannesburg on medical surveillance conducted on pesticide sprayers working for the city. A report and recommendations were provided to the city.

RESEARCH

The section was involved in a number of self-initiated research projects and collaborative projects with other NIOH sections. The self-initiated projects are discussed below.

Cost effectiveness of safety engineered devices and training versus non-safety engineered devices in reducing needlestick injuries in South African healthcare workers

Study team: *P de Jager, K Wilson, M Zungu, B Nyantumbu, S Kgalamono, D Rees, R Dyers*

Safety engineered devices (SEDs) have been engineered to protect healthcare workers from needlestick injuries. This engineering increases the unit cost of needles, so that often non-SEDs are procured instead. The preliminary findings showed that SEDs are cost saving, driven mainly by the high prevalence of HIV in South Africa and the need for post-exposure prevention (PEP) after a needlestick injury. Training is effective and cost effective, but is dominated by the SED strategy (which is cost saving). Training and SED combined is cost effective at the ~8000USD willingness to pay threshold. According to the WHO guideline this is highly cost effective.

Measuring health and safety in informal work: a review of methods used

Study team: *V Ntlebi, K Wilson and J Phillips*

The informal economy is a diverse set of economic activities, enterprises, and workers that are not regulated or protected by the state. Originally applied to self-employment in small unregistered enterprises, the concept of informality has been expanded to include wage employment in unprotected jobs. As this is a difficult sector to access, traditional research methods may not be as effective. A review is under way to identify approaches and methods which have been used to describe and quantify disease and injuries in informal workers.

Tuberculosis strategic review

Study team: *S Jack, P de Jager, K Wilson*

This project is a systematic review of the incidence and prevalence of tuberculosis exposure across different occupations, with special focus on healthcare workers, miners and construction workers. The information will be used to calculate the occupational burden of TB in South Africa and by profession where sufficient data is available.

Occupational health and safety of waste pickers at a municipal dump

Study team: *V Ntlebi, K Wilson, J Phillips*

Reclaimers who spend time on a landfill collecting materials for re-use will be approached by study workers to participate in focus groups and complete questionnaires for this study. The aim of the study is to provide workable recommendations to improve the health and safety of the reclaimers. An MoU has been drafted with the company concerned and as soon as the document is signed the study will commence.

Support for research projects involved most sections of the NIOH, with respirator fit testing provided by Occupational Hygiene; allergic sensitisation among poultry workers supported by Immunology; and MMed research analysis support by Occupational Medicine.

Other research outputs included peer reviewed journal articles and reports for the WHO, DoH and the Priority Cost Effective Lessons for System Strengthening (PRICELESS)¹:

Surveillance programmes to protect workers from potential risks of manufactured nanomaterials: a systematic review

Collaborative study team: *P de Jager^{1,2}, M Gulumian³, J Verbeek⁴, C Andraos³, N Sanabria³*

¹Department of Epidemiology and Surveillance, NIOH; ²School of Public Health, Faculty of Health Science; University of the Witwatersrand; ³Department of Toxicology, NIOH; ⁴Finnish Institute of Occupational Health, Helsinki, Finland

A systematic review was conducted to identify worker health surveillance approaches that could be implemented for workers at risk of adverse health effects from exposure to specific nanomaterials or groups of nanomaterials. It was found that there is very low quality evidence that targeted nanomaterial health surveillance might provide early signs of adverse health effects. There was no evidence on specific items that should be included in a surveillance programme. The evidence generated from this review will inform the WHO's guidelines for workers at risk of exposure to nanomaterials in the workplace.

¹ Analysis and economic evaluation is performed by staff of the secretariat at the University of the Witwatersrand School of Public Health, led by Prof. Karen Hoffman. Collaborators include those at the University of Cape Town Faculty of Health Sciences, the Johns Hopkins Bloomberg School of Public Health, the Harvard School of Public Health and the University of Queensland.

A rapid process evaluation of the Medical Bureau for Occupational Diseases and the Compensation Commissioner for Occupational Diseases

Collaborative study team: P de Jager^{1,2}, S Kisting³, T Ledibane⁴, B Kistnasamy⁴, S Pardesi⁴, T Khaka⁴, S Molautsi⁴, S Masilela⁴, J Similane⁴, F Zuma⁴, R Meredith⁴, Members of the Certification Committee⁴, D Leseyane⁴, D Rees³, N Vorajee³, V Ntlebi¹, K Wilson¹, M Ndaba³, L Darwin³

¹Department of Epidemiology and Surveillance, NIOH; ²School of Public Health, Faculty of Health Science, University of the Witwatersrand; ³NIOH; ⁴MBOD/CCOD, South African Department of Health

Notwithstanding the need for macro-reforms in occupational health and social security in South Africa, the focus of this report was at an organisational level, particularly focused on the operations of the Medical Bureau for Occupational Diseases. A process evaluation was undertaken to identify key impediments and bottlenecks within the current MBOD/CCOD processes and make recommendations on how these may be addressed.

Fiscal policies for occupational health and safety: a discussion document

Collaborative study team: P de Jager^{1,2}, K Hofman¹, S Kisting², S Kgalamono², M Ndaba², D Rees², N Stacey¹, A Tugendhaft¹

¹NIOH; ²School of Public Health, Faculty of Health Science, University of the Witwatersrand

Currently occupational health and safety services have a bias toward secondary prevention and worker compensation rather than primary prevention. Research has not adequately contributed to effective interventions and improvements in workers' health. This paper, using South Africa as a case study, describes a process of priority setting in occupational health and safety. It is argued that fiscal policies are well placed to deal with complex inter-sectoral health problems and to focus efforts on primary prevention. A key challenge is the lack of empirical evidence to support the effectiveness of fiscal policies in improving workers' health. A second challenge is the de-prioritisation of occupational health and safety, partly due to the relatively small burden of disease attributed to occupational exposure. Both challenges can and should be overcome by i) conducting policy-relevant research to fill the empirical gaps and ii) re-conceptualising, both for policy and research purposes, the role of work as a determinant of population health. In the post Millennium Development Goal era, sustainability is the focus of the international development agenda. Sustainable Development Goal 8 specifically aims to promote inclusive and sustainable economic growth, employment and decent work for all. Achieving the Sustainable Development Goals will require a paradigm shift. Fiscal policies could play an important role, not as a replacement for other efforts to improve health, but as part of a comprehensive effort toward sustainable prevention and decent work for all.

TEACHING AND TRAINING

Teaching and training are core functions of the section. Two important workshops were run for NIOH staff, one on Health Economics and the second on Burden of Disease Methods. Lectures on an introduction to occupational and environmental epidemiology were also given at the universities of Pretoria and the Witwatersrand by section staff during the period under review.

Two students registered at the University of the Witwatersrand, an MSc and an MPH, were supervised by the section staff while two further MSc students at the same institution were assisted with their data analysis by the section.

HONOURS

Two members of staff recently became collaborators in the Global Burden of Disease Project for South Africa and Occupational Health.

PROFESSIONAL DEVELOPMENT

A PhD application was accepted for one member of staff on *The epidemiology of lung cancer in South Africa: an exploration of occupational attributable risk, survivorship and risk factors, using retrospective data and record linkage*.

Dr P de Jager received a bursary to attend an international training course on Methodology for Global Burden of Disease Technical Workshop. Dr De Jager also completed four modules towards an MSc in Health Economics Policy and Management at the London School of Economics.



OCCUPATIONAL
HYGIENE DIVISION

The Occupational Hygiene Division provides professional occupational hygiene services in the form of training, advice, risk assessments and exposure monitoring to the private sector and the national and provincial government departments, including Health, Labour, Mineral Resources, Defence, Correctional Services and Environmental Affairs, as well as support for occupational health and safety initiatives within the NIOH and the NHLS.



Head: Mr Gopolang Sekobe
(retired September 2015)



Verifying the bolometer using a mini wind tunnel in the Polley Dust Duct (PDD) Laboratory. The bolometer is used for assessing forced ventilation in the workplace

OCCUPATIONAL HYGIENE SERVICES

Occupational hygiene risk assessments, audits, surveys and advisory services were provided to a range of industries, including mining, manufacturing, laboratories, and healthcare facilities. The division provides recommendations which will contribute to improved occupational health in all workplaces.

The Occupational Hygiene Division conducted eight occupational hygiene surveys in a wide range of workplaces. All the reports included practicable recommendations aimed at reducing occupational health hazards in the workplace. Improved health at work enhances productivity and reduces national health expenditure resulting from sickness and absenteeism.



Poor maintenance of respirators is a common finding during occupational hygiene surveys

ANALYTICAL SERVICES

The division also provides Analytical Services, including asbestos counting using phase contrast microscopy (PCM) and quartz analysis with Fourier transform infrared spectroscopy (FTIR), X-ray Fluorescence (XRF) and X-ray Diffraction (XRD). The XRF, FTIR/XRF Laboratory functions within the Occupational Hygiene Division and is headed by Ms T Madzivhandila under the supervision of Mr K Renton. Samples of quartz containing dust and solutions are analysed to help determine workplace risk.

A total of 251 samples from the mining industry were analysed at the XRD Laboratory during the period under review. Of the 251 samples analysed, 170 were elemental analyses using XRF, six solution samples were analysed using attenuated total reflectance (ATR), 13 respirable samples were analysed for crystalline silica using a direct on filter method on XRD, and 13 respirable samples were analysed for crystalline silica using the direct on filter method on FTIR. In addition, 49 bulk soil samples were analysed using XRD following the Rietveld method.

Eight filter samples were analysed for asbestos fibres by the Asbestos Laboratory using the PCM method. These samples originated from surveys conducted by private clients.

RESEARCH

Several research projects are in progress in the division:

Exposure to hazardous chemical substances within NHLS laboratory workers

Led by: G Mizan

The research project is ongoing with the field work completed. A total of sixteen laboratories located in five provinces were visited and workers' exposure to volatile organic compounds, acids and formaldehyde was measured. The results of these measurements were communicated to the laboratories concerned and a report collating the information and recommendations will be published later in 2016.

Particulate exposure in waste reclaimer's at a Gauteng landfill site.

Led by: T Maeteletja

This is an ongoing project that aims to assess the association between PM₄ (particulate matter with a 50% median cut off point of 4µm), soot and mineral composite exposure, and various respiratory symptoms in waste reclaimers at a Gauteng landfill site. The focus of the study emanates from the lack of knowledge on hazards that are presented as a result of increasing waste generation, disposal, recycling and the influx of waste reclaimers in landfill sites.

Continuous dust monitoring and suppression

Led by: K Renton

This Mine Health and Safety Council (MHSC) project is aimed at improving the control of workers' exposure to mine dust. The research initiative has been planned using the controlled environment of the Polley Dust Duct to test the effectiveness of mist at reducing respirable crystalline silica dust.

Characterisation of respirable crystalline silica in the dust obtained from abandoned mines around Roodepoort, West Rand, and Johannesburg, South Africa

Led by: T Madzivhandila

This research project relates to respirable crystalline silica dust exposures in abandoned mines around Roodepoort. The study aims to identify the mineral composition of the dust obtained from abandoned mines and to evaluate and characterise the seasonal exposure risks to the communities adjacent to and surrounding these abandoned mines.

A study on respirator fit test and face sizes of NHLS respirator users during 2013–2014

Led by: J Manganyi

The study was conducted over a year period during 2013–2014 and was submitted towards the completion of the third year MPH research project. The study was successfully completed and a degree was awarded in July 2015. The results of the study were reported to the participants and laboratories concerned.

Effectiveness of respiratory protective equipment for nanoparticle exposure: Systematic review and meta analysis

Led by: *L Ntlailane*

The review will fill the knowledge gaps on the issue and contribute to more focused research on the subject. This will feed into policymaking for nanoparticle exposure prevention as a contribution towards public health.



A worker aliquoting lead oxide in a gold assay laboratory during a survey – important findings were exposure to lead due to poor ventilation maintenance, and poor quality plastic bags used

TEACHING AND TRAINING

During the period under review, the Occupational Hygiene Division was involved in both formal and informal training activities for undergraduates, postgraduates and external clients and stakeholders. Teaching activities included academic support for undergraduate and postgraduate students at the universities of Johannesburg, North West and the Witwatersrand.

Undergraduate

BSc degree and postgraduate degree students (25) from the University of Limpopo School of Physiology and Environmental Health were hosted by the Occupational Hygiene Division for a session on the “how and what” of occupational hygiene methods.

Postgraduate

Teaching and training activities included course management, student supervision and teaching, as well as practical support for the Masters in Public Health (Occupational Hygiene) Degree from the University of the Witwatersrand.

Informal

Four risk assessment training sessions were provided to private and government departments, including the provincial Department of Health Occupational Hygiene personnel and NHLS Safety, Health and Environment (SHE) representatives, with approximately 95 delegates attending.

A three-day respirator fit testing training was conducted by divisional staff and attended by the NHLS SHE Department. Employees that attended were also tested for competency in performing respirator fit testing. The training transformed into the rollout of fit testing to all regions within NHLS.

Formal

Two of the staff members presented a three-day pilot Occupational Health and Safety Training Course for medical doctors and nurses in the railway sector, in collaboration with the NIOH Occupational Medicine, Ergonomics and Training sections in October.

A two-day training course on asbestos fibre counting was conducted from 12–13 August 2015 to private clients from different industries. The second training session was provided to staff members from a registered asbestos contractor from 2–3 December 2015.

Mr G Mizan, in collaboration with the University of KwaZulu-Natal, co-presented the international OHTA Module W504 – Asbestos and Other Fibres, at the NIOH.

QUALITY

The division obtained SANAS 17020 accreditation for Inspection Bodies and is currently in the process of obtaining an approval from the Department of Labour.

The division participates in two international quality control schemes: the XRD/FTIR Laboratory participates in the Respirable Crystalline Silica International Quality Assurance of the Health and Safety Laboratory (HSL), UK. The Asbestos Laboratory participates in the Asbestos Fibre Regular Informal Counting Arrangement (AFRICA) asbestos proficiency testing scheme with the Institute for Occupational Medicine (IOM) in Edinburgh, UK. The latter maintained a '1' grading.

In addition to the SANAS 17020 accreditation, the division is currently in the process of obtaining SANAS 17025 accreditation for the XRD Laboratory.

HONOURS

Ms J Manganyi is actively supporting the Department of Labour through the assessment of inspection bodies for SANAS accreditation. This role improves the quality of Approved Inspection Authority (AIA) work done throughout workplaces in South Africa.

PROFESSIONAL DEVELOPMENT

Occupational hygiene staff continued to make progress in obtaining professional status with the South African Institute for Occupational Hygiene (SAIOH). One member of staff obtained her SAIOH certification at Occupational Hygiene Assistant level and another obtained an Occupational Hygiene Technologist level certificate.

Three staff members passed the Legal Knowledge course for Occupational Hygiene, presented at North-West University, fulfilling the Department of Labour requirement for members of AIAs.

Effort has continued to be put into the development and training of the division's employees and the expansion of the capabilities of the Occupational Hygiene Division.

Undergraduates enrolled: 1 (BSc Honours in Occupational Hygiene at the University of Pretoria)

Postgraduates enrolled: 3 (2 MSc in Community Health at the University of Pretoria; 1 MPH at the University of the Witwatersrand)

Postgraduate courses completed: 1 (Masters in Public Health [MPH] at the University of the Witwatersrand)



QUALITY
ASSURANCE



Manager: Mr Bonginkosi Duma

quality and competency standards. During the first quarter of the year, the institute's medical laboratories were audited on ISO 15189, which is now based on the new ISO 15189:2012 standard. This standard requires that quality indicators are put in place and more work, together with additional documentation, is expected to be produced by the laboratories for accreditation. These quality indicators include turnaround time, performance and participation in external QA schemes, as well as internal quality controls. According to the new standard, laboratories are no longer required to report annually whether they have passed or failed laboratory quality controls. Instead the performance of a laboratory's quality controls must be checked and verified throughout the year. This audit by SANAS for ISO 15189:2012 was passed successfully by all three medical laboratories in April 2015 and the next audit will take place in April 2016.

During the same quarter, the NIOH was audited by SANAS for ISO 17020 in Occupation Hygiene. This is the standard for the competence of inspection laboratories and forms part of the requirement from the Inspection Authority at the Department of Labour (DoL) to ensure that AIA laboratories are accredited before they receive a government licence to conduct workplace occupational hygiene surveys. The Occupational Hygiene Division passed this audit successfully after much hard work and preparation, with the assistance and guidance of QA staff, and obtained its accreditation licence. During the third quarter of the review period, the NIOH was audited for ISO 17025 (a standard for calibration laboratories), which was successfully passed by the water testing area of the Analytical Services Section. Comments from SANAS included how the quality systems were improving at the NIOH each year.

