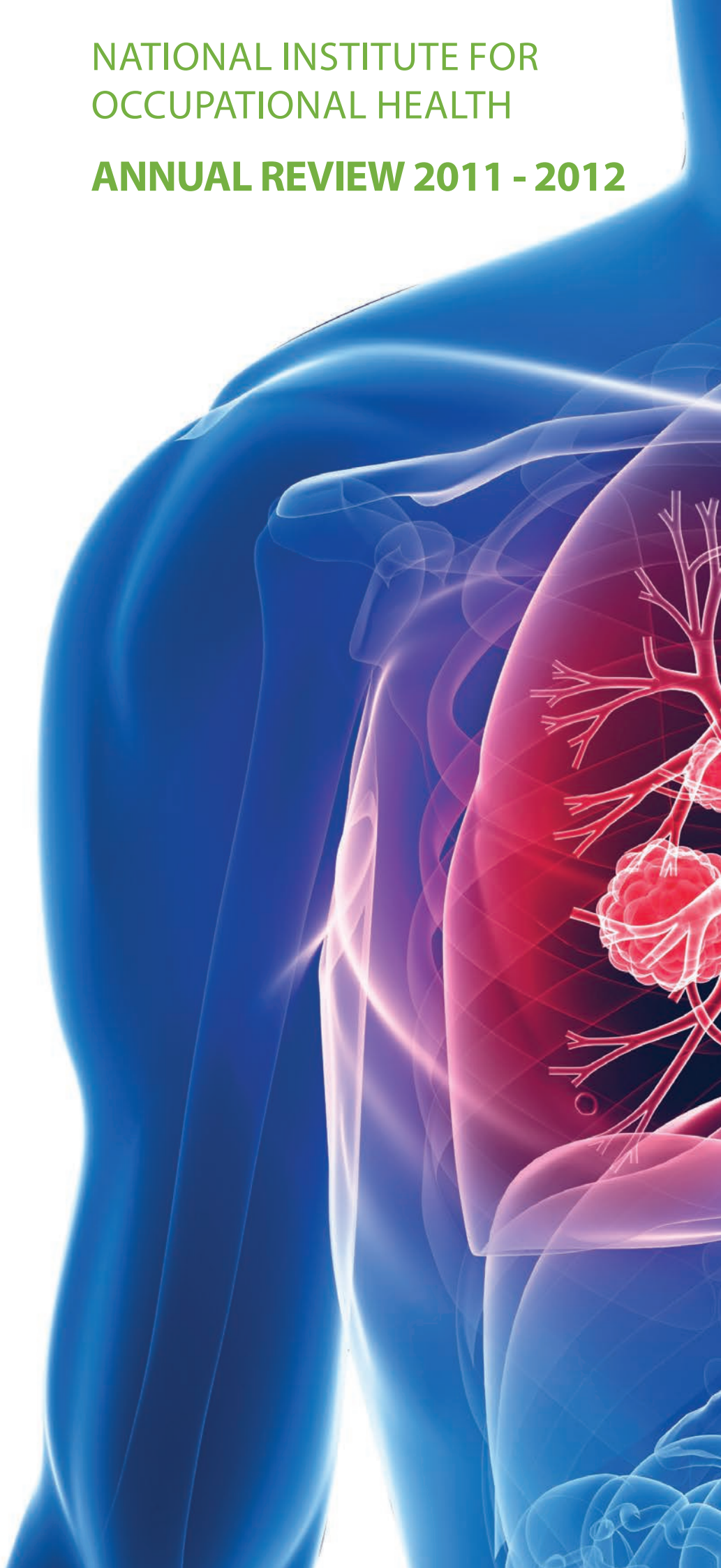


NATIONAL INSTITUTE FOR
OCCUPATIONAL HEALTH

ANNUAL REVIEW 2011 - 2012



NATIONAL HEALTH
LABORATORY SERVICE

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH



NATIONAL HEALTH LABORATORY SERVICE

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

2003

The National Institute for Occupational Health (NIOH) was taken over and governed by NHLS.