Internal audits are conducted every year on all laboratories, whether they are accredited or not. The non-conformances noted during the internal audits are reported at the Annual Quality Management Review Meeting within NIOH that takes place in May of each year. The NIOH continues to strengthen its quality management systems by conducting monthly departmental accreditation meetings and continuously participating in the National Quality Assurance meetings and Quality Manual Reviews held at the NHLS Head Office.

TRAINING

The QA Section conducted training internally to NIOH staff on quality-related topics throughout the period under review. This was done largely with the aim of increasing awareness of quality requirements within the NIOH and included topics such as:

- Root cause analysis
- R80 document training (document for proficiency testing scheme)
- Method validation
- Personnel file training
- Document control.

The field of quality assurance involves making certain that tasks, procedures and processes are executed accurately as intended. The NIOH Quality Assurance (QA) Section is responsible for dealing with and conducting both internal and external audits and handling complaints in the organisation from a variety of clients. These complaints are studied, analysed and a root cause analysis is done, after which the complaints are then closed. The section is also responsible for conducting internal inspections to find any variations within the NIOH departments to ensure compliance with the requirements of the Quality Management System.

The section also supports the NIOH laboratories in getting SANAS approval on the Quality Management System and Technical Competence.

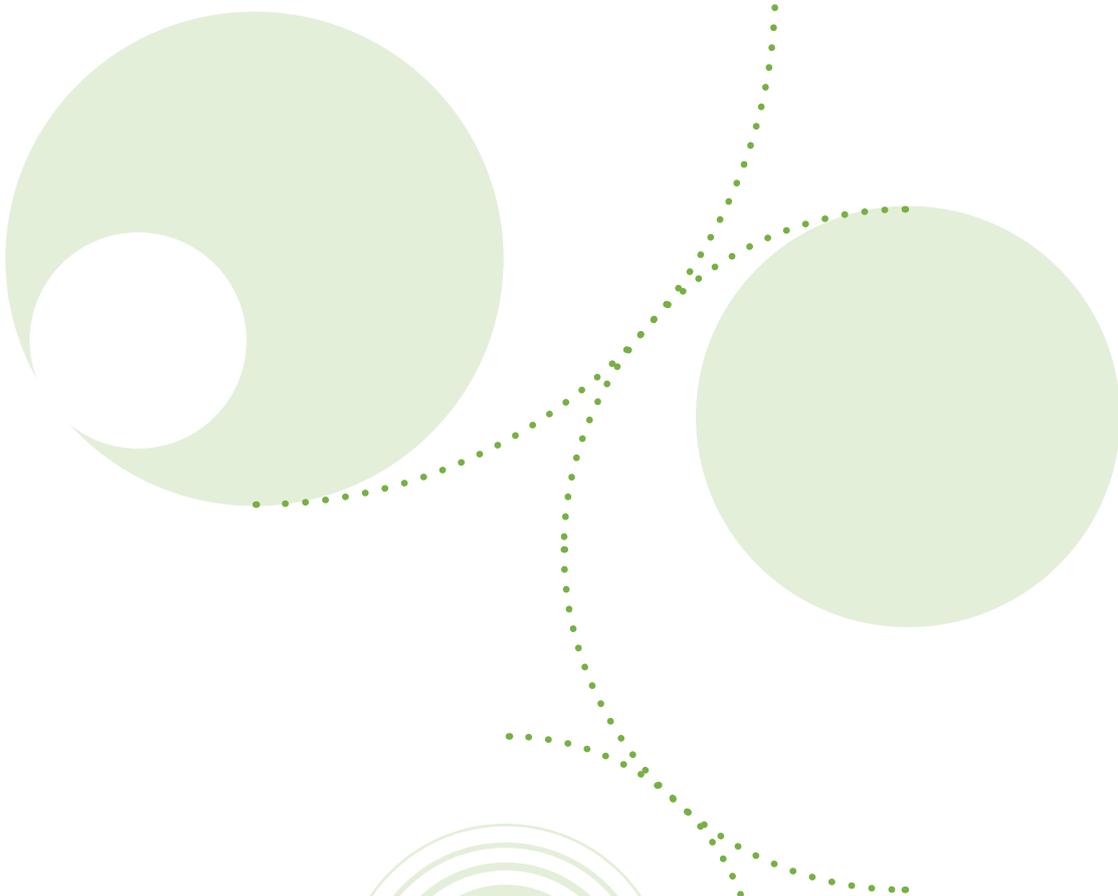
SERVICES

Quality remains a priority at the NIOH, with three laboratories (Analytical Services, Immunology and Microbiology, and Pathology) maintaining their

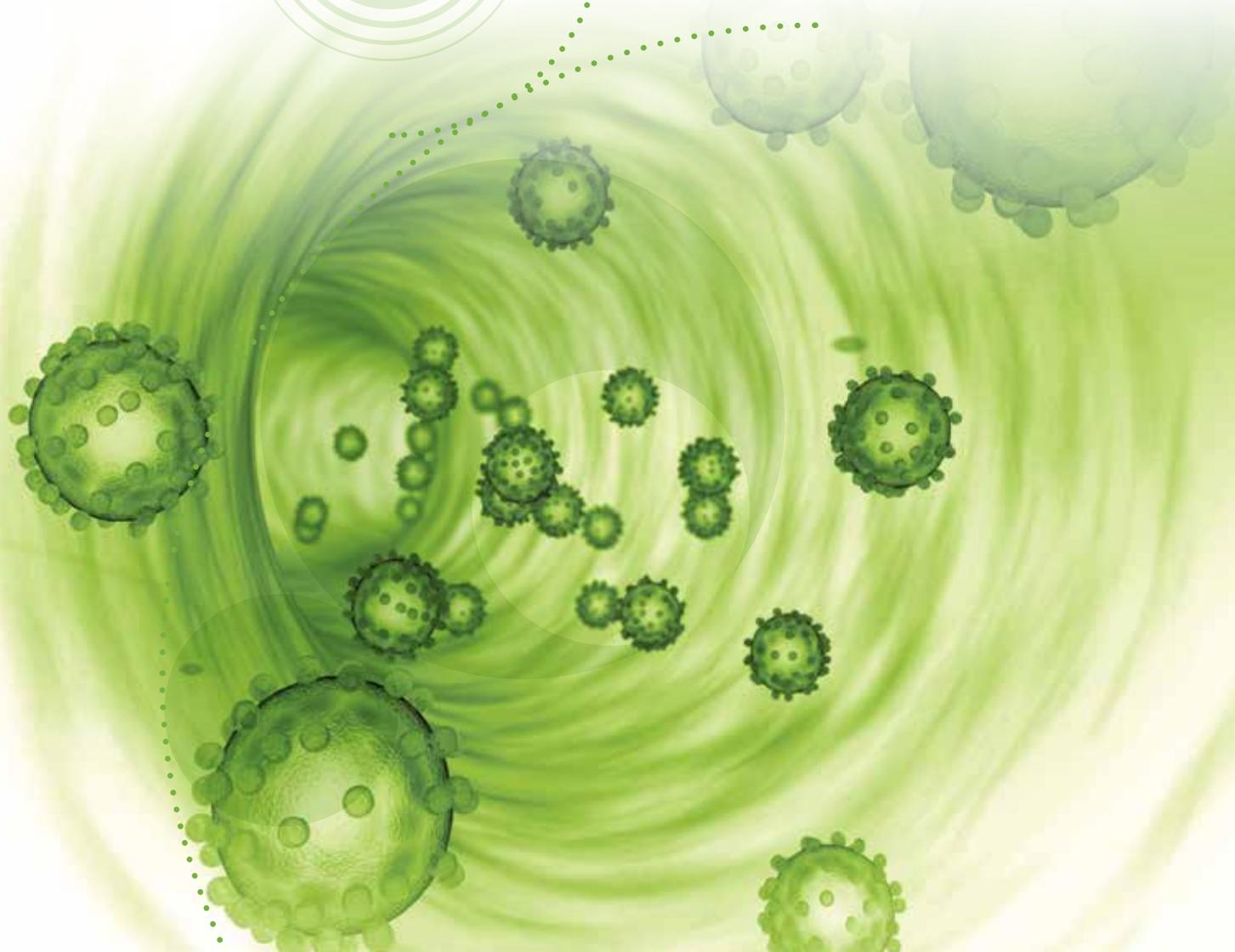
Training was also done by approved external service providers for NIOH staff on method validation and the uncertainty of measurement and health technology assessments. Mr B Duma continues to handle risk management within the NIOH and risk-related problems that affect the quality and accreditation status of the NIOH, in an effort to ensure the strength of the quality system.

PROFESSIONAL DEVELOPMENT

During the first quarter of the period under review, Mr B Duma presented at the Namibian Quality Conference in Windhoek on *The importance of having a Quality Management System in the workplace*. During the same quarter, Mr Duma gave an international presentation to Occupational Health and Safety colleagues on *The purpose of quality management systems in occupational hygiene* at the International Commission on Occupation Health (ICOH) congress in South Korea.



HIV/TB IN THE
WORKPLACE UNIT



Human Immunodeficiency Virus (HIV), Acquired Immunodeficiency Syndrome (AIDS) and tuberculosis (TB) continue to be an ever present threat globally and in South Africa in particular. The Joint United Nations Programme on HIV/AIDS (UNAIDS) reports that in 2014 alone, 36.9 million [34.3 million–41.4 million] people were living with HIV globally and 6.8 million [6.5–7.5 million] were South Africans. The South African national estimates for HIV prevalence for adults aged 15–49 were at 18.8% (95% CI [confidence interval]: 17.5–20.3) in 2012 according to the Human Sciences Research Council (HSRC). This is further compounded by the continued TB epidemic, which wreaks havoc among populations in Africa, particularly in South Africa, despite the availability of the potent six-month treatment regimen in existence since the 1970s. The World Health Organization (WHO) reports that in 2014, 450 000 [400 000–510 000] South Africans had TB.

According to Statistics South Africa, in 2015 South Africa had a population of 54.96 million, ≥ 36.2 million were in the age group 15–64 years and of these just >16 million were employed. This is of particular importance, as HIV is more prevalent among the reproductive age groups, which in turn creates a fertile environment for TB, the most common opportunistic infection and cause of death in HIV infected persons. Thus HIV and TB are critical workplace issues and are in fact listed occupational diseases in certain sectors like health, mining, construction and others. It is in this respect that the NIOH continues to have a specific unit for HIV and TB in the workplace.

The unit is primarily a public health unit, focusing on knowledge generation through various research initiatives, teaching and training, as well as service delivery. Over and above the special focus on HIV and TB, the unit has a special interest in the health of health workers at work and in occupational health and safety policy and management systems.

SERVICES

Occupational health and safety assessments

The unit, supported by the Occupational Hygiene Division, conducted an assessment at the Witbank TB Hospital in Mpumalanga. The report produced was used to strengthen the protection of workers' health in the Mpumalanga Provincial Department of Health (DoH).

Occupational medicine clinic

The unit runs a weekly occupational health and safety clinic for health workers based at Kalafong Provincial Tertiary Hospital. At this clinic the unit provides a wide range of services from medical surveillance, incident investigations and technical support to the health and safety committee, infection control, and TB HIV advocacy teams.

HIV and TB workplace queries

The unit received and responded to queries related to HIV and TB in the workplace on an *ad hoc* basis. These were managed, in part, by the overall query handling service of the NIOH.

Industrial incidents

In collaboration with the Gauteng Provincial DoH and the Epidemiology Section of the NIOH the unit managed a foodborne disease outbreak in a health facility. This outbreak resulted in a single hospital admission, four healthcare consultations and 98 self-limiting cases of gastroenteritis. Even though the food outbreak was mostly self-limiting, the presence of the NIOH allowed for a formal investigation that produced a report that could be used for future learning and the prevention of similar outbreaks.

Information products

The unit organised and hosted two major HIV commemoration events and one TB Awareness Day event among health workers. The HIV commemoration events were held at the NIOH and with the Gauteng Provincial DoH's Employee Health and Wellness Programme at Kalafong Provincial Tertiary Hospital. During the events numerous speakers, including workers, trade unions, management and people living with HIV provided input to discussions; information leaflets on both HIV and TB were disseminated.



Head: Dr Muzimkhulu Zungu

An ongoing campaign on TB and health workers was conducted, where information leaflets and posters were distributed for health workers and patients alike. Respirators and surgical masks were distributed to health workers, patients and visitors and TB symptom screening was conducted among health workers.

**KALAFONG PROVINCIAL TERTIARY HOSPITAL
WORLD AIDS DAY COMMEMORATION
"GETTING TO ZERO"**

<p>YOU CAN GET HIV FROM YOUR WORKPLACE!</p> <p>KNOW YOUR HIV STATUS</p> <p>ALWAYS WEAR PROTECTIVE MATERIAL WHEN HANDLING BODY FLUIDS AND SHARPS</p> <p>GET POST EXPOSURE PROPHYLAXIS (PEP) IMMEDIATELY AFTER EXPOSURE</p> <p>BE A CHANGE AGENT AND SAY NO TO HIV RELATED STIGMA IN THE WORKPLACE</p>	<p>TB DISEASE AMONG HEALTH WORKERS IS A REALITY</p> <p>BE TB WISE, KNOW THE INFECTION CONTROL POLICY</p> <p>OPEN WINDOWS AT ALL TIMES</p> <p>USE N95 TO PROTECT YOURSELF</p>
<p>PEP IS AVAILABLE, SPEAK TO YOUR OHS CLINIC OPPOSITE THE NEW STAFF DEVELOPMENT OFFICE NEXT TO MOHAU CENTRE TEL: 012 318 6403</p>	






HIV/TB information leaflet for health workers (World AIDS Day 2015)

The unit engaged in several information sessions with health and safety managers, trade unions, employer representatives, government representatives, non-governmental organisations (NGOs) and developmental partners, including the International Labour Organization (ILO), International Organization for Migration (IOM) and the WHO. These information sessions were in the agricultural, construction, health, mining and service sectors of the South African economy.



Executive Management of Kalafong Provincial Tertiary Hospital and NIOH staff with their respirators on TB Awareness Day

Projects conducted with an external partner

The unit is working with the University of British Columbia, Canada (UBC), the ILO and the WHO on the implementation of HealthWISE in Mozambique, South Africa and Zimbabwe. HealthWISE is an action-oriented participatory methodology developed by the WHO and ILO to assist health facilities in improving working conditions, workplace safety and performance. It applies simple, effective and affordable methods that introduce change through management and worker teams.

In collaboration with the Chamber of Mines (CM), mining sector trade unions, and government departments involved in mine health and safety, the unit is working on the UNAIDS 90 90 90 strategy-inspired HIV/TB campaign to:

- Offer HIV counselling and testing (HCT) to 100% of miners
- Start antiretroviral therapy (ART) in 100% of those eligible
- Virally suppress HIV in 100% of those on ART
- Screen 100% of miners for TB
- Start TB treatment in 100% of those testing TB positive to cure 100% of those on treatment.

The project is led by the Honourable Deputy President, Mr Cyril Ramaphosa, and the Honourable Minister of Health, Dr Aaron Motsoaledi.

Technical discussion documents to inform policy options

Together with the South African Medical Association (SAMA), the unit produced the draft discussion document for the World Medical Association (WMA) on occupational and environmental health and safety (OEHS). The document looks at the role of national medical associations in the promotion and prevention of occupational and environmental diseases and injuries, and gender equality in the world of work through universal access to OEHS systems. Through the broader NIOH consultative process, the unit contributed to the document on occupational health services within the primary healthcare system of the (DoH).

The unit also participated in the discussions for the TB MDR and XDR infection control policy of the DoH, led by the CSIR. The unit continues its secretariat role in the development of the HIV TB Workplace Policy for Health Workers.

Advisory support activities for government departments

The unit has ongoing relations, including the provision of technical advisory support to the Department of Labour (DoL), DoH, and the provincial departments of health (Mpumalanga and Gauteng). These support activities include input into policy options, occupational health and safety systems and HIV and TB in particular.

NHLS policies

The unit reviewed and revised the NHLS HIV/TB Workplace Policy, which has since been submitted to the Board and Executive Committee (EXCO) for approval. Since the discussions on the NHLS Act amendment bill and the National Public Health Institutes of South Africa (NAPHISA) bill in 2015, the unit has played a pivotal role in consolidating NIOH responses, together with other units of the NIOH and external stakeholders.