2005-2006

NIOH recognised as a collaborating centre in occupational health in January 2005.

Commissioned the P3 microbiology laboratory; the XRD Unit [X Ray Diffraction] for the analysis of crystalline silica and the Polley Dust Duct.

- An alliance between NIOH and the State Forensic Laboratories which provide NIOH with post-mortem facilities while the NIOH provides training facilities for students and post-graduates.

2002

SADC Clearing House was established at NIOH where it collates and provides regional information on OHS legislation and policy; professional training; research; international activities; and practical solutions to controlling exposure to silica and pesticides.

2004-2005

10 October 2004 NIOH was approved as an Inspection Authority (AIA) of the Occupational Health and Safety Act, 1993, for monitoring of Physical, Biological, Chemical Stress Factors (including lead and asbestos) by the Department of Labour.

2006-2007

NIOH celebrated its 50th anniversary, having developed from a pneumoconiosis research institute for miners' occupational lung diseases in 1956 to a multidisciplinary World Health Organization (WHO) collaborating centre (CC) for occupational health (OH). The focus of the jubilee year was the development of sustainable occupational health services within the provinces to assess the national value of the NIOH.

2007-2008

NIOH facilities were consolidated within the old University of the Witwatersrand Medical School building, where the new Pathology Division includes the only formalin recycler in Africa. The 'new' pathology service established the first outreach programme, which launched with training in clinical aspects and autopsy submission of occupational respiratory disease for Mpumalanga provincial occupational health service.

- Another first was the SANAS accreditation of the Immunology, Microbiology and the Analytical Services laboratories.

2008-2009

NIOH applies to WHO for re-designation as a Global OH CC from 2009-2012. The NIOH was extensively involved in the Communications and Networking Activity Area of the 2006-2010 Global Network Plan.

- NIOH Pathology and Occupational Medicine involved in the Mine Health and Safety Council (MHSC) Project – Track C: Silicosis elimination awareness for persons affected by mining operations in SA.
- NIOH Toxicology involved in the MHSC project on the assessment of the toxicity of mine dusts collected from different gold mines. The results created awareness of the presently accepted OELs to protect miners in mines having more toxic dusts.

2009-2010

The amalgamation of the National Cancer Registry (NCR) and the Cancer Epidemiology Research Group (CERG) with the NIOH. Optimising collaboration and sharing of epidemiological expertise and resources. NHLS aim to promote the identification of risk occupations and industries in the country with the potential of target interventions.

- Renewed linkage with International Agency for Research on Cancer (France) to support the NCR.
- Establishment of an HIV/TB in the Workplace Unit at NIOH; to provide support and education in workplace interventions for HIV/TB.
- Partnering with SANDF and Surgeon-General on technology assessment and provision of occupational health services.
- Nanotoxicology new facilities were commissioned such as the TSI particles counter, xCelligence system and CytoVova hyperspectral microscopy. Developed in partnership with the DST and DTI with the help of the WHO to develop guidelines in the protection of workers from exposure to nanomaterials. In addition, the NIOH has represented the DST and DTI at international forum including the OECD and the ISO TC229 on nanotechnologies.
- Signed MOU with the Finnish Institute for Occupational Health (FIOH) in 2009.

2010-2011

The new cancer regulations were passed by Health Minister Dr Aaron Motsoaledi, on 26 April 2011, which requires all doctors and health facilities that confirm cancer cases to report their findings to the NCR. The new legislation allows for the establishment by the NCR of a population-based cancer registry. Such a registry will pick up all cancers regardless of method of diagnosis.

The regulations will increase and improve the surveillance capacity of the NCR and provide reports, which will assist in cancer control.

- During this period, the NIOH was also instrumental in listing Toxicological Sciences as a new discipline for the accreditation and registration of toxicologists in South Africa with SACNASP.
- The NIOH signs a memorandum of understanding with the US EPA to provide training on Health Risk Assessment in Africa.
- Asbestos Laboratory was officially opened at NIOH, providing information, identification, counting, monitoring and evaluation services.
- Began links with the IAEA (International Atomic Energy Agency) in Vienna, Austria and the NCR - 2010.
- Renewed links with the International Labour Organisation (ILO) - 2010.
- Began links with the Organisation for the Prohibition of Chemical Weapons (OPCW) in the Hague - 2010.

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Dr Barry Kistnasamy
Executive Director

DIRECTOR'S OVERVIEW

The National Institute for Occupational Health (NIOH) and the National Cancer Registry (NCR) play an important role in supporting health services in South Africa. These bodies provide services, training and research to enhance workers' health and surveillance for cancers. During the past financial year, policy advice and technical support were provided to the Department of Health, Department of Labour, Department of Mineral Resources, and the Department of Public Service and Administration. The NIOH reached key milestones whereby workers' health was enhanced by inputs into the health and safety summits of the departments of Mineral Resources and Labour. Many decentralised occupational health and surveillance activities were conducted with the provincial health departments, the South African Military Health Services, and several other national departments and public entities.

The NCR's plan to ensure that the regulations and requirements on cancer surveillance are complied with could not be implemented due to a lack of financial and technical resources. Another factor was an inability to improve the capacity of the NCR to collate, analyse and report on cancers in South Africa. On a positive note, discussions were held with the Department of Health and other partners to provide resources that will enable the NCR to deliver on its mandate.

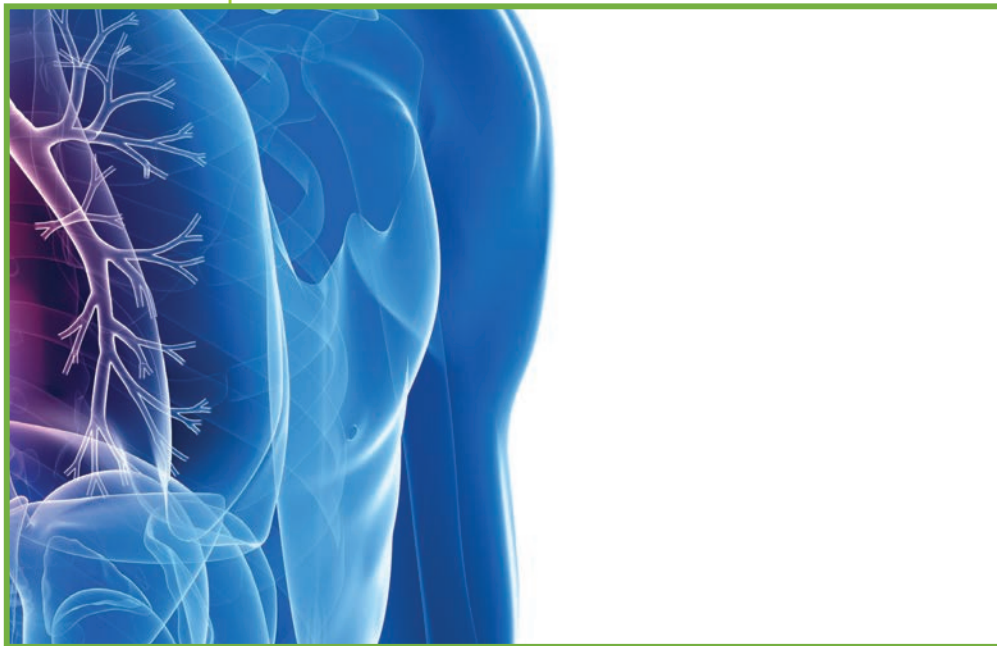
The past financial year was one marked by the consolidation of library services under the NIOH's auspices. The immunology and microbiology and analytical services have maintained ISO 15189 accreditation for the fifth consecutive year.