TEACHING AND TRAINING

Academic qualifications in Occupational Health and Safety

The unit hosted a Master's in Public Health (MPH) epidemiology fellow and a Master of Medicine (MMed) registrar in Public Health Medicine, and is co-ordinating the Diploma in Occupational Health and Medicine (DOHM) which has an annual intake of 25 diplomates and is graduating at least 18 students in the 2015/16 financial year, in collaboration with the University of Pretoria's School of Health Systems and Public Health.

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

The unit provided training to the National Union of Mineworkers (NUM), DoL, Mpumalanga Provincial DoH, Gauteng Provincial DoH and the NHLS on HIV and TB workplace programmes and occupational diseases in general. The unit also provided training on HIV and TB to Legal Aid South Africa in collaboration with ILO and to infection control practitioners in collaboration with the CSIR.

RESEARCH

The unit is involved in research projects that are ongoing in the agricultural, construction, health and mining sectors. These research projects are on the HIV and TB disease burden, availability of HIV and TB services and policy options for HIV and TB in the workplace.



ANALYTICAL
SERVICES SECTION



Head: Dr Boitumelo Kgarebe

The Analytical Services Section has principally focused on the analysis of hazardous substances in biological and environmental media, as a way of strengthening the assessment of workplace exposures in compliance with the Regulations of Hazardous Chemical Substances. The section continued to provide specialised laboratory tests, advisory services and training in support of private industries, government departments, and academic institutions in occupational and environmental health. In addition, greater emphasis than in previous years has been placed on various research projects of national importance and support of research in general. The section developed and accredited methods to support a research project on the Multi-Element Analysis of Heavy Metals in Blood and Serum, in collaboration with the Department of Health Sciences, University of Pretoria. Another research project undertaken was a Case Study of the Injection of Elemental Mercury in Breast Tissue in collaboration with a Gauteng hospital. Yet another highlight in the research output of the section has been the support provided in the Therapeutic Drug Monitoring of Selected Patients at the Wits Donald Gordon Medical Centre.

The section has rendered advice to the private and public sectors, trained postgraduate students on Good Laboratory Practice (GLP) and analytical techniques applied in chemical contaminant-detection in the workplace and for biological monitoring. Through the attendance of seminars, workshops, conferences and lectures, the section has increased its own capacity in addressing occupational health concerns. Furthermore, by admitting postgraduate students and hosting students for exposure to various practical aspects of an accredited laboratory, the section continues to assist national institutions to prepare students for laboratory-focused careers.

DIAGNOSTIC SERVICES

Over 10 689 tests (for diagnostic and research purposes) were completed during the reporting period. The tests included assays on toxic metals, mainly for aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, uranium, vanadium, and zinc in blood, serum, urine, water and other environmental samples. Organic assays requested on biological samples were mainly for o-cresol, dichloromethane, hexanedione, hydroxypyrene, mandelic acid, methanol, methylene diphenyl isocyanate methylhippuric acid, methyl ethyl ketone, phenol, toluene diamine isocyanates, organophosphate metabolites, toluene, benzene, trichloroacetic acid, and *t,t*-muconic acid.

NEW DEVELOPMENTS

In line with increasing its scope of activities and analyses, the section developed and submitted three methods for SANAS accreditation in 2015. The methods were accredited on 14 April 2015, and have now been adopted for routine use. These were the multi-element analysis of arsenic, cadmium, chromium, cobalt and manganese in blood, as well as arsenic, cadmium, chromium, cobalt, manganese and nickel in urine; both methods use the Inductively-Coupled Plasma Mass Spectrometry (ICPMS) technique. The third method was the measurement of lead in blood by Atomic Absorption Spectrometry (AAS).

In November 2015, the section gained ISO 17025:2005 provisional accreditation through SANAS for testing aluminium and mercury in water. ISO 17025:2005 is a standard for competence of testing and calibration laboratories. Accreditation is an independent and formal recognition of the competence of a laboratory to perform specific tests.

Again in November 2015, after a submission to a call for funding proposals by the Mine Health Safety Council (MHSC), the MHSC announced the approval of seed funding for R22.5 million to the section for the purchase of an integrated chromatography system. The equipment purchase is for new knowledge creation through multidisciplinary intervention research for the mining industry that will help inform policy coherence, which will result in workplace equity and greater emphasis on prevention. This state-of-the-art equipment will greatly enhance the scope of work undertaken not only in the Analytical Section, but also in the NIOH as a whole.

Two medical intern scientists, Ms Lerato Mochaki and Ms Bianca Southern registered with Analytical Services for a two-year training programme for full registration as medical scientists with the Health Professionals Council of South Africa (HPCSA).

ACCREDITATION

The Metals and Organic units maintained ISO 15189 accreditation status. A total of 16 tests are currently accredited in the Metals Unit and six tests in the Organic Unit. The Metals Unit tests include aluminium in serum; cadmium, lead, mercury, chromium, creatinine and arsenic in urine; and cadmium, lead, manganese, and mercury in whole blood. The Organic Unit's accredited tests include mandelic acid, phenol, o-cresol, hexanedione, 1-hydroxypyrene and methylhippuric acid in urine.

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

In terms of benchmarking both quality and competence of the results and personnel, the section continued with its participation in the following External Quality Assurance (EQA) programmes:

- NY State Department of Health for arsenic, cadmium, chromium, lead, manganese and mercury in blood and urine
- German EQA programme for mandelic acid, nickel, phenol, o-cresol, hexanedione, 1-hydroxypyrene and methyl hippuric acid in urine and aluminium in serum
- Thistle EQA programme for creatinine in urine
- CDC-USA Lead and Multi-element Proficiency Programme for cadmium, lead and mercury in blood
- SABS-Water Check Proficiency Testing Scheme.

RESEARCH PROJECTS

Ms Bianca Southern is continuing with her MSc (Med) in Forensic Medicine and Pathology through her dissertation at Wits University under the co-supervision of Dr B Kgarebe. The title of the dissertation is: *The effect of temperature and headspace on the determination of ethanol in post-mortem blood specimens: A South African perspective.*

In collaboration with the Occupational Medicine and Hygiene sections, the Analytical Services Section undertook a collaborative study on occupational exposures of workers at the Platinum Metals Refinery in Rustenburg.

TEACHING AND TRAINING

The section continues to host groups of postgraduate students, providing insight into the operations of an accredited laboratory. In the reporting year, the section hosted training sessions on GLP, and Health and Safety Practice and Auditing in an Accredited Laboratory for Honours level students in the division of Forensic Medicine and Pathology, University of the Witwatersrand. A training session on Data Collection was provided for the same group of students.

HONOURS

The Analytical Services Section continues to serve as a Reference Laboratory for the German External Quality Assessment Scheme (G-EQUAS) due to continued good performance in the determination of 2,5-hexandione in urine, which is a biomarker for exposure to hexane.

PROFESSIONAL DEVELOPMENT

Frans Sethosa and Angela Mawela attended the annual Analytical Chemistry course sponsored by the OPCW, and held at Protechnik Laboratories in Pretoria from 4–15 May 2015. Bianca Southern attended the Analytical Skills Development Course at the Swedish Defence Research Agency in Umeå, Sweden, from 24 August–4 September 2015 (these are training courses in chemical analysis). The aim of the courses was to assist qualified analytical chemists from member states, whose economies are developing or in transition, to acquire further experience and practical knowledge, and to facilitate the analysis of chemicals related to national implementation of the Chemical Weapons Convention; to enhance national capacities in these Member States by offering training in analytical chemistry to personnel from industry, academic institutions, and government laboratories and to facilitate the adoption of GLP.

Undergraduates enrolled: 2 (BTech in Analytical Chemistry at the Vaal University of Technology)

Postgraduates enrolled: 1 (MSc in Forensic Science at the University of the Witwatersrand)



TOXICOLOGY
DIVISION

In line with the NIOH's mission, the Toxicology Division is committed to promoting research in collaboration with national and international scientific institutions; providing specialised services; contributing to capacity development through training and teaching of occupational toxicology to undergraduate and postgraduate students; and also providing consultation in occupational toxicology to government departments and industry. The delivery of these services by the division is achieved through four specialised units, namely the Genotoxicity Unit, the Health Risk Assessment (HRA) Unit, the Nano- and Microparticle Toxicity Unit and the Toxicogenomics Unit.

SERVICE DELIVERY

The division continued to conduct risk assessments on a number of pesticides for registration purposes with the Department of Agriculture Forestry and Fisheries (DAFF), as per the requirements of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947).

RESEARCH AND SPECIAL PROJECTS

Research in the division involved the study of the toxicity and the risk assessment of incidental and engineered nanoparticles and also toxic metals and pesticides through funding obtained from the Department of Science and Technology (DST), the European Commission's Framework Programme 7 (EU FP7), and the Mine Health and Safety Council (MHSC).

Engineered nanoparticles

Projects on engineered nanoparticles included the investigation of the functional groups, the degree of dissolution and their ability to generate free radicals as a measure of their toxicity and biodurability, conducted by two PhD students. The interference of nanoparticles in these and other test systems was also investigated. In addition, the apoptosis induced by nanoparticles using molecular biology techniques was tested. The nanoparticles tested included gold, TiO₂ rod-shaped, CuO, Ag, MWCNT, CdTe, Au spherical, Au rod-shaped, CdTe Quantum Dots and nanodiamonds.

Exposure assessment

Exposure assessment to nanoparticles was investigated within the project entitled *Exposure assessment to nanoparticles in research laboratories*, where the levels of nanomaterials released in the work environment at different laboratories were assessed.

Completed research projects

Two projects were completed during the reporting period namely:

- *Adverse Health Impacts Associated with Dust Emissions from Gold Mine Tailings*, funded by the MHSC. The aim of this project was to assess the hazardous nature of tailings particles collected as bulk, ambient PM₁₀ and respirable (personal) samples, from six South African gold mine tailings storage facilities
- *Health risk assessment of lead exposure to children in Blantyre, Malawi*, the aim of which was to determine if children in Blantyre are exposed to hazardous levels of lead, using the Environmental Protection Agency's Integrated Exposure Uptake Biokinetic (IEUBK) model. The project was conducted by Mr Wells Utembe for his PhD, under the supervision of Prof. M Gulumian.

INTERNATIONAL COLLABORATION

The division contributed to the development of the following documents for different international bodies:

For the International Standards Organization Technical Committee on Nanotechnologies (ISOTC229):

- Nanotechnologies – Use and application of acellular in vitro tests and methodologies to assess nanomaterial biodurability
- A label-free methodology to assess the toxicity of nanomaterials in vitro.



Head: Prof. Mary Gulumian

For the Organisation for Economic Co-operation and Development (OECD):

- Assessment of biodurability of nanomaterials and their surface ligands
- Nanomaterials exposure case study: gold nanoparticle occupational exposure assessment in a pilot-scale facility.

For the World Health Organization:

- Guidelines for nanomaterials in the work environment.

During the period under review, the division also participated in WHO Chemical Risk Assessment network activities, which include capacity building and training; chemical risk assessments/sharing knowledge; risk assessment methodology; and identification and communication of research priorities.

The division contributed successfully to the following EU-funded research programmes:

- EU FP7 Nanosolutions Project on Biological Foundation for the Safety Classification of Engineered Nanomaterials (ENM): Systems Biology Approaches to Understanding Interactions of ENMs with Living Organisms and the Environment
- EU FP20 eCallibrate Project on Performance Testing, Calibration and Implementation of a Next Generation System-of-systems Risk Governance Framework for Nanomaterials.

CAPITAL INVESTMENT

The division obtained substantial funding from the MHSC to upgrade an existing instrument used for the assessment of cellular internalisation of nanoparticles, as mentioned previously. Using this instrument it is possible to show that there are differences in the toxicity of the dust generated from different mines producing different commodities. Some of these dusts have the ability to enter the cells while others cannot.

With this upgrade, it will be possible to identify target organelles within cells, which in turn will enable the assessment of differences observed in the toxicity of the different types of nanoparticles. More reliable results will therefore be produced for research purposes and also for teaching and training of postgraduate students.

TEACHING AND TRAINING

The division successfully hosted the 7th International Symposium on Nanotechnology, Occupational and Environmental Health (NanOEH2015), which was held at Legend Safari Resort in Limpopo, with pre-congress workshops being held on 18 October, and the main symposium from 19–22 October 2015. The symposium provided a scientific forum for researchers and practitioners to present and discuss the latest research on occupational and environmental health issues and risks associated with nanotechnology.

The pre-congress workshops consisted of one-day training workshops for toxicologists on three main topics, namely *Risk Assessment of Nanotechnologies*, which provided participants with an overview of the occupational, safety and health issues regarding nanomaterials and nanocomposites, with an emphasis on the practice of risk analysis and current approaches for assessing and managing risk and uncertainty; *Exposure assessment of nanomaterials* which covered basic exposure assessment and also exposure assessment strategies and techniques for nanomaterials and an introduction to exposure modelling; and *Nanoecotoxicology* which provided participants with an overview of environmental concentrations and fate in real ecosystems, aquatic hazard (ecotoxicity tests with fish, invertebrates, and algae), terrestrial hazard (soils and tests with soil organisms using nanomaterials) and risk assessment and policy issues for nanomaterials.

The division continued to train and supervise postgraduate students for Masters and PhD degrees and trained two DST-NRF interns during the period under review.



Participants at the 7th International Symposium on Nanotechnology, Occupational and Environmental Health (NanOEh2015), which was held at Legend Safari Resort in Limpopo, from 19–22 October 2015

HONOURS

Prof. Gulumian was officially inaugurated as a member of the South African Council for Natural Scientific Professions (SACNASP) by the Minister of Science and Technology, Dr Naledi Pandor, on 25 June 2015 in Pretoria. As a council member of SACNASP, Prof. Gulumian attended the Council strategic session to discuss:

- The relationship between the DST and SACNASP
- Background and framework to the development of the 2016–2020 Strategic Plan
- Presentation of proposed key strategic goals and objectives to inform development of the five-year Strategic Plan
- Proactively guide the Minister on the Natural Scientific Professions.

PROFESSIONAL DEVELOPMENT

Postgraduates enrolled: 10 (7 PhDs at the University of the Witwatersrand, 1 PhD at the University of Pretoria, 1 MSc at the University of the Witwatersrand and 1 BTech at the Tshwane University of Technology)

The background of the page features a green-tinted image of a DNA double helix structure. Overlaid on this are several light green circular shapes of varying sizes and a dotted line that forms a stylized path or bracket. The text is positioned on the right side of the page.

OCCUPATIONAL
HEALTH, SAFETY
AND ENVIRONMENT
(SHE) SERVICES

STAFFING

The year under review saw the filling of the vacated Safety Health and Environment (SHE) Officer post in Gauteng; the section is pleased to welcome Ms S Mokoena to the post.

The department also received the resignation of Mr M Mulugisi, Occupational Health Nurse (OHN) Manager for Limpopo/Mpumalanga. His post was advertised and interviews were conducted in Polokwane in March 2016. A candidate has been identified and it is hoped that the candidate will commence early in the new financial year.

The Occupational Medicine Practitioner (OMP) position was not filled during the year and Dr O Abrahams of the NIOH Occupational Medicine Section is continuing to act as OMP, providing guidance and caring for the NHLS employees.

The department welcomed Ms N Xulu in the year under review in the capacity as Departmental Secretary. Her presence is making a tremendous difference to the department.

CLINICAL

The Occupational Medicine Section continued to provide guidance and expert medical support to specific cases and incidents. Of particular note were:

- Possible exposure to Brucella
- Employees with TB
- Exposure or possible exposure to chemicals and other biologicals like meningitis causing agents.

The OHNs have continued, under the guidance of Dr Abrahams, with a project which commenced in the last financial year to check the levels of compliance with regard to Hepatitis B immunisation and also surveillance for tuberculosis. The information collected is being captured on the Occupational Health and Safety Information System (OHASIS) Workforce Health module.

The level of compliance for Hepatitis B immunisation amongst potentially at risk employees, including those currently receiving vaccinations, has now reached 89%.

HAZARDOUS WASTE

The need for a new section, dedicated to ensuring the compliance of NHLS facilities as well as those of service providers, to hazardous waste requirements, was identified during the period under review. This new section has been included as part of the SHE Department. It is envisaged that the section will comprise a Waste Assurance Manager, Waste Assurance Officers and an Administrator. All posts were profiled and the Waste Assurance Manager position was advertised. Potential candidates were shortlisted and it is expected that interviews will be held early in the new financial year.

In line with the decision not to take employees out of the laboratory unless absolutely necessary, an online training course on healthcare risk waste, which was developed in-house and loaded onto the intranet, is continuing. The aim is to empower employees in the segregation and legal handling of healthcare risk waste from 'cradle to grave'.