The Occupational Hygiene Section has maintained its registration with the Department of Labour as an Approved Inspection Authority as well as its link with various international proficiency schemes. The Pathology Section achieved accreditation in the year under review.

The NIOH and NCR contributed significantly towards the training, capacity development and ongoing professional development of health professionals through linkages with academic institutions, professional societies and national and provincial government departments. Many members of staff have made contributions in imparting of knowledge, and been duly credited for their varying inputs. Staff members teach under- and postgraduate programmes at universities while other staff members were recognised for their contribution to occupational health by receiving various awards and being invited to serve as members of national and international committees.

The programme on HIV and tuberculosis (TB) in the workplace has matured with NIOH support for interventions in HIV and TB in the mining sector, led by the Department of Mineral Resources and TB in migrant workers, and by the Department of Health and the Southern African Development Community (SADC) health secretariat. Key result areas in policy, legislative, organisation and delivery of services have been formulated and will be monitored by the relevant national departments.

Research continues to be a strong focus with a number of publications in accredited journals, chapters in books and presentations at conferences showcasing the research outputs of the NIOH and the NCR. Ongoing research collaboration continues across the NHLS and with other local and international organisations. Links with various multilateral and bilateral agencies have continued and NIOH's application as a World Health Organization (WHO) Collaborating Centre was renewed. The support of the Minister and Department of Health for the application for renewal to the WHO is acknowledged with appreciation.



PATHOLOGY





Prof Jill Murray

Head

PATHOLOGY

The Pathology Section is involved in teaching and training, research and service work. The origins of the division lie in the Pneumoconiosis Research Unit that was founded in 1956. The section's focus is lung disease and the service work provides material for surveillance, teaching and research. In addition to the postmortem services offered, the section is a referral centre for lung biopsies. Analytical electron microscopy services are also conducted. A major achievement in 2011 was the accreditation by the South African National Accreditation System (SANAS) of all the laboratories in the section, in accordance with the recognised International Standard ISO 15189:2007.

DIAGNOSTIC SERVICES

Autopsies

In terms of the Occupational Diseases in Mines & Works Act: Act 78 of 1973, the Pathology Division carries out the statutory requirement of examining the cardio-respiratory organs of deceased miners. The pathology examination forms part of the compensation process for miners and involves the Mines Bureau for Occupational Diseases and the Compensation Commissioner. This service is funded by the national Department of Health, and the deduced information is made accessible by the Pathology Division database (PATHAUT). This database is a national resource and contains unique information about disease trends in the mining industry. It is an important tool for disease surveillance and has been utilised in international collaborative studies. Detailed disease surveillance reports compiled from the PATHAUT database providing demographic data and disease rates are produced annually. These have been made available in the public domain through the NIOH website (www.nioh.ac.za). In 2011, 1,329 autopsies were carried out as part

of the compensation process. To encourage the utilisation of the autopsy service by all communities, an outreach programme informs, educates and trains stakeholders in all aspects of the compensation process. Due to financial constraints, this programme was scaled down in 2011 and the number of autopsies carried out was 173 less than in 2010.

Surgical pathology

As a recognised centre of excellence, a diagnostic service is offered to satisfy the demand for opinions on lung biopsies and bronchial washings. Diagnostic requests were received from clinicians, academic hospitals served by the NHLS and the private sector during the past financial year.

Electron microscopy

The electron microscopy service is headed by Prof JI Phillips, a National Research Foundation-rated (NRF) scientist. This service supplements the service work of the Pathology Section by determining the asbestos fibre concentrations in lung tissue to assist with the compensation process and assisting with diagnoses using electron microscopy techniques.

The service carries out qualitative and quantitative analyses for the presence of asbestos fibres. Analyses are performed on bulk materials or air samples obtained on filters. These analyses are performed for other divisions of the NIOH and external clients including national; provincial and local government, non-governmental organisations and private businesses. The service participates in an external quality assurance scheme and has maintained its satisfactory rating in the Asbestos in Materials (AI) international quality assurance scheme coordinated by the Health and Safety Laboratory in the UK.

The service to analyse samples for asbestos was first offered in 2003. Since then, data generated from the samples submitted for analysis have been stored and entered into a database. This database is unique in South Africa and its interrogation is providing information about the legacy of asbestos in the country.

RESEARCH

Material and data from the service work provide 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. TB is a particular problem in the mining industry and is a focus area for research.

During the course of the year, Prof Murray and Prof Phillips were asked by editors of scientific journals to be peer reviewers for research articles. The section collaborates with others within the NIOH and local and international researchers, fostering links with local and overseas institutions. These currently include: University of Pretoria; University of the Witwatersrand; Schools of Pathology, Public Health, Clinical Medicine and Archaeology; 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; University of Washington in St Louis, USA; Washington University in Seattle, USA; University of Idaho, USA; Brooklyn College; City University of New York, USA; and the University of Vermont, USA.

HONOURS

N Ndlovu and G Nelson were awarded prizes for their presentations at the International Congress for Occupational Health held in Cancun, Mexico from 18 to 23 March 2012.

TEACHING AND TRAINING

The Pathology Section plays a teaching and training role through formal lectures to professional bodies, universities and teaching hospitals. Two staff members hold positions at the University of the Witwatersrand; Prof Murray is an Associate Professor in the School of Public Health, Prof Phillips is an Associate Visiting Professor in the Faculty of Health Sciences at the University of Johannesburg. Prof Phillips is also an Honorary Senior Researcher in the School of Pathology.

Staff members participate in the mentoring, teaching and supervision of PhD and Masters students at the University of the Witwatersrand and Diploma in Occupational Health students from the Universities of Pretoria, KwaZulu-Natal and the Witwatersrand. They also moderate examinations and chair the Academic Advisory Committee of the University of Johannesburg. The section participates in clinical pathology meetings with doctors from the Johannesburg teaching hospitals. Registrars in pathology rotate through the section as part of their specialist training. Short courses are conducted for healthcare professionals and organised labour organisations.

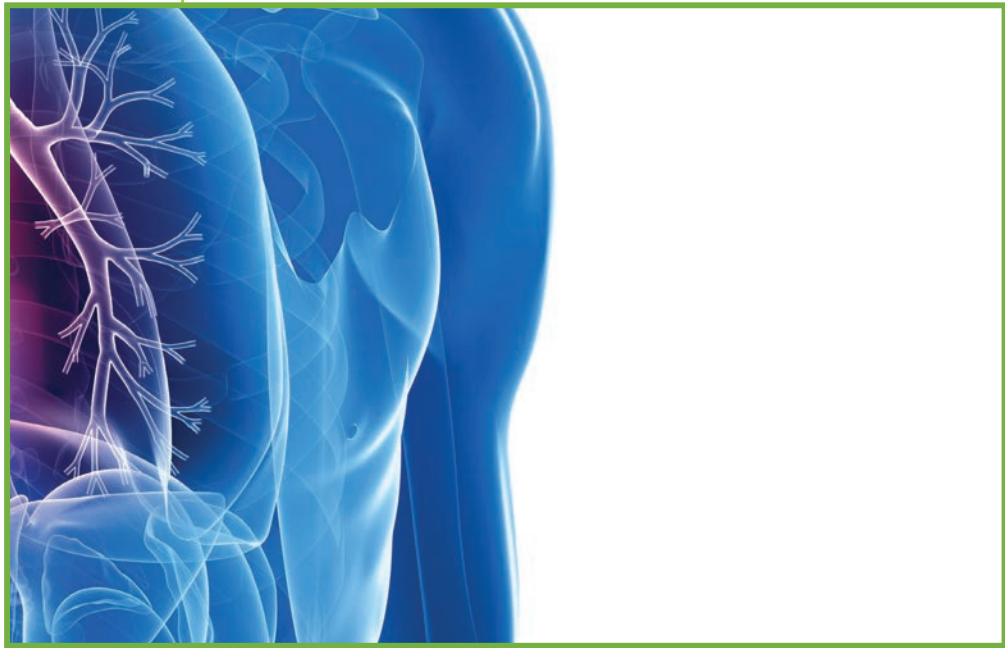
The pathology laboratory is an accredited training laboratory for Health Professions Council of South Africa intern medical scientists. Specialised small group training is given to healthcare professionals, organised labour, and mortuary and funeral parlour staff. Teaching has been carried out in Gauteng, Limpopo, Mpumalanga, Free State, KwaZulu-Natal, Northern Cape and North West provinces. In collaboration with the National Union of Mineworkers (NUM), members of the Pathology Section conducted an awareness campaign focusing on lung disease and compensation.