Manager: Mr David Jones

SPECIAL INVESTIGATIONS AND NIOH SUPPORT

Expert support from various sections in the NIOH continued, including: Occupational Hygiene, Occupational Medicine, Immunology, IT and Finance. Examples of expert opinion and guidance related to:

- The fit testing of N95 respirators for staff
- Compliance with legal requirements regarding medical surveillance
- Consulting with employees and their treating healthcare professionals who have specific occupational medical concerns
- Noise surveillance
- Chemical exposure
- Indoor air quality monitoring
- Ergonomic assessments
- Immunology advice
- Ongoing development of OHASIS.

OCCUPATIONAL HEALTH INFORMATION SYSTEM – OHASIS

OHASIS, which began as a paper-based system and progressed to an online system, has now been upgraded to Version 3, which was developed in-house, together with the original developers, the University of British Columbia (UBC).

Training of identified persons in facilities using online methods, accessed via the intranet, continues. To date 449 employees (an increase from the 312 in the previous reporting period) have been trained and loaded as users of OHASIS live. This means that they are able to input data into the Incident Reporting and Investigations and/or Waste Tracking Modules and are also able to access reports. The intention is to continue with this process.

Although the right to access the different modules in OHASIS is controlled, concerns were identified around the confidentiality of information in terms of others with assigned rights having general access to captured data of a registered user. To address this concern the development of Version 4 of OHASIS commenced in late 2015. It is now in the testing phase and rollout is envisaged early in the new financial year.

It is further intended to expand OHASIS to include a module that will assist health and safety committees to meet their legal requirements. This module will assist with setting up of agendas, dissemination of minutes as well as records of the various checklists that are completed by safety appointees like health and safety representatives, first aiders and fire wardens.

The value of the OHASIS system is becoming recognised in South Africa beyond the NHLS and an agreement has been signed for rollout to the Gauteng Department of Health. Other entities that have expressed an interest include the Free State for a general rollout beyond the pilot sites and the Western Cape. Demonstrations have also been made to the Mine Health and Safety Council, City of Johannesburg and the Namibian Laboratory Services.

A breakdown of some of the outcomes for the 447 incidents recorded on OHASIS in the year under review, compared to the 374 incidents recorded in the previous financial year, are reflected in Figure 2.

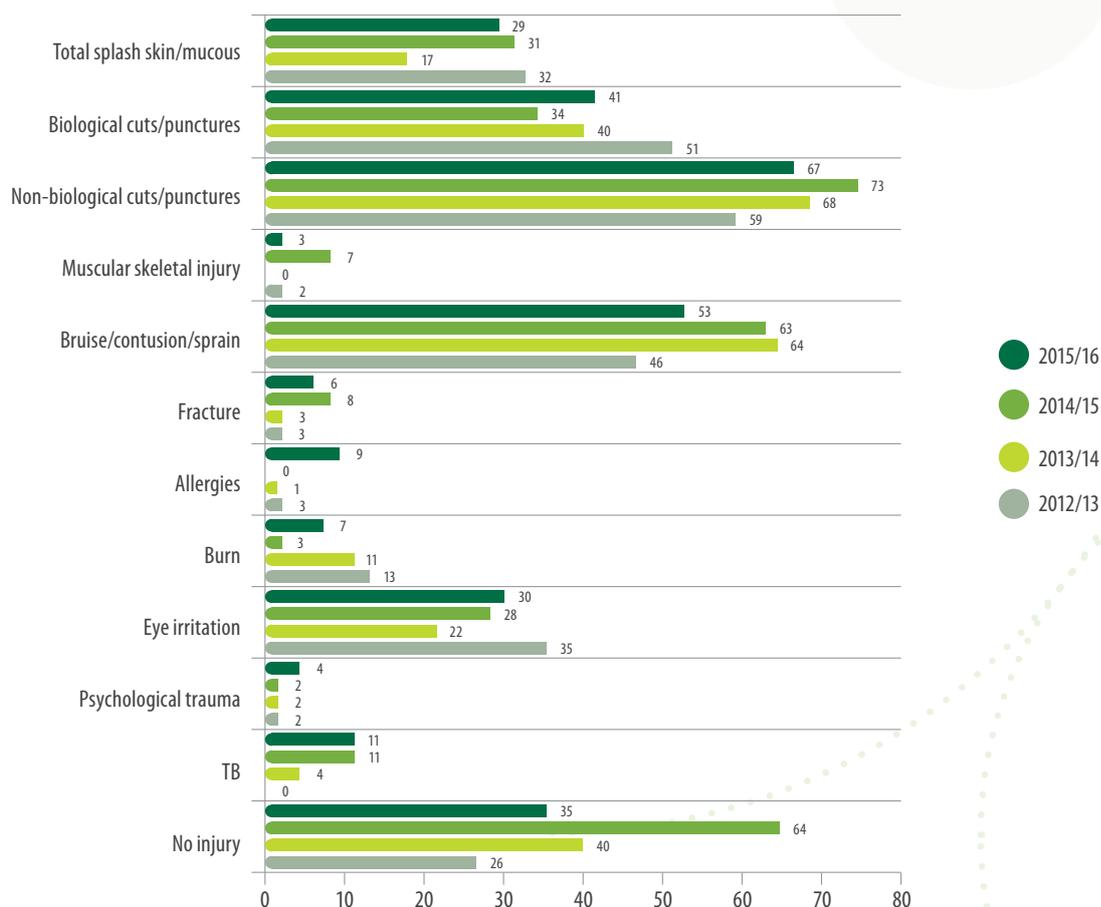


Figure 2: Incidents recorded in OHASIS by outcome

AUDITS AND RISK ASSESSMENTS

During the period under review, SHE officers under the guidance of Ms M Morgan, continued with the process of auditing facilities, based on the type of information that would be looked at by the Department of Labour and the requirements of the OHS Act.

A total of 340 safety audits were conducted and the number of facilities which achieved a 100% score increased from one in 2013/14 and nine in 2014/15 to 16 in the year under review.

In an ongoing effort to be compliant with legislation and to assess the level of risks employees are exposed to, the SHE Department continued to evaluate the risk assessments done by various facilities. Where these were found to be wanting, improvements were facilitated to ensure compliance.

CONFERENCES AND TRAINING

Health and safety representative training

Online training of health and safety representatives and managers continued to be co-ordinated by the SHE Department during the year under review. A concerted effort was made to ensure that any new health and safety representatives did the course, which is available on the intranet.

Other training and presentations

In an effort to provide in-house, laboratory-specific training material for employees, the SHE Department has, throughout the year, developed and posted training material on the intranet. Topics covered include Standard Precautions in the Workplace; Chemicals in the Laboratory; Xylene; Formaldehyde; TB in the Workplace; Exposure to Blood Borne Pathogens; and Risk Assessment. Each topic is covered by means of a PowerPoint presentation and also a short *toolbox talk*.

The department continued to be involved in training presentations within respective areas of expertise. These ranged from Safety Orientation/Induction, Healthcare Risk Waste (HCRW), and OHASIS, to Business Manager meeting presentations, Management Review meetings, and Evacuation Drills.

Two members of the SHE Department, Ms L Maja and Ms N Masiza, received funding to attend the 58th American Biological Safety Association Conference (ABSA) in Providence, Rhode Island, USA from 9–14 October 2014. The conference included state-of-the-art keynotes, papers and panel discussions highlighting best practises and hands-on skills crucial for today's biosafety and biosecurity professionals. Both members of the group had the opportunity to attend the pre-conference courses and seminars.



The SHE Department and NIOH staff at the fit testing training in Rustenburg.

Back row (l to r): Lincoln Darwin, Noluthando Masiza, Sophia Kisting (Executive Director NIOH) and Maleshwane Magasa

3rd row (l to r): Michelle Morgan, Anna Potgieter, Marlinee Naidoo, David Jones, Odette Abrahams and David Rangongo

2nd row (l to r): Jeanneth Manganyi, Paulinah Letsoalo and Nontutuzelo Fatyela

Front row: Sinah Mokoena, Ncebakazi Mvakade and Lasi Maja

GRANT-FUNDED PROJECTS

To provide for additional fit testing for staff, a grant was applied for and secured to cover the supply of five Portacount machines and training for the SHE Department. Ms J Manganyi and Mr D Rangongo of the NIOH Occupational Hygiene Department developed and presented training to the SHE Department at a grant-funded three day training course held near Rustenburg. The rollout of fit testing will now be done, focusing firstly on TB laboratories.



Paulinah Letsoalo (left) and Sinah Mokoena (right) during Respirator Fit Testing Training

Grant funding has also been obtained to develop additional modules for OHASIS. These include a Health and Safety Committee Module and a module aimed at tracking maintenance of equipment.

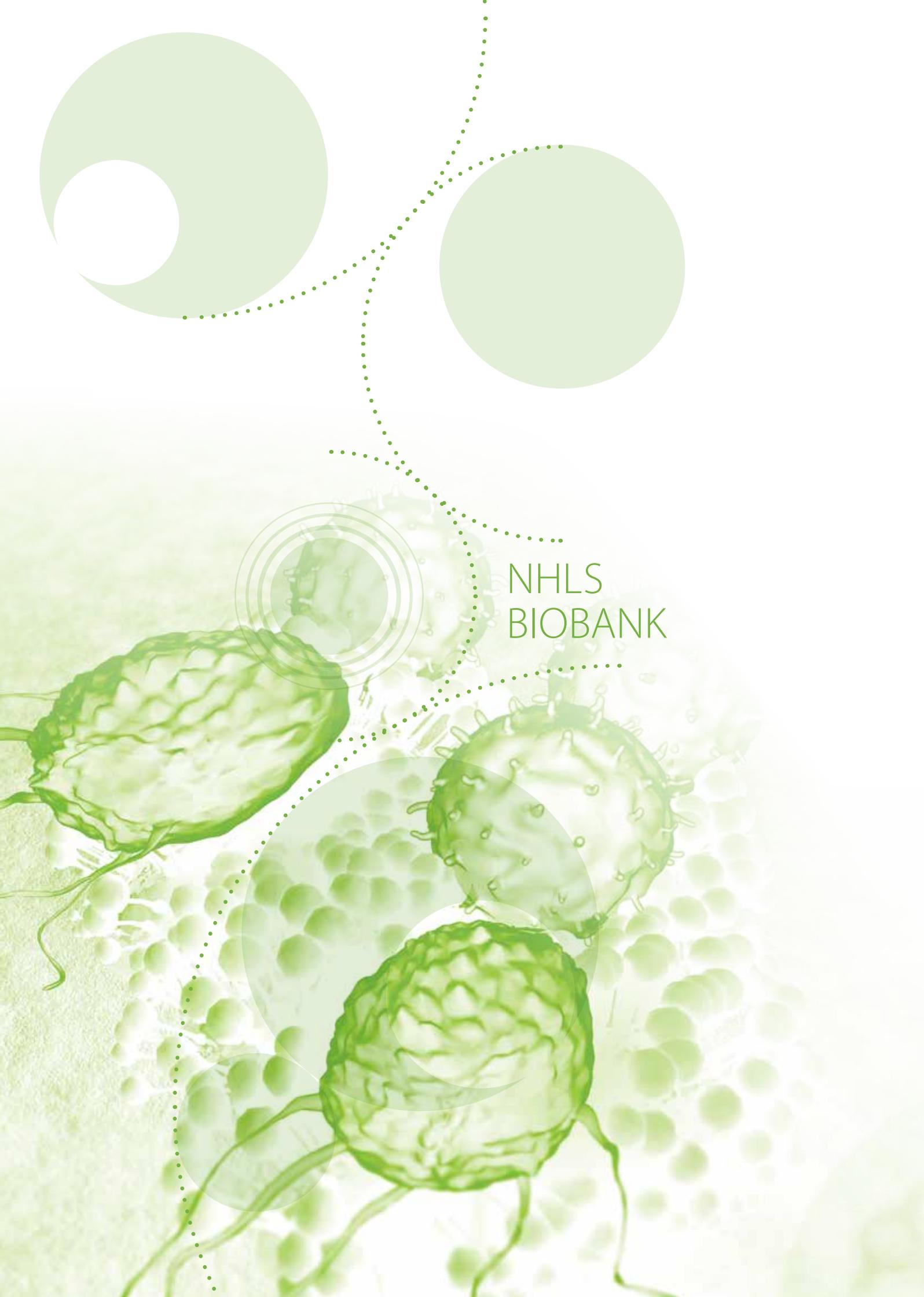
In 2014/15 NIOH Annual Review it was mentioned that grant funding had been applied for to produce induction biosafety/ biosecurity videos. The funding was obtained, scripts were developed in consultation with subject matter experts, videos filmed (with the assistance of the Graphics, Marketing and Communications Section) and final editing is currently in progress. The SHE Department looks forward to distributing copies of the final product on DVD, to provide basic biosafety and biosecurity induction for all new employees, newly appointed managers, visitors and contractors, security guards and to every NHLS laboratory early in the new financial year. The videos will also be available on the intranet and on 25 iPads, which will be distributed to Area Head Offices, Corporate Head Office as well as identified academic sites.



The video production team. Back row: Kobus Zietsman, Gladwin Lucas, David O'Reilly, and Ntokozo Majozi
Front row: Guy Hall, Michelle Morgan, Shanaz Hampson, David Jones



The video production



NHLS
BIOBANK

SERVICES

The NHLS National Biobank experienced continued growth during the year under review. The Biobank stores biological specimens for research from both NHLS laboratories and external clients. The facility maintains a high level of security and constant monitoring of ultra-low freezer temperatures, as well as environmental conditions, to ensure that specimens remain preserved optimally in line with international standards/practice. The capacity of the Biobank has increased to over 700 000 specimens that can be stored at temperatures of -86 degrees Celsius.

By September 2015, a total of 520 000 specimens had been collected from private clients, making this the largest source of the 524 000 specimens currently stored. The balance has been supplied by NHLS researchers and government departments. Samples stored range from serum, DNA, plasma and urine to TB Microbanks.

The Biobank enhanced its services by installing the Biobank Information Management System called Nautilus. This increased its capacity for storage and retrieval of samples and data. The security of samples is of the utmost importance and procedures for better security are being reviewed and security increased at the request of some clients.

Monthly Biobank meetings with clients continue as per contractual agreements. At these meetings discussions on the proper analysis and usage of specimens is discussed.



Biobank has capacity for over 700 000 specimens and currently has over half a million samples



Manager: Mr Bonginkosi Duma

PROFESSIONAL DEVELOPMENT

During the third quarter of the year, Biobank staff attended training on Biobanking Best Practices at the WHO International Agency for Research on Cancer (IARC) Biobank Facility in France. During the next financial year the Biobank will have the services of a bioinformatics scientist to assist it with data and the creation of research platforms. More scientists will be employed as the number of projects grows.



WHO IARC Training in France. Front row: Nonhlanhla Tlotleng (NIOH-NHLS), Dr Maimuna Mendy (WHO, IARC France), Marianne Henderson (NHI, USA). Back Row: Jerry Moseboa (NIOH-NHLS) and Bongi Duma (NIOH-NHLS)



Visitors to the Biobank. Left to right: Prof. Rees, NIOH; Deputy Minister: Mineral Resources, Mr Molefe Oliphant; Mr B Duma, Biobank Manager

VISITORS

An increase in Biobank awareness among clients and government led to a visit in July 2015 by the Deputy Minister of Mineral Resources, Mr Molefe Oliphant. Mr Oliphant was impressed by the management of the Biobank and expressed interest in the storage and retrieval of data. The South African National Defence Force's (SANDF) Phidisa Management visited in April 2015 as part of a continuous evaluation on how their specimens are stored and protected.

BIOBANK MEMBERSHIP

The NHLS remains a member of the International Society of Biobanking and Biorepositories (ISBER) on which it is represented by Mr B Duma, and is part of the two working groups of ISBER. It is also active in the European, Middle Eastern and African Society for Biopreservation and Biobanking (ESBB) as part of the African Working Group. Mr Duma presented at an ESBB meeting in London in 2015 on *Managing and transportation of large-scale specimen in the Biobank*. The president of the ESBB, Mr Erik Steinfeld from the Netherlands, visited the facility in February 2016 to observe how specimens are stored and managed. He was impressed with the presentation and the professionalism of the Biobank.

NHLS Biobank is also part of the WHO Biobank Cohort Network (BCNet), of which the NHLS serves on the committee, with Mr B Duma as deputy chairperson. BCNet holds meetings annually in France in November and provides training to members on biobanking. The Biobank, through these biobanking societies, continues to uphold international standards.



Mr B Duma (Manager National Biobank) with
Mr E Steinfeld (President of the ESBB)



INFORMATION
SERVICES

Information Services is a support function for the NIOH, the National Cancer Registry (NCR) and the national Health Laboratory Service (NHLS), and acts as a gateway to occupational health information, not only for the organisation, but also for external patrons. Information Services encompasses South Africa's national reference library for occupational health (AJ Orenstein Memorial Library); a query-handling service providing technical and scientific information on occupational health to practitioners throughout South Africa, southern Africa and internationally; an archive, which is aimed at fully documenting and preserving the character and identity of the organisation and providing evidence of the historical development and changes of the organisation over time; and the institutional repository, which is a digital collection of the organisation's intellectual output. Moreover, in providing seamless and consistent access to information resources (electronic and print) throughout the NHLS to support and enable researchers to conduct world-class and innovative research, Information Services expanded its offerings to include the libraries of the National Institute for Communicable Diseases (NICD) and the NHLS (formally known as the SAIMR Library), located in Braamfontein, and serve the needs of all NHLS staff, including those located in laboratories, and the eight medical schools throughout South Africa.



Head: Ms Angel Mzoneli

SERVICES

Information Services supports the promotion of good occupational health practice by offering its knowledge and information to all stakeholders, both internal and external. Its mission is to ensure 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 primary 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.

To achieve this, a wide variety of information resources is supplied. These include electronic databases and scientific periodicals and monographs – both in print and electronic formats. The NIOH Library, which deals exclusively with occupational health topics and is the only specialist occupational health reference library in South Africa, continued its principal function of searching, retrieving and disseminating information in support of occupational health services throughout South Africa and the SADC region. Through various library interventions, the skills needed to source information in occupational health were shared with occupational health professionals, university students, workers, management, health and safety representatives and labour union officials.

Information Services consistently received and responded to requests for technical and scientific information on occupational health issues through its query-handling service. These queries came through the 'info mailbox', which is linked to the organisation's website, and were captured on the query ticket system, ensuring a 24-hour turnaround time. Among others, the queries concerned:

- Requests for information, training and guidance on occupational health topics, such as asbestos (e.g. regulations governing the removal of asbestos and how to register as an asbestos contractor, etc.)
- Information on training interventions offered by the institute
- Information on autopsy services offered by the NIOH to ex-miners
- Information held by the Medical Bureau for Occupational Diseases and outcomes on applications for compensation of second-degree benefits
- Information on occupational health studies offered by the NIOH
- Requests for risk assessments or occupational hygiene surveys
- Assistance requested by university students for research guidelines.

Queries received and responded to came from a wide range of people and organisations, such as university students, government departments, private industry, construction and mining companies, occupational health practitioners, doctors, and academic institutions. To emphasise the national and international role played by Information Services, it is important to note that queries came from all nine provinces, as well as other countries such as Zimbabwe, Mozambique, Botswana, India, the USA, China, the Democratic Republic of Congo, Australia and many more that were not indicated by the requestors. The NIOH Library and the Query Handling Service combined received 875 queries and successfully answered 860 during the year.

In expanding the library collections, 29 journal titles were subscribed to, of which ten dealt with occupational health topics. In support of research activities and ease of access to full-text scientific journal articles, the libraries obtained a free trial to access the Medline Complete database (EBSCO Health), which provides full-text access to over 2 400 medical journal titles. Open-access electronic resources/databases were also added to the library collection, which researchers can access through the library page on the intranet. Information Services continued to provide researchers with the necessary literature to carry out their research projects. A total of 27 scientific papers, published by NIOH researchers, was uploaded onto the website. Information Services also disseminated 20 publication summaries from the research output to regional occupational health co-ordinators and other occupational health practitioners in South Africa.

To commemorate world health events, the libraries put on displays/exhibitions to create awareness of various themes, e.g. World TB Month, World Aids Day, National Science Week and Cancer Awareness Week, and of the various library resources available in support of those themes.

One of the highlights was the successful relocation of the NICD library from the PRF Building in Sandringham to the NIOH Resource Centre. Whilst housed at the NIOH Resource Centre it continues to provide a vital service (sourcing and dissemination of information and providing training on use of databases for e-resources) to the NICD community.

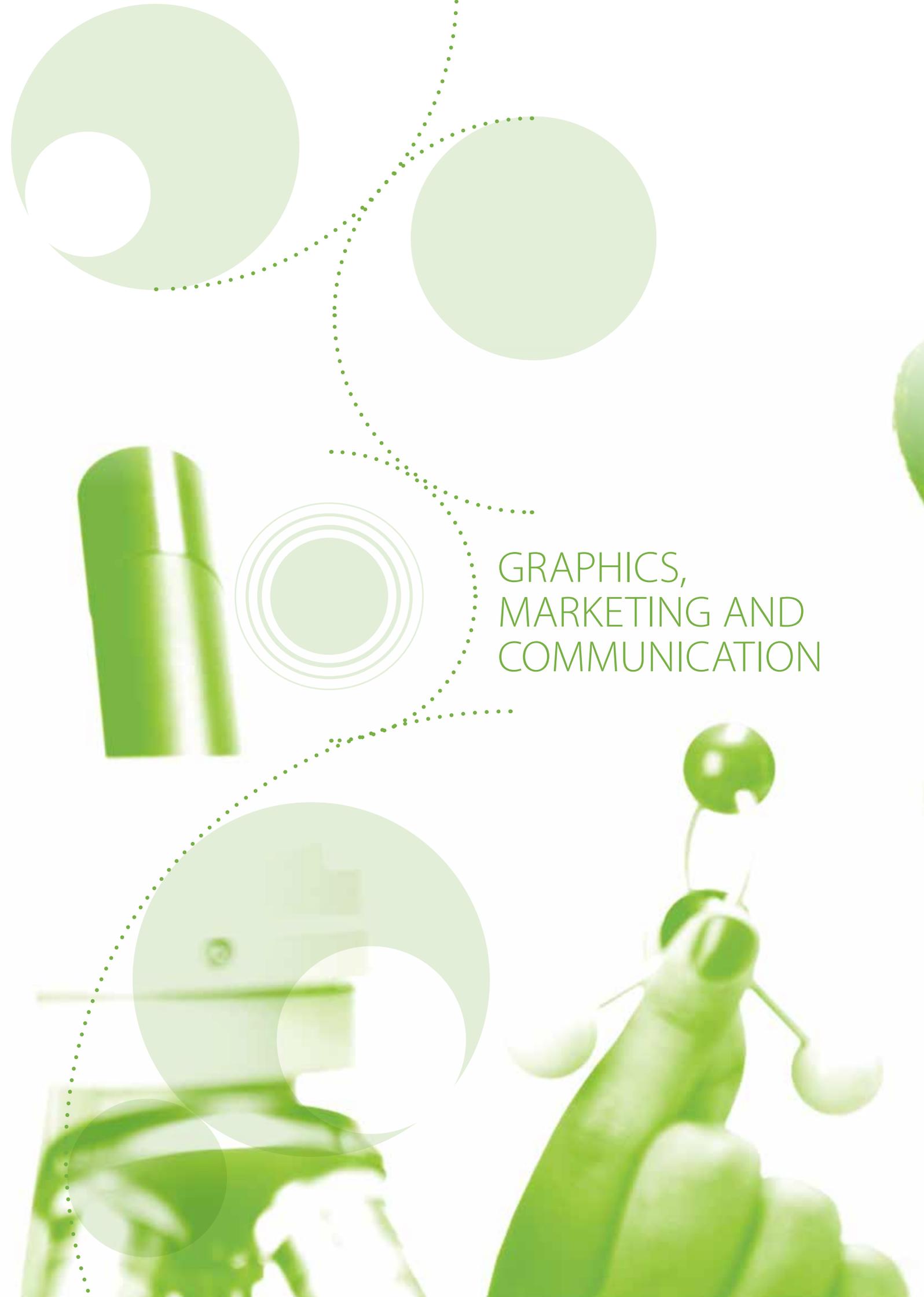
TEACHING AND TRAINING

In fulfilling its teaching and training function, Information Services delivered a lecture on sourcing occupational health information to Master's in Public Health students from the University of the Witwatersrand. Four students from the University of Fort Hare and one from the University of Limpopo were hosted in an experiential learning programme. 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 training to new employees and interns on information search tools, such as TDNet, a portal for electronic journals. Staff from various sections were trained in the use of the query ticket system. The training covered topics relating to capturing and responding to queries. Information Services also held library orientation sessions for occupational health nurses, registrars, officials from provincial government departments, health practitioners, university students and international visitors.

PROFESSIONAL DEVELOPMENT

Staff in the section attended various training interventions and workshops to enhance their skills in sourcing information and carrying out their work, e.g. InMagic, Open Access (OA) Statement Workshop and the Resource Descriptive Access (RDA) Workshop. Other in-house skills development courses that were attended by staff members included Excel 1, 2 and 3, PowerPoint, Project Management, Mentoring and Coaching and Customer Care.

Postgraduate degrees completed: 1 (Bachelor of Arts Honours in Information Science at the University of South Africa)



GRAPHICS,
MARKETING AND
COMMUNICATION



Manager: Mrs Shanaz Hampson

The Graphics, Marketing and Communication Section provides a support function to the NIOH and the NHLS. In addition, the section contributes marketing and graphics assistance to the National Cancer Registry (NCR) where necessary. Its primary objectives are the promotion of good occupational health and safety together with the development of human resources and networks in the Southern African Development Community (SADC) region through international training and outreach programmes. The section co-ordinates training programmes of the NIOH, organises programmes for visitors, and provides an event management, marketing, communications, public relations and graphic design service internally and externally, locally and internationally. The section also manages and co-ordinates the NIOH Programme for Continuing Professional Development (CPD) through the Health Professions Council of South Africa (HPCSA), and provides support to the NIOH's OHS Training Unit.

In 2016, the NIOH celebrates 60 years of a rich history that has contributed to the promotion of healthy, safe and sustainable workplaces through cutting-edge research, service delivery and training. Looking ahead, the institute plans to contribute more to supporting efforts related to inequality at work by addressing the decent work deficit in the country. During the next reporting cycle, the NIOH will be hosting many celebratory events. The focus of the anniversary is an imperative of the NIOH in support of all efforts to nurture a culture of sustainable prevention of occupational injuries and diseases as well as non-communicable diseases that may be exacerbated by conditions at work. "Important areas that will require more attention relate to gender concerns at work; workers who may be considered more vulnerable including migrant workers, subcontracted workers and workers with disabilities. The NIOH plans also to take a lead in establishing a service to assist professionals with ethical considerations in occupational health and safety"².

SERVICES

During the reporting period, section staff contributed to the management and provision of content for the websites of the NIOH, NCR, and NHLS's Biobank, as well as the NHLS intranet. The website platforms serve as robust information dissemination portals, and the section continued to ensure consistency of content, layout and design, both in alignment with the corporate identity of the NHLS as well as through the activation of topical content for all stakeholders. In consultation with the Executive Director, the section identified the need for a thorough redesign and development of the NIOH website in the next financial year. The purpose of this project is to enhance the brand identity and position the institute's website portal as a 'touch point' providing quality OHS information dissemination. This will be done through topical website content and quick access to toolkits and information fact sheets – thereby enabling focused, tailored communication to stakeholders. The section also plans to increase its capacity through the hiring of an editorial specialist. The position has been profiled and advertised with interviews taking place early in the next financial year.

The section staff are also members of the NHLS Communications Forum and attended meetings, which brought together communications representatives from the NHLS, NIOH and NICD to develop and implement an integrated communications and marketing strategy across the NHLS. The aim of these meetings is to share experience and knowledge, and to ensure that the communications and marketing methodologies employed are aligned with the corporate strategies and meet the organisational strategic and operational goals. In addition, section staff are members of the Public Relations Institute for South Africa (PRISA).

The Pathology Division, with marketing and events management support and assistance, provided training to Doves Funeral Services for the training of 11 mortuary staff on *Safety, procedure and policies related to cardiorespiratory organ removal in the mortuary*. The training took place from 9–10 June at Doves Funeral Services in Rustenburg, North West. The training covered the following topics: a short history of mortuary workers and prosectors; mortuary procedures; Chapter 1 of the Human Tissue Act, 1983 (Act No. 65 of 1983); mortuary functions, procedures and the role of the prosector/mortuary worker; confidentiality; infections and the use of disinfectants in the mortuary; personal protective equipment (PPE); the Occupational Disease in Mines and Works Act, 1973 (Act No. 78 of 1973); removal of cardio respiratory organs; fixatives and the preservation of respiratory organs; and dispatch of respiratory organs to the NIOH.

² Extract from an Article published in the *Mining Prospectus*, Issue 25, December 2015, Cape Media ISSN 2225-871X

The section provided marketing and communications support to Dr E Singh (Acting Head: NCR) regarding the NCR exhibition focusing on cancer registration, which took place at the African Union Summit during the first quarter of the financial year. The NCR was invited to participate and exhibit at this summit and Mrs S Hampson provided assistance with the generation of promotional/educational materials and advice regarding the best way to position the NCR brand for this type of meeting.

In addition, the section contributed to the project management of the NHLS Biosafety Biosecurity induction video project, in collaboration with SHE Department. This project was funded through Metabiota in the USA. The SLA was finalised on 27 May 2015 and the service provider met with the international subject matter expert, Ms L Crawford (Sandia Laboratories, USA), in June to devise content for scripting. These videos will be in line with local and international legislation and good practice, and are necessary to provide industry-specific occupational health and safety orientation and induction for various audiences, including NHLS staff, laboratory managers, security personnel and external visiting guests and contractors.

The film shoot was completed within the five-day timeframe during the last quarter of the period under review. The production office has begun the editing and translation/voice over process and will revert back to the SHE and Communications units prior to finalisation. The intention of the project is to create professionally produced training material that can be accessed via computer, DVD and/or the intranet at each of the NHLS facilities.

During the period under review, the section, together with the Information Services Section, developed design concepts and ideas for the first permanent fixed exhibition on the NIOH premises. This exhibit earmarks and delineates the NIOH's 60 years of existence through a historical look at its past and present and also looks ahead to the future. The planning team is working with Ms R Keene from the University of the Witwatersrand, who has extensive curator and archival exhibition experience, as well as Mr M Sinoff who has been contracted to build the physical structure and layout of the exhibit. The exhibition will be launched in the new financial year.

Section staff assisted with poster design and preparation as well as the design of marketing materials for NIOH staff attending both local and international conferences and events. These included: The 31st International Commission for Occupational Health (ICOH) Conference, in Seoul Korea; the 58th American Biological Safety Association Conference (ABSA) in Providence, Rhode Island, USA; the 7th International Symposium on Nanotechnology, Occupational and Environmental Health in Limpopo, South Africa; the African Union Summit in Polokwane, South Africa; the inaugural Pathology Research and Development (PathRed) Congress in Kempton Park, Johannesburg; the NIOH Biennial Research Day in Johannesburg, South Africa; and the Public Health Association of South Africa event in Durban.

MARKETING AND STAKEHOLDER RELATIONS

Stakeholder engagement provides opportunities to further align business practices with societal needs and expectations, helping to drive long-term sustainability and value. This engagement is intended to help public and occupational health practitioners and specialists to fully realise the benefits of stakeholder engagement in their organisations, and to compete in an increasingly complex and ever-changing business environment, while at the same time bringing about systemic change towards sustainable development.

On 3 September 2015, the NIOH hosted its biennial Research Day. The day was opened by NHLS CEO, Mrs Joyce Mogale, and was well attended by OHS colleagues from universities and technikons, the government departments of Health and Labour, the Chamber of Mines, the Mine Health and Safety Council, and industry partners (both public and private). The NIOH has been involved in research since its inception and many prominent publications have arisen as a result. The Research Day provided young researchers within the institute with an opportunity to showcase their projects.

Keynote addresses were given by Prof. Leslie London (Head of the Division of Public Health Medicine – University of Cape Town) on *Ethics in Research* and Prof. Lindiwe Zungu (Department of Health Studies – UNISA) on *Women and Health: Gender concerns in Occupational Health*. Dr Babatyi Malope-Kgokong (NHLS AARQA) provided an inspiring talk to young researchers on *NHLS Support for Research*.

Fourteen researchers did oral presentations of their work and a further 15 showcased posters on the day. Positive feedback was received from participants and stakeholders with many stating that it was a very informative event where opportunities for future collaboration exist. Creation and optimal utilisation of new knowledge through research provide excellent opportunities to make a significant impact on OHS in the world of work.