PROFESSIONAL DEVELOPMENT

A postgraduate candidate was awarded a PhD by the University of the Witwatersrand.

Two staff members, who are both holders of a University of Michigan/Fogarty International Centre Millennium Promise Programme Scholarship, are registered as PhD students with the University of the Witwatersrand's School of Pathology.

“The PATHAUT database is a national resource and contains unique information about disease trends in the mining industry”



OCCUPATIONAL MEDICINE





Prof David Rees

Head

OCCUPATIONAL MEDICINE

The Section comprises two sub-sections: Occupational Medicine, and Immunology and Microbiology.

The sub-section of Immunology and Microbiology maintains an electronic allergy database, which contains a list of the common allergy tests available in South Africa. During 2011, the database was made accessible on the NIOH website to be used by medical practitioners both internal and external to the organisation.

OCCUPATIONAL MEDICINE

The sub-section, headed by Dr S Kgalamono, is involved in teaching and training, research and service by way of clinical assessments and ergonomic risk assessments. The sub-section consists of the Occupational Medicine Referral Clinic and the Ergonomics Unit. The clinic has been assessing workers since 1972 for possible occupational diseases. It evolved from being mainly service-orientated, to having a focus on key performance areas and quality assurance under the NHLS, offering medicine support and advice nationwide. Doctors and scientists in the section worked in collaboration with the newly formed Occupational Health Services unit to establish a service for NHLS employees.

OCCUPATIONAL MEDICINE CLINIC

DIAGNOSTIC SERVICES

The clinic is the largest of the three specialist referral clinics in the country and gets referrals from a wide range of industries both within South Africa and neighbouring

countries. Apart from doing clinical assessments of workers referred for suspected occupational diseases and possible compensation, the clinic also provides professional consultation and advisory service on occupational health issues at a policy level and at an individual level for clinical management. In the year under review, trade union members and small enterprises that were being targeted by the Department of Labour to assess their health and safety practices were some of the frequent customers seeking advice on various occupational health issues. Clinical services remain a vital focus for the sub-section and private companies are now being charged a nominal fee for all their referrals, a service which was previously offered free of charge.

The majority of cases assessed in the year under review were occupational respiratory diseases mainly from construction, food and beverages, chemical and steel manufacturing companies. Although the majority of cases assessed were for pulmonary, musculoskeletal and neurological disorders, mental disorders from occupational stress and occupational allergies continue to be on the increase. All workers were seen as sentinel events, provoking a thorough investigation at the workplace to assess the possible causes of the diseases and advise on workplace modification to prevent further exposure to other employees. Furthermore, workers were assisted with claim submission for compensation and medical management.

The clinic has increased access to services in two strategic service areas, namely, mental health in the workplace focusing mainly on occupational stress, and work disability assessments. These were areas that were identified as gaps in occupational health services within the country.