Staff in the section, with support from the OHS Training Unit, were responsible for co-ordinating and arranging visits by key stakeholders, to re-establish links and initiate new collaborative endeavours. During the reporting year, meetings were held with representatives from the Medical Bureau for Occupational Diseases (MBOD); the Department of Labour and the Compensation Commissioner; provincial occupational health co-ordinators; the Chamber of Mines; the Organisation for Economic Co-operation and Development (OECD); National Institute for Occupational Safety and Health (NIOSH) CDC, USA; the International Atomic Energy Agency (IAEA); the World Health Organization (WHO); the International Labour Organization (ILO); the Finnish Institute for Occupational Health (FIOH); the Gender Research Alliance; the Mine Health and Safety Council (MHSC); the American Society for Tropical Medicine; the Organisation for Applied Scientific Research (TNO, Netherlands); the Self-employed Women's Association (SEWA); the Asia Monitor Resource Centre (AMRC); the Railway Safety Regulator (RSR); the Asbestos Relief Trust (ART) and Kgalagadi Relief Trust (KRT).

The section, in collaboration with the OHS Training Unit, also co-ordinated visitor programmes for occupational health nursing students from the University of the Witwatersrand and from industry; Diploma in Occupational Health doctors from the University of the Witwatersrand School of Public Health and the University of Pretoria School of Health Systems and Public Health; undergraduate students from the a Physiology and Environmental Student Society, University of Limpopo; a visiting academic from Brazil; officials from the City of Johannesburg Municipality; and senior colleagues from the RSR who visited to discuss NIOH involvement in OHS training facilitation and the provision of assistance for the identification of hazards and risks associated with each job category per industry within the railway industry. The NIOH will develop MoUs with each of the entities for this service provision.

Special presentation sessions were given to NIOH staff by visiting academics on a variety of topics, including *Experiences in Cancer Control from Australia: Lessons for South Africa* – Professor Freddy Sitas (an event in collaboration between the National Cancer Registry and the Carnegie-Wits Alumni Diaspora); *Occupational Health and Safety in Brazil* – Prof. Carlos Tietbol, occupational medicine specialist (Pulmonology and Tisiology), Brazil; *Antiretroviral therapy uptake among eligible co-infected patients at integrated and non-integrated healthcare facilities* – Dr Ledibane, Sefako Makgatho Health Sciences University and *Strategies to assess exposure to nanoparticles* – Dr Derk Brouwer, Chair in Occupational Hygiene, School of Public Health, University of the Witwatersrand.

INFORMATION DISSEMINATION

The section dealt with a number of queries from the media and occupational health professionals from various industries, both public and private, for printed and audio-visual marketing materials and technical and scientific information on a variety of occupational health-related issues. These queries were taken from the website or were sent directly to the section.

Staff continued to foster online links with the web platforms of many occupational health-related organisations and societies, allowing the NHLS and NIOH to act as a single entry point for these information resources.

Direct marketing and information dissemination were undertaken through advertising and editorial placements in the *Debate Journal*, *Mining Prospectus* and the *Occupational Health Southern Africa (OHSA) Journal*.

LOCAL AND INTERNATIONAL COLLABORATION IN OCCUPATIONAL HEALTH

Together with other sections at the NIOH, collaboration, networking, and the fostering and maintaining of links with international organisations were maintained. These included the WHO, ILO, the International Commission on Occupational Health (ICOH); NIOSH-CDC, USA, the FIOH, the Health and Safety Laboratory (HSL) of the UK, Sandia Laboratories, USA as well as local societies and stakeholders, namely the national and provincial departments of health, the departments of Labour and Mineral Resources, the South African Society of Occupational Medicine (SASOM), the African Regional Association for Occupational Health (ARAOH), the South African Society of Occupational Health Nurses (SASOHN), the Mine Medical Professionals Association (MMPA), the Gender Research Alliance, academia, union representatives, employers, employees, and public and private sector groups.

The NIOH's commitment to the concept of decent work and the protection and promotion of workers' health continued, with the NIOH hosting an *Ethics in OHS* seminar at the Sunnyside Park Hotel in Parktown Johannesburg during the second quarter. The seminar focused on the enabling role of ethics in OHS and was well received by the 85 delegates in attendance, 56 of whom were from various OHS industries (both public and private), trade union federations and universities. The remainder constituted senior staff members from the NIOH.

Speakers who delivered presentations included Prof. Leslie London (UCT), Prof. Rodney Ehrlich (UCT), Ms Claudina Nogueira (Board member, ICOH), Dr Murray Coombs, Dr Cas Badenhorst (Anglo American), Mr Eric Gcilitshana (NUM) and Mr Charles Mbekeni (Chamber of Mines). The speakers presented on topics including:

- Ethics in OH
- An overview of the ICOH international code of ethics and changes in the 2014 version
- Ethics in OH practice relating to SASOM guidelines
- OHS clinical services – perspective from workers on challenges and possible solutions
- Code of ethics for SAIOH
- Ethical dilemmas in OHS.

Two panel discussions took place on *Ethical Challenges in the African Context* and *Ethical Challenges in Compensation*. Both topics stimulated healthy discussion and debate amongst delegates. It was noted that a broader ethical discussion needs to occur with DoH policymakers and all disciplines of OHS. The NIOH has noted that more seminars on ethical challenges and concerns are required and much more in-depth discussion and debate needs to occur across OHS disciplines. A future seminar is planned for 2016. Following from this seminar, Ms S Hampson and Prof. JI Phillips (Pathology Division), in collaboration with Ms L Meadon (Manager: e-Learning Centre for Learning and Teaching Development at the University of the Witwatersrand) proceeded with the conceptualisation, storyboard and mapping of a mobile application that is being developed for the NIOH by the university. This ethics tool can be used by OHS professionals who may have ethical challenges or queries. A panel of ethics experts will then be given access to the application to answer any questions posed by the OHS professionals. The 'app' is in its concept stages at present and the NIOH hopes to launch it in the new financial year as part of the 60th anniversary celebrations.



Speakers at the Ethics Seminar. Left to right: Dr Charles Mbekeni, Mr Eric Gcilitshana, Prof. Rodney Ehrlich, Dr Murray Coombs, Dr Sophia Kisting, Ms Claudina Nogueira, Prof. Leslie London and Dr Cas Badenhorst

In an effort to improve the safety of prosecutors and mortuary workers, and raise awareness of possible exposure to certain diseases, a training course outlining the legislation, health hazards and effects of working in a mortuary as well as the removal of cardio-respiratory organs was devised by the Pathology Division. The training was held during June 2015 titled *Safety, procedure and policies related to cardio-respiratory organ removal in the mortuary*. The primary objectives of the course were to inform prosecutors, and mortuary workers on the procedures, policies and preservation of tissue or organs, with reference to the Human Tissue Act; to facilitate discussions on the removal of cardio-respiratory organs in terms of the Occupational Diseases in Mines and Works Act; and to provide information on good practice mortuary technique.

In supporting the need for a greater focus on gender concerns in the workplace, the NIOH launched the Gender, Health and the World of Work Programme during the fourth quarter. This NIOH programme has the involvement of staff from all sections of the NIOH. The intention of this initiative is to assist with mainstreaming gender concerns in the world of work in South Africa, thereby contributing to the realisation of decent work for all. The launch event marked the beginning of a quest to bring the Sustainable Development Goals (SDGs) of health, decent work, gender equity, youth employment and sustainable economies to the forefront of occupational health in South Africa. In addition, the programme aims to facilitate a greater gender responsive approach in workplaces, including the informal economy, by collaborating with various stakeholders and role-players in workplaces in different sectors of the economy and in institutions of higher learning. The NHLS CEO, Ms Joyce Mogale, opened the ceremony alongside the NIOH's Executive Director, Dr Sophia Kisting, who emphasised the need for engagement between workers and their trade unions, employers, and different government departments engaged in the world of work.

Dr Kisting stressed that “new workplace knowledge in the form of research is fundamental to help prevent occupational injuries and diseases. New knowledge which is gender informed helps inform policy and practice in public health, in surveillance as well as the development of OHS services. It is also an investment in the future and promotes equity at work. Similarly, well targeted gender-informed OHS training and good OHS service delivery in the public and private sectors can result in the reduction of absenteeism, greater sustainability of workplaces and ultimately the sustainability of economies. Above all, it engenders respect and the protection of human rights at work”.

Keynote speakers for the day included ILO specialists on Gender and Occupational Safety and Health, Mwila Chigaga and Franklin Muchiri, respectively; the Department of Labour's Director of Health and Hygiene, Milly Ruiters; the Department of Mineral Resources' Director of Occupational Medicine, Duduzile Lekoba; the Programme Manager and Regional Co-ordinator for the Swedish Workplace HIV/AIDS Programme, John Viner and Jacob Graaf, respectively; the Director of the Gender Research Alliance, Grania Mackie; a legal advisor from the Commission for Gender Equality, Masilo Lesoalo; and the Governance and Gender Justice Manager from Gender Links, Mariatu Fonnah. Keynote speakers covered various aspects of gender responsiveness in the world of work, from the legal frameworks and industry-specific challenges, to the implementation of pilot projects and audit tools on gender.

Towards the end of the financial year, the Gender Research Alliance was commissioned to audit gender and disability in the workplace at NIOH. This audit is an ILO-based participatory audit to facilitate the mainstreaming of gender responsive practices in the NIOH workplace and in the institute's OHS work, and to facilitate alignment with the SDGs.

During the last quarter of the financial year, the NIOH, in collaboration and consultation with the DoH, hosted a consultative meeting with OHS professionals from across South Africa to examine and discuss the role of an effective National Occupational and Environmental Health Institute in the establishment of the National Public Health Institute of South Africa (NAPHISA).

Executive Director of the NIOH, Dr Sophia Kisting, commissioned a Concept Paper to review the character of occupational health and safety systems (OHSS) around the world, with a view to appropriately extracting system elements representing best practice. The Concept Paper was drafted by Prof. Jonny Myers and has been revised following comments. The Concept Paper also considers the role of the NIOH, because in the poorly resourced area of occupational health and safety, the institute is an important component for future development of an effective OHSS.

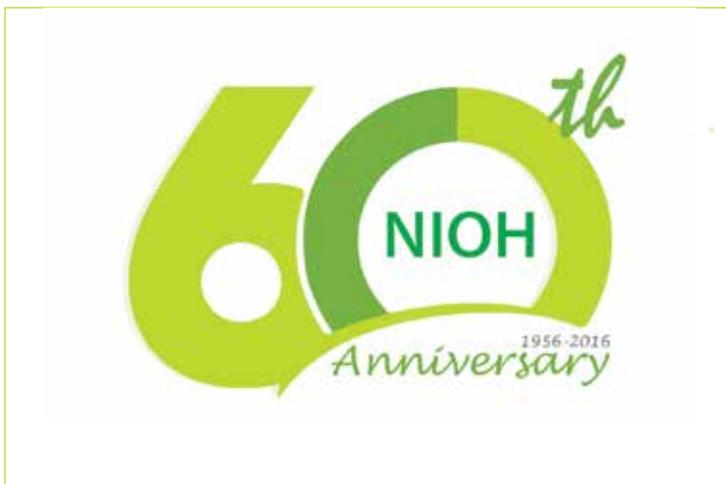
It is hoped that the Concept Paper will stimulate discussion about a future OHSS in South Africa. A copy of the paper can be accessed via: <http://www.nioh.ac.za/?page=topical&id=13&rid=655>



Prosecutor training at Doves Funeral Services



NIOH Research Day. Dr Kisting (Executive Director of NIOH) with Mr Tibor Szana (Chief Inspector for DoL)



NIOH 60th logo designed by the Graphics, Marketing and Communications Section in consultation and collaboration with NHLS Communications Unit



Some of the speakers at the Launch of the NIOH Gender, Health and the World of Work Programme. Left to right: Ms Milly Ruiters (DoL), Mr Franklin Muchiri (ILO), Dr Sophia Kisting (NIOH Executive Director), Ms Duduzile Lekoba (DMR), and Ms Mwila Chigaga (ILO)



INTERNATIONAL
LIAISON

OUTREACH TO THE SADC AND AFRICAN REGION

The NIOH played a major role in providing occupational health technical support to the Southern African Development Community (SADC). Laboratory and clinical support was provided as well as training on occupational health-related matters such as exposure sampling and medical surveillance. Activities included assessing lead exposure in children in Malawi and analytic support to Ghana. The HIV/TB Unit, in collaboration with Zimbabwe, Mozambique, Mpumalanga Provincial Department of Health (DoH), International Labour Organization (ILO) and University of British Columbia (UBC), continued plans to implement healthWISE.



Manager: Dr Tanusha Singh

INTERNATIONAL COLLABORATION IN OCCUPATIONAL HEALTH

Ms M Vetten attended the Manufactured Nanomaterials Technology Workshop for the African Region, held at Cresta Golfview Hotel in Lusaka, Zambia, from 16–17 April 2015. The workshop was funded by the Government of Switzerland and implemented by the United Nations Institute for Training and Research (UNITAR) in conjunction with the Government of the Republic of Zambia, through the Zambia Environmental Management Agency (ZEMA). Mr James Mulolo attended from the Africa Institute (Basel and Stockholm Conventions Regional Center), which is a centre hosted within the Department of Environmental Affairs. Ms Vetten made two presentations on behalf of the Organisation for Economic Co-operation and Development (OECD), entitled: *OECD Work on Chemicals and on Manufactured Nanomaterials* and *Safety Testing and Risk Assessment of Manufactured Nanomaterials*. Ms Vetten was appointed to the co-ordinating group of the Nano Network in Africa. The HIV/TB Unit provided training to Legal Aid South Africa in collaboration with the ILO on the Basics of HIV and TB. Dr K Wilson and Ms S Jack collaborated with the ILO to initiate a Gender Audit at the NIOH.

Prof. M Gulumian was invited to attend the 9th Congress of Toxicology in Developing Countries (9th CTDC) where she presented on *Safety of Nanomaterials today: Challenges for workers, consumers, and the environment* and also chaired a session on *New solutions for risk assessment of engineered nanomaterials*. In her capacity as the vice-President of the International Union of Toxicology (IUTOX), Prof. Gulumian also attended the Executive Committee meeting and participated in a strategy discussion related to the question *What is our mission and how can we accomplish these goals in membership and developing countries?* The Toxicology Section prepared a draft policy proposal on occupational and environmental health and safety for the World Medical Association (WMA) through the South African Medical Association (SAMA). The HIV/TB Unit, in collaboration with ILO, UBC, Zimbabwe, Mozambique and the Mpumalanga Provincial DoH discussed the possibility of implementing HealthWISE in two facilities in Mpumalanga.

Prof. Gulumian and Mr K Boodhia attended the NANOSOLUTIONS Joint Steering Committee and International Advisory Group Meeting at the Marina Congress Center, Helsinki. The objectives of the meeting were to explore the relevance of the project's scientific results and enable further dissemination of the results and impact of the project. As a participating collaborator in the Nanosolutions Consortium, Mr Boodhia attended the second Nanosolutions Consortium Review Meeting in Stockholm, Sweden. Mr Boodhia also attended the Exploitation Strategy Seminar, hosted by the Nanosolutions Consortium, in Barcelona, Spain from 17–18 February 2016. Topics at the seminar included *Information on potential exploitable or commercial outputs, How to pitch exploitable results, and Achieving project goals*.

Other key highlights include the 7th International Symposium on Nanotechnology, Occupational and Environmental Health, which the NIOH Toxicology Section hosted together with the Toxicology Society of South Africa (ToxSA) from 18–22 October at the Legends Safari Resort in Limpopo. This was a significant event for OHS globally and the NIOH is proud to have hosted the event and to collaborate with the Department of Science and Technology and several international organisations. The aim is to provide a platform for presentation of generated knowledge, through targeted research, on specific and relevant nanotechnology issues pertaining to occupational health, safety and the environment. The NIOH also hosted Dr M Kamouchner, a pathologist at the Department of Pathology at the Acicenne University Hospital in France, and Ms O Macchi, a sociologist and a member of the European Research Council Silicosis Project team at Science Po University, Paris. Their visit to the NIOH Pathology Division was to discuss continued collaboration between France and South Africa. Prof. CNT Filhlo, a Pulmonologist and Occupational Medicine Specialist from Brazil, visited the Pathology Department to discuss occupational exposure to grain dust, silica and asbestos.

WORLD HEALTH ORGANIZATION (WHO)

The NIOH was designated as a WHO collaborating centre in occupational health for a further cycle. Progress on priority activities was communicated to WHO via the Annual Progress Report 2014–2015. Dr S Kgalamono represented the NIOH at the WHO Collaborating Centres meeting in Jeju Island, South Korea. She chaired a session on *Integration of occupational health training at primary care level*. Prof. Gulumian, Dr N Sanabria, Ms C Andraos and Dr P de Jager finalised the WHO report entitled *Health surveillance of nano-workers*. The team also finalised and submitted a document entitled *Development of systematic evidence review for WHO guidelines on protecting workers from potential risks of manufactured nanomaterials*. Prof. Gulumian was invited to attend the first meeting of the WHO Chemical Risk Assessment (CRA) Sub-network of Developing Countries, from 2–4 December 2015, in Bangkok, Thailand. The meeting provided a forum for developing country CRA Network members and candidate members to meet, exchange information and collaborate on topics of mutual interest. Tools developed by WHO and other international organisations for chemical risk assessment in developing countries were also promoted.