SPECIAL PROJECTS

Disability management project

Progress has been made in setting up a disability management referral service within the NIOH in order to keep up with global trends in occupational health. This referral service looks at disability prevention strategy, rehabilitation, treatment and safe return to work programmes, in an effort to reintegrate people with mild to moderate disabilities back into the workplace.

The service has several long term objectives:

- To improve knowledge and awareness among workers, managers, and occupational health practitioners on the necessity of disability

management as an integral part of occupational health;

- To develop a disability management service that conducts medical assessments and determines the level of disability for mental and physical impairment;
- To carry out performance monitoring and evaluation of the disability management programme while building capacity for occupational health practitioners to deal with disability management in the workplace.

Lectures on the concepts of disability and disability management have been incorporated into the Department of Health programme to raise awareness among occupational health doctors. Experts in the field were identified to be part of the expert panels contributing to the planning of this service. Job descriptions were established to appoint the multidisciplinary team that are required for this service.

The disability assessment service is targeted at employees not covered by insurance to assist in re-integration back into the workplace and coordination of rehabilitation.

Mental health in the workplace

Mental disorders have a high prevalence and are a leading cause of disability in many countries, including South Africa. The burden of these disorders is underestimated in low and middle income countries despite strong evidence highlighting their social impact. South Africa lacks capacity to deal with work-related mental health issues. Public health services are over-burdened and under-staffed.

The long term objectives aim to increase knowledge and awareness among workers, managers and occupational health practitioners on the impact of work-related mental health; establish a mental health service that seeks to fill existing gaps in identifying risk factors for mental ill-health; and diagnosis of these diseases and advice on holistic management and accommodation of employees within workplaces. This has to be parallel to building the capacity of occupational health practitioners in dealing with mental health issues proactively.

Recruitment is underway for relevant professionals and links are established with academic institutions already dealing with aspects of mental health, namely the departments of psychology, occupational therapy, social science and psychiatry.

RESEARCH

The head of the section, Dr Kgalomono, is a newly elected editorial member of the local Occupational Health Southern Africa Journal and has also been involved in examining Masters research projects for the MPH degree at the University of the Witwatersrand. Final reports for completed projects for the WHO workplan 2009-2012 cycle were submitted in the areas of occupational health services. The section submitted a number of research projects to the current WHO Collaborating Centres (CC) in occupational health network meeting in Cancun, Mexico (2012-2017 workplan). A project on occupational asthma cases assessed in the clinic was presented at the International Congress for Occupational Health in Mexico.

Current (ongoing) research projects are:

- Evaluation of Diploma in Occupational Health curriculum;
- Evaluation of public occupational health services in South Africa;
- Psychosocial risk assessment tool for evaluation in South African workplaces;
- Evaluation of noise-induced hearing loss programmes in iron and steel companies – a collaborative project with the Occupational Hygiene Section.

TEACHING AND TRAINING

Formal and informal training initiatives were used to strengthen capacity development and create awareness of occupational health within employers, workers and trade unions, health practitioners, government and other stakeholders. Three registrars are in training for the occupational medicine speciality.

Undergraduate

Staff members in the clinic contributed to the Graduate Entry Medical Programme at the University of the Witwatersrand. Informal training was conducted during the year for small groups of workers, union members, occupational health nurses, Department of Labour inspectors and occupational medicine practitioners on relevant topics.

Postgraduate

The clinic offers opportunities for training of registrars and clinical skills refinement for other healthcare workers. Every year, public health registrars from the Universities of Pretoria, Witwatersrand and Limpopo rotate through the clinic for experiential learning in occupational health.

Staff in the clinic supervise and examine Masters and PhD theses from the University of Witwatersrand and teaching activities include lecturing at the postgraduate Diploma in Occupational Health and Masters in Public Health programmes at the Universities of the Free State, Pretoria, Witwatersrand and KwaZulu-Natal.