INTERNATIONAL STANDARDS ORGANIZATION (ISO)

The document ISO/PDTR 19057 entitled *Nanotechnologies – Use and application of acellular in vitro tests and methodologies to assess nanomaterial biodurability* was submitted for discussion. Mr Boodhia, Ms Vetten and Prof. Gulumian addressed comments received on the ISO/TC New Item Proposal entitled *The use of label-free impedance technology to assess the toxicity of nanomaterials in vitro*.

ICOH CONGRESS

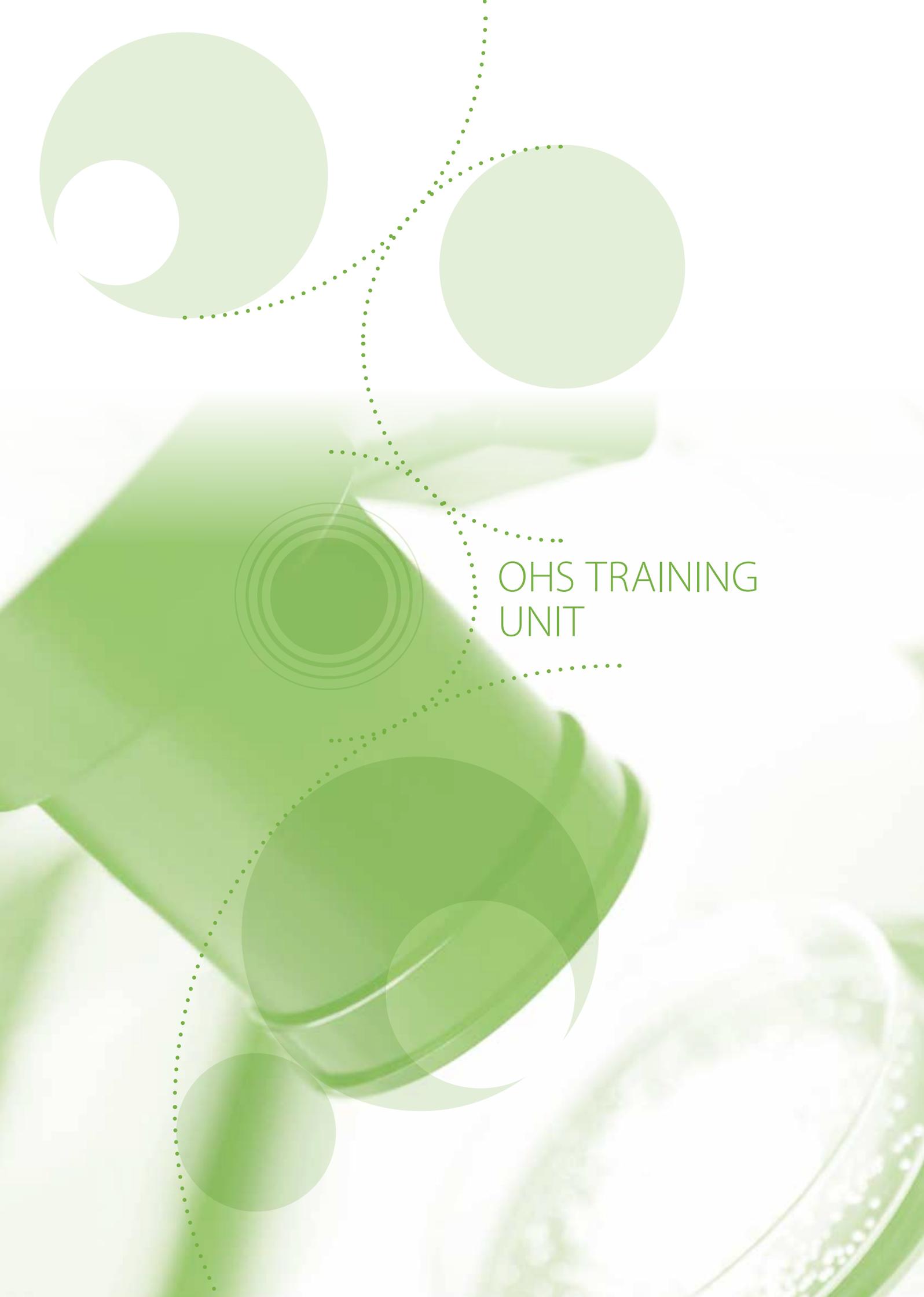
Thirteen staff members presented at the ICOH Congress in South Korea and several attended and contributed to scientific and business meetings. Prof. Gulumian was invited to make presentations entitled *Introduction to Nanotechnology, Nanomaterials, and Nanotoxicology* and *What we know and what we don't know about Nanotoxicology*. She also contributed to a course organised by Kangho Ahn (Hanyang University) and Il Je Yu (Hoseo University) and sponsored by the Nanotechnology Research Association, Korea Standards Association, Korea Evaluation Institute of Industrial Technology (KEIT), Ministry of Trade, Industry and Energy, National Research Foundation of Korea and the Korea Occupational Safety and Health Agency. Dr Singh was appointed to the Indoor Air Quality Scientific Committee and to the Working Group for Occupational Infectious Diseases.

THE ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)

As the Head South African delegation, Prof. Gulumian was invited to make a presentation entitled *Dissolution and Biodurability of Nanomaterials*. Steering Group 8 (Exposure Measurement & Mitigation) of the OECD Working Party on Manufactured Nanomaterials (WPMN) conducted a number of important projects regarding exposure assessment, exposure mitigation, and waste disposal of nanomaterials. This workshop therefore provided an opportunity to share knowledge of SG8 activities and discuss the outlook on the assessment of occupational, consumer and environmental exposure of nanomaterials, as well as exposure mitigation strategies. Prof. Gulumian attended two meetings in Paris, France: Seminar on Risk Assessment and Regulatory Programmes for Nanomaterials and the 15th OECD WPMN Meeting. The launch of a public website to communicate the results of the testing programme including the publication of dossiers (the dossier on gold nanoparticles was prepared by the NIOH Toxicology Section) was discussed. The Toxicology Section completed the OECD Consumer and Environmental Exposures to Manufactured Nanomaterial Survey.



NIOH staff at the ICOH Congress in Seoul, Korea. Left to right: Mr D Jones, Dr T Singh, Ms O Matuka, Ms M Malotle, Dr S Kgalamono and Mr G Sekobe



OHS TRAINING
UNIT



Head: Mrs Inakshi Naik

The Occupational Health and Safety (OHS) Training Unit was established in January 2012 and was managed by Mrs I Naik until her retirement in December 2015. Mr D Afrika (NIOH Pathology Division) subsequently took on the role and has managed the Workplace Skills Plan (WSP) for the NIOH and assisted with internal capacity development. The Training Manager position has been advertised but not yet filled.

The unit provides specialised training services to support the practice of occupational and environmental health within the private and public sectors. As its core function, it is responsible for building capacity in the country through a variety of training programmes in occupational health. The training done by the unit primarily targets occupational health professionals through seminars, workshops and lectures. Also included in the training are continuing education and supplementary courses aimed at maintaining and developing professional skills. Many of the training events are Continuing Professional Development (CPD) accredited through the Health Professionals Council of South Africa (HPCSA). Ms S Hampson, Graphics, Marketing and Communication, provides logistic support and manages the CPD accreditation for the training as well as the generation of certificates.

The unit also provides support to Graphics, Marketing and Communications in managing events and the hosting of visitors.

CAPACITY BUILDING INITIATIVES IN OCCUPATIONAL HEALTH

The following training courses were conducted during the period under review:

ILO CXR: International Labour Organization Classification of Radiographs of Pneumoconiosis Training

The Occupational Medicine Section hosted three one-day training courses on ILO CXR during the period under review. The workshop is intended to assist occupational medicine practitioners in recognising radiological changes due to mineral dust and to understand the International Labour Organization (ILO) Classification of Radiographs of Pneumoconiosis. It includes both theoretical and practical aspects and use of the ILO Classification System. The workshop deals mainly with parenchymal abnormalities (small and large opacities), pleural changes, and other features associated, or sometimes confused, with occupational lung disease.

In total, 20 doctors from the MBOD Certification Committee, Harmony Gold Mining Company, Eskom, Anglo Gold Ashanti, Shanduka Coal as well as NIOH registrars attended the training. The training was conducted by Prof. D Rees and Dr S Kgalamono from the Occupational Medicine Division, with logistic support from Mrs I Naik and Ms S Hampson.

The training course was submitted by Ms Hampson to the HPCSA and is approved for four CPD points.

Prosector – Mortuary Techniques Training

On 9 and 10 June 2015, training was given by the Pathology Division entitled *Safety, procedure and policies related to cardio-respiratory organ removal in the mortuary*. In total 11 mortuary professionals and prosectors attended the course at Doves Funeral Services, Rustenburg. Ms Hampson provided event management support and advice to the division.

Asbestos Identification and Counting in Bulk Materials Training Course

In a collaboration between the NIOH Occupational Hygiene and Pathology sections, a two-day training course on the identification of asbestos and fibre using Phase Contrast Microscopy (PCM), and the identification of asbestos in bulk material samples using Polarised Light Microscopy (PLM) and X-Ray Diffraction (XRD) was held at the NIOH from 12–13 August and again from 2–3 December 2015.

The workshop module was interactive and included practical sessions giving students the opportunity to demonstrate their newly acquired skills. Participants were introduced to:

- Setting up a PCM
- Clearing and mounting filters
- Applying the MDHS 39/4 and WHO/HSG248 counting rules
- Calculating asbestos exposures
- Quality assurance and proficiency testing schemes
- Sampling of asbestos in bulk materials

- Setting up a PLM
- Identification of asbestos fibres in bulk materials using PLM, based on MDHS 37 and NIOSH 9002.

The course was delivered by G Mizan, T Madzivhandila and J Phillips. Due to the interactive nature of the course as well as delegates requiring maximum time behind the microscope for competency, class sizes were limited to a maximum of eight delegates with six registering for the August course and four for the December course. The training was well received by delegates with most receiving competency certificates for accuracy of fibre counting.

Training of primary healthcare nurses in Fundamentals in Occupational Health

Mrs Naik conducted training to Primary Health Care (PHC) nurses on the *Fundamentals of Occupational Health*. The course was conducted at the Lillian Ngoyi Nursing College from 25–27 May 2015. Twenty-two PHC nurses studying towards a Diploma in Clinical Nursing Science, Health Assessment Treatment and Care attended the training. Mrs Naik gave all the lectures, except those on occupational asthma and allergies and an introduction to ergonomics. These were given by Ms A Fourie (Immunology and Microbiology Section) and Ms Busi Nyantumbu-Mkhize (Occupational Medicine Division) respectively. The training course was also conducted in Delhi, India, and attended by 35 nurses from various parts of India.

The need for such training was identified as part of the restructuring of PHC in South Africa due to the current shortage of occupational health nursing practitioners in the country. In addition, not all employers have on-site occupational health services. When an employee develops occupational ill health, the client may consult a healthcare worker at a PHC clinic. PHC nurses are not taught the basics of occupational health in their training and are thus not skilled in the identification of an occupational disease. PHC nurses who complete this course are better equipped to identify and manage occupational ill health. The financial burden of this ill health is then referred back to the employer rather than falling on the state, as is often the case. Through the early detection of disease the morbidity associated with occupational diseases can also be reduced, thereby decreasing the disease burden in the country.

The purpose of the training is to equip PHC nurses with the knowledge and skill necessary to take an appropriate occupational history and refer suspected occupational disease cases to the next level of referral, i.e. the district hospital. Their task is to have a high index of suspicion regarding work-related problems and knowledge of referral systems within the district. At the beginning and end of training, pre- and post-knowledge was evaluated. The criteria included knowledge in OH; role of nurses in OH; different groups of hazards and risk of exposures; adverse health outcomes due to exposures; occupational lung disease; asbestos and silica-related lung disease; noise induced hearing loss; occupational asthma and skin disease; taking an occupational history; knowledge on Acts and legislation governing OH; referral systems within South Africa; and compensation processes.

These training courses served as part of a larger funding proposal submitted by Mrs Naik to the Asbestos Relief Trust (ART) in July 2015 for the development of training material to train PHC nurses in Fundamentals in Occupational Health and Safety with a Special Focus on Recognition of Disease Caused by Exposure to Asbestos and Silica Dust. The analysis of evaluation for each pilot training showed significant improvement in knowledge in each criterion mentioned above. Most of the PHC nurses saw the course as an 'eye opener' and have now realised the importance of OH within the public health nursing sector. Funding for this proposal has been granted.

Accreditation of training materials

From the outcome of the pilot studies it was noted that the training could possibly be included as part of the curriculum within the Diploma in Clinical Nursing Science Health Assessment Treatment and Care course, currently offered by Chris Hani Baragwanath Nursing College. Negotiations in this regard commenced between Mrs Naik and Sister Gassiep, Head of the Rahima Moosa Nursing College. To enable this training, materials have to be aligned with South African Qualification Authority (SAQA) unit standards i.e. the design and the development of the learning material (SAQA unit standards 115755) and outcome-based assessment (SAQA unit standard 115753.) The materials have to be developed into both 'Student' and 'instructor' manuals together with 'Outcome-based assessments'. Currently the materials have been developed, delivered and facilitated by Mrs Naik and by subject experts from the NIOH.

Once the materials are developed into the 'Student' and 'Instructor' manuals they will be submitted to the relevant body for accreditation. Accredited materials can then be:

- Used to train PHC nurses at district level
- Incorporated into the Diploma in Clinical Nursing Science Health Assessment Treatment and Care curriculum, which is aimed at advanced PHC nurses
- Used to train nurses from Asian countries
- Used to train nurses from SADC counties.

On completion of the course, participants will submit a Portfolio of Evidence to qualify for a Competency Certificate, which will be jointly issued by the NIOH and ART/KRT.

OHTA W504 – Asbestos and other Fibres Training Module

The Discipline of Occupational and Environmental Health (DOEH) at the University of KwaZulu-Natal (UKZN), in collaboration with the NIOH presented the Occupational Hygiene Training Association (OHTA) Intermediate level training course on 23 September 2015. This course is a credit-bearing module that makes up the Certificate of Competence in Occupational Hygiene offered by OHTA and its international associations.

The DOEH is an accredited course provider for OHTA in Southern Africa and is one of the first in South Africa to offer the OHTA qualification modules. They have offered the foundation module and six intermediate modules since 2012 with excellent success – an average 85% pass rate for the *Measurement of Hazardous Chemical Substances* module, 90% pass rate for *Asbestos, Health Effects for Hazardous Substances* module and a 100% pass rate for the *Control and Ventilation* module.

DOEH-UKZN prides itself in presenting quality courses and is determined to identify and utilise the best specialist presenters for the various subjects.

This module covered many aspects of asbestos work, including legal compliance requirements for both Occupational Hygienists and Asbestos Contractors. Subjects covered included:

- Asbestos types and other fibrous materials
- Health hazards and exposure limits
- Asbestos in buildings and conducting identification surveys
- Asbestos risk assessment
- Asbestos abatement and demolition methods
- Air sampling techniques
- Asbestos fibre counting
- Asbestos bulk analysis techniques
- SA legislation for asbestos.

This collaborative endeavour was initiated by Mrs Naik who identified a need for OHTA teaming modules in the discipline of Occupational Hygiene. A memorandum of understanding was drawn up between DOEH-UKZN and the NIOH for the delivery of these modules, using subject matter experts and equipment on the NIOH premises.

Ethics in Occupational Health Seminar

Historically, adherence to the essential principles of OHS ethics has been of immense support to OHS professionals and helped towards greater prevention as well as more effective and efficient service delivery. In the ever changing, complex world of work, with the impact of globalisation on both developing and developed countries, it is more important than ever to support OHS professionals to adhere to the principles of OHS ethics.

With the above in mind, the NIOH hosted a one day seminar entitled *Ethics in Occupational Health and Safety (OHS): The Enabling Role of Ethics in OHS in the Quest for Decent Work and Good Service Delivery*, held on 18 August at the Sunnyside Park Hotel, Johannesburg. The seminar was attended by 90 occupational health physicians, nurses, occupational hygienists, ergonomists, scientists involved in occupational health research, professionals from other disciplines involved in OHS, trade unionists, employers and employees from the mining and other sectors of the economy. Based on positive feedback from stakeholders a follow-up seminar will be hosted in the new financial year.

This seminar was accredited by HPCSA for 12 ethics points.

STRATEGIC INITIATIVES IN OCCUPATIONAL HEALTH

Railway Safety Regulator (RSR) Pilot Training

The RSR approached the Occupational Medicine section in December 2014 to develop and deliver a training course for occupational health professionals (OHPs) employed in railway operations. The RSR identified gaps in training in railway operations and has since worked with NIOH to develop a comprehensive training programme.

Since the initial meetings with RSR representatives, the NIOH team has developed a five-day training programme covering aspects of OHS such as ergonomics; hazard and risk identification; medical surveillance; health effects of exposures; fatigue management and risk work; how to interpret a risk matrix; legislation; and injury on duty (IOD) management.

A pilot programme was conducted for RSR representatives from 19–21 October 2015 at the RSR Headquarters in Centurion, Pretoria. The training was attended by 22 invited doctors and nurses working in the railway industry. The feedback and evaluation from this pilot training

was positive in terms of the quality and content of the course material and presenters. A memorandum of understanding has been drafted between the NIOH and RSR and is currently with the NHLS and RSR legal departments pending Intellectual Property (IP) clarifications prior to the official launch and conducting of the series of training courses.

Mrs S Hampson assisted in having the training programme accredited by HPCSA for 29 points.

TRAINING SUPPORT AND CAPACITY BUILDING WITHIN THE NHLS

Workplace Skills Plan 2015/16

Each year, a training needs analysis is conducted to identify the main skills gaps and training needs that must be addressed to improve the NHLS' performance and achieve its business strategy. A Workplace Skills Plan(WSP)/Annual Training Report for 2015/16 will be compiled.

The WSP for the NIOH, which was due for submission to the Health and Welfare Sector Education and Training Authority (HWSETA) by the end of April 2015, was required by the Learning Academy of the NHLS. The facilitation, co-ordination and gathering of information from all the departments at the NIOH were done by Mrs Naik. She also successfully negotiated funding for the NIOH to meet the needs of the Training Needs Analysis (TNA). A final comprehensive spreadsheet was submitted to the Learning Academy at the end of March 2015. With Mrs Naik's retirement, Mr Afrika co-ordinated and compiled the new set of Personal Skills Plans (PSP) and WSP for the NIOH for 2016.

Training courses that were conducted for NIOH staff included topics such as customer service, time management and good laboratory practice (GLP), based on the OECD Principles of Coaching and Mentoring. In total, six training sessions were held in the last quarter of the financial year and 106 staff were trained (26 males and 76 females).

Mr Afrika liaised closely with Mr Molelle from the NHLS Training Academy throughout the last quarter of the year to ensure that NIOH staff were well trained and informed of the new Learning Academy requirements.

Wellness Talks

The first in the series of Wellness Talks, entitled *Maintaining Work-Life Balance* was presented by Ms G du Plooy from the Occupational Medicine Section to all staff on 21 April 2015. Ms Du Plooy is a registered psychologist and the talk focused on illustrating the wide range of factors affecting our work-life balance and personal happiness.

Risk Assessment and Respirator Fit Testing Training

The Occupational Hygiene Division conducted three training sessions with NHLS and NIOH staff on 14–16 July 2015. Topics included *hazard identification, risk assessment* and *respirator fit testing*.

Ms J Manganyi also presented a three-day workshop on *Respirator Fit Testing* to health and safety representatives within NHLS SHE Department from 2–4 February 2016, in Rustenburg.

Resource Allocation and Cost-effectiveness Analysis

On 6 October 2015, Dr P de Jager conducted a half-day training course covering health economics, statistics and evidence-based medicine. By the end of the training, participants should have had a basic understanding of the principles of conducting an economic evaluation in healthcare and what is involved in developing an economic model.

Health and Safety Representative (HSR) Training

On 27 October 2015, NHLS SHE staff conducted a half-day training session for NIOH staff on the *OHS Act, Safety Inspections and Checklists, Risk Assessments, Incident Reporting and Investigation and OHASIS* and *Medical Surveillance in the NHLS*. In total, 70 NIOH staff attended the training.

HIV and TB Workplace Programme

On 30 October 2015 staff from the HIV/TB Unit held a one-day seminar detailing the tools required for the design and implementation of an HIV and TB Workplace Programme, including activities appropriate to their workplace. In total, 29 NIOH and NHLS staff attended the training.

Burden of Disease Analysis

On 6 November 2015, Dr De Jager hosted a half-day workshop with NIOH staff on *Burden of Disease Analysis*. The aim of the workshop was to allow staff to gain a broad understanding of the methodological components of the burden of disease and how to interpret disease analysis. Topics included the calculation of healthy life expectancy for a hypothetical country. Participants were able to have a basic understanding at the end of the workshop on the principles of burden of disease studies and how to interpret key metrics.

2015/16 Publications List

BOOK CHAPTERS AND JOURNAL ARTICLES

1. Bunderson-Schelvan M, Hamilton RF Jr, Trout KL, Jessop F, Gulumian M, Holian A. Approaching a unified theory for particle-induced inflammation. In: *Biological Effects of Fibrous and Particulate Substances*. Chapter 3. Takemi Otsuki, Yasuo Yoshioka, Andrij Holian eds. Springer Japan. 2016; pp 51–76. ISBN 9784431557319/9784431557326. doi: 10.1007/978-4-431-55732-6.
2. Botha TA, Kailen Boodhia K, Wepener V. Adsorption, uptake and distribution of gold nanoparticles in *Daphnia magna* following long term exposure. *Aquatic Toxicology*. 2016; 170: 104–111.
3. Carman HA, Fourie A. Systemic contact dermatitis: Occupational dermatitis caused by inhalation of metal dust (2 case reports). *Occupational Health Southern Africa*. 2015; 21(3): 30–31.
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CONFERENCE PRESENTATIONS

International

Oral Presentations

31st International Congress on Occupational Health (ICOH), Seoul, South Korea 31 May–6 June 2015

Gulumian, M. Introduction to Nanotechnology, Nanomaterials, and Nanotoxicology. Professional Development Course on Nanomaterial Exposure Assessment.

Gulumian, M. What we know and what we don't know about Nanotoxicology. ICOH session on Nanosafety Research Activities in Occupational Health: Nanomaterial Workers' Health.

Gulumian, M. Dissolution and Biodurability of Nanomaterials. Special Session for ICOH Congress 2015: Workshop: OECD WPMN SG8 Nanomaterial Exposure Assessment.

Matuka O, Singh T, Bryce E, Yassi A, Kgasha O, Zungu LM, Kyaw K, Malotle M, Renton K, O'Hara L. Detection of airborne Mycobacterium tuberculosis in South African healthcare setting: A pilot study.

Singh T, Matuka O, Binta B, Kgasha O, De Jager P, van Reenen T. Efficacy assessment of South African marketed UVGI devices in reducing airborne MTB.

Zungu LM, O'Hara L, Yassi A, Malotle M, Darwin L, Barker S. Linkage of human resource records and tuberculosis registry to assess the risk of occupational TB in resource limited health care setting.

Zungu LM, Bryce E, Yassie A, Mlangeni NR, O'Hara L, Malotle M, Kyaw K, Kgasha O, Renton, K. An evaluation of Tuberculosis infection control practices in a Regional hospital setting, South Africa, 2012–2017.

Zungu LM. Workers' health within PHC.

34th EAACI Congress, Barcelona, 6–10 June 2015

Mwanga HH, Dalvie MA, Singh T, Channa K, Jeebhay MF. Relationship between pesticide metabolites, cytokine patterns and asthma outcomes in a rural farming population.

XVI International Meeting on the Biology and Pathogenicity of Free-living Amoebae FLAM 2015, 18–22 May 2015, Alghero, Italy

Bartie D. Free Living Amoeba.

SENN 2015, 12–16 April 2015, Helsinki, Finland (keynote presentation)

Gulumian M, Koekemoer L-A, Boodhia K, George J, Sanabria N, Andraos C. Suitability of in vitro tests for the assessment of the toxicity of nanoparticles with surface plasmon resonance (SPR).

Workshop for the African Region, Cresta Golfview Hotel in Lusaka, Zambia, 16–17 April 2015

Vetten M. OECD Work on Chemicals and on Manufactured Nanomaterials.

Vetten M. Manufactured Nanomaterials/Technology.

Vetten M. Safety Testing and Risk Assessment of Manufactured Nanomaterials.

The 7th International Symposium on Nanotechnology, Occupational and Environmental Health, 19–22 October 2015, Legend Safari Lodge, Limpopo

Andraos C, Gulumian M. In vitro toxicity assessment of dust emissions from South African gold mine tailings sites.

Boodhia K, Gulumian M. The Influence of surface functionalization on the toxicity and intracellular uptake of different nanomaterials.

Maseki J, Gulumian M. Nano-particle and ultra-fine-particle size distributions from domestic coal combustion in top-lit and bottom-lit braziers.

Potgieter K, Gulumian M. Dissolution kinetics of naked and coated CuO nanoparticle exposed to simulated phagolysosomal fluid assessed with static system.

Vetten M, Gulumian M. Investigation of the Endocytosis of 14 nm Gold Nanoparticles into the Human Bronchial Epithelial cell line BEAS-2B.

9th Congress of Toxicology in Developing Countries (CTDC), 7–10 November 2015, Natal, Brazil

Gulumian M. Safety of nanomaterials today: challenges for workers and consumers. <http://www.cbtox.com.br/en/>

First Meeting of the WHO Chemical Risk Assessment (CRA) Sub-Network of Developing Countries, 2–4 December 2015, Bangkok, Thailand

Gulumian M. Post-graduate training on CRA in South Africa.

SOT 2016, 55th Annual Meeting, 13–17 March 2016, New Orleans, USA

Andraos C, George J, Boodhia K, Koekemoer LA, Magogotya M, Vetten M, Gulumian M. Applicability of in vitro methodologies to assess cytotoxicity and genotoxicity of gold nanoparticles.

Vetten M and Gulumian M. Interference of gold nanoparticles in the assessment of endotoxin contamination *in vitro*.

Poster Presentations

The 7th International Symposium on Nanotechnology, Occupational and Environmental Health, 19–22 October 2015, Legend Safari Resort, Limpopo Province, South Africa

Andraos C, Gulumian M. The Use of Conventional Tests and Fluorescence Dyes in the Assessment of the Toxicity of Plasmonic Gold and Silver Nanoparticles: A Cautionary Note.

Maseki J, Gulumian M. Analysis of real time ultrafine particles exposure data from Spray Furniture Polish using ARIMA models abstract.

Matatiele P, Gulumian M. Gold nanoparticles induce extracellular metallothionein in HEK293 cells.

Sanabria N Gulumian M. HRM qPCR assay procedure for detection of engineered nanomaterial interference during genotoxicity studies.

Sanabria N, Gulumian M. Gold nanoparticles (AuNPs) interfere in conventional gene expression analysis method.

Tlotleng N, Gulumian M. Exocytosis of gold nanoparticles in cultured cells.

Zwane M, Gulumian M. The interference of citrate capped gold nanoparticles in the assessment of the ROS generation using electron spin resonance technology.

31st International Congress on Occupational Health (ICOH), 31 May–6 June 2015, Seoul, South Korea

Malotle MM, Zungu LM. HIV among healthcare workers in a health laboratory in South Africa.

Malotle MM, Zungu LM, Kgalamono S, Abrahams O, Nattey C. HIV TB KAPB knowledge, attitudes, behaviour and perceptions among health laboratory workers.

Jones D, Wilson K, Kistnasamy B, Darwin L, Adu P, Yassi A, Spiegel J. The Implementation and Evaluation of a Health Information System in a Health Laboratory Service.

Kgalamono S. Occupational Stress in a South African Workforce: Instrument Testing, Prevalence Measurement and Risk Factor Analysis.

SENN 2015, 12–16 April 2015, Helsinki, Finland

Boodhia K, Gulumian M. The intracellular uptake and toxicity of functionalize metal oxide nanomaterials.

Boodhia K, Magogotya M, Gulumian M. A Genotoxicity study assessing the potential influence of metal oxide nanoparticles on the Alkaline Comet Assay.

National

Oral Presentations

PathRed Congress 2015, 15–16 April 2015, Emperors Palace, Kempton Park, Johannesburg

George J. Genotoxicity assessment of gold nanoparticles using *in vitro* micronucleus assay.

20th Annual National Conference: 20 Years of IAIASA, 11–14 August 2015, Champagne Sports Resort, Drakensberg, KwaZulu-Natal

Masondo LR, Mohapi K N, Masekameni D, Makonese T, Maseki J, Gulumian M. The influence of coal-particle size on nano-particle and fine-particle size distributions from domestic coal combustion in top-lit updraft ignition (tlud).

HOSPERA and ILO, Durban South Africa

TB Booklet for health workers launch – keynote address.

Department of Labour national consultation on the construction regulations, Kempton Park, South Africa

HIV and TB in the construction sector.

Allergy Society of South Africa Conference, 6 September 2015

Ratshikhopha E, Njajilo D, Singh T, Jeebhay M. Allergic sensitisation and immunological profiles in poultry farm workers.

YWP Conference, Pretoria, 18 November 2015

P Muchesa presented an oral presentation.

11th Annual Conference of the Public Health Association of South Africa, 7–9 October 2015, Durban

Ngajilo D, Singh TS, Ratshikhopha E, Baatjies R, Jeebhay MF. Risk factors associated with asthma phenotypes in poultry farm workers.

Poster Presentations

PathRed Congress, 14–16 April 2015, Emperors Palace

Bernstein DM, Phillips JI. Evaluation of the fate and pathological response in the lung and pleura of brake dust alone and in combination with added chrysotile compared to crocidolite asbestos following short term inhalation exposure.

Phillips JI. Routinely collected laboratory data: A neglected resource for research.

Local Conferences

Oral Presentations

Biennial NIOH research day, 3 September, Johannesburg South Africa.

Abrahams O, Khgalamono S. Occupations and breast cancer in women treated at a tertiary hospital in Johannesburg.

Andraos C, Gulumian M. *In vitro* toxicity assessment of dust emissions from South African gold mine tailings sites.

Carman HA, Fourie A. Systemic occupational contact dermatitis caused by inhalation of metal dusts.

Jack S, Dekker K, Nkosi V, Ibiejugba O, Andraos C, Sanabria NM, Gulumian M. Silica exposure assessment: internal vs. external dose monitoring in risk assessment.

Jones D, Wilson K, Morgan M, Kistnasamy B, Darwin L, Adu P, Yassi A, Spiegel J. The implementation and evaluation of a health information system in a health laboratory service.

Kgasha O, Singh T. Determination of viable airborne Mycobacteria tuberculosis cells.

Kielkowski D, Urban M, Nattey C. Lung cancer risk attributable to occupation: in a case control study in black South African 2001–2008.

Manganyi J, Wilson K, Rees D. A study of respirator fit and face sizes of South African health laboratory respirator users during 2013–2014.

Mizan GE. Exposure to volatile organic compounds and formaldehyde in histopathology and cytology laboratories.

Madzivhandila T, Sekobe G, Kgarebe B, Larkin J. Characterisation of respirable crystalline silica dust in the abandoned mines around Roodepoort, central rand Johannesburg, South Africa.

Mogane NM, Voyi K. Occupational exposure to iron oxide nanoparticles in a research laboratory.

Muchesa P, Leifels M, Jurzik L, Barnard TG, Bartie C. Free living amoebae isolated from a hospital water system in South Africa: a potential source of nosocomial and occupational infection.

Nthoke T, Madzivhandila T, Mizan GE, Sekobe G. Environmental asbestos monitoring during asbestos roof removal in two human settlement areas.

Vetten M. OECD Sponsorship Programme for the Testing of Manufactured Nanomaterials: the South African Contribution.

Vorajee N, Murray J, Phillips JI. Immunohistochemical screening for epidermal growth factor receptor (EGFR) and anaplastic lymphoma kinase (ALK) mutations in lung adenocarcinoma in South Africa.

Vorster GS, Sanabria NM, Gulumian M. An investigation into hazard identification and possible interference of gold nanoparticles with RT-qPCR reactions.

Zungu LM, O Hara L, Yassi A, Malotle M, Darwin L, Barker S. Linkage of human resource records and tuberculosis registry to assess the risk of occupational TB in resource limited health care setting.

Poster Presentations

Biennial NIOH research day, 3 September, Johannesburg South Africa

Boodhia K. Assessing the potential toxicity of gold nanoparticle carrier systems conjugated with therapeutic peptides.

Boodhia K. The intracellular uptake and toxicity of functionalized Metal Oxide Nanomaterials.



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