PROFESSIONAL DEVELOPMENT

Masters in Medicine (occupational medicine registrarship): 2

Diploma in Occupational Health nursing enrolled: 1

ERGONOMICS UNIT

The Ergonomics Unit is headed by B Nyantumbu-Mkhize and offers its services at a fee-for-service basis to both public and private enterprises within South Africa, including specific projects in the NHLS. Besides teaching, training and research, the unit offers ergonomic risk assessments, hand-arm vibration syndrome evaluations and advisory services to occupational health practitioners. To create an enabling work environment at NHLS, the unit contributes to the cross functional tender committee functions to assist the procurement department in ensuring that furniture bought for NHLS employees meets health and safety standards. In the year under review, the Ergonomics Laboratory prepared for accreditation.

SERVICES

Ergonomic risk assessments were mainly performed in office environments where the assessment was focused at modifying the office workstation to accommodate the affected workers in the workplace. The assessments identifies ergonomic hazards and provides control measures to mitigate the hazards.

Furthermore, the unit responded to ergonomic queries from a variety of government departments including the Department of Trade and Industry, Department of Labour, and the Department of Agriculture, Forestry and Fisheries. The unit continues to engage with the

Department of Labour to motivate for the development of an ergonomics regulation in South Africa.

RESEARCH

The head of the unit is an editorial member for the Curationis journal and participates in reviewing research papers. She is also involved in examining research reports of postgraduate students. Final reports of projects for the WHO workplan 2009-2012 were submitted to the WHO and expression of interest was submitted for the WHO workplan 2012-2017 for a project linked to the cultural and psychological influences on disability (CUPID) research project. A poster entitled 'Musculoskeletal disorders in nurses from two hospitals in South Africa: A CUPID study' was presented at the Epidemiology in Occupational Health conference held at Oxford University, United Kingdom from 7-9 September 2011.

Good practice methods to prevent musculoskeletal disorders in South African healthcare workers

Healthcare workers, particularly nurses, report high prevalence of musculoskeletal disorders. Their work, which involves lifting of heavy patients, working long hours in a standing position and doing shiftwork, puts them at high risk of musculoskeletal disorders. In order to protect their health and safety, programmes on good practice methods should be sought and implemented. These programmes will be informed by the outcomes of the CUPID project which is currently underway. CUPID's aim is to determine factors that influence the development of musculoskeletal disorders in nurses including health beliefs.

TEACHING AND TRAINING

The unit offers teaching and training in ergonomics and hand-arm vibration syndrome to postgraduate occupational health practitioners to build capacity in recognising ergonomic hazards, their health effects and management in the workplace.

In line with the Occupational Health and Safety Act, the unit participates in raising awareness about ergonomic hazards, their health effects and control through continuing education presentations to NHLS employees about health effects and injuries that laboratory workers sustain. The unit has also undertaken to increase teaching activities to include experiential training for student interns, and environmental health and occupational therapy students to attract more

professionals to the discipline. Furthermore, the newly established training unit has earmarked an ergonomics workshop for occupational health nurses and doctors in May 2012.

The International Labour Organisation publishing department (granted permission) to reproduce sections of the 'ILO Ergonomic Checkpoints' which entail practical and easy to implement solutions for improving safety and health and work conditions' publication to use for training purposes.

IMMUNOLOGY AND MICROBIOLOGY

The sub-section is headed by Dr T Singh and consists of three specialised units: Bioaerosol Monitoring, Occupational Allergy and Waterborne Pathogens.

DIAGNOSTIC SERVICES

A referral diagnostic service related to occupational allergies continued for the current financial year. Laboratory analytical support was provided for collaborative research projects in which 79 workers were assessed for possible occupational skin allergies. The test workup included an array of sensitisers and irritants and differed per individual case depending on the workplace exposure. Some examples include: nickel, heavy duty hand cleaner, wool, alcohols found in lanolin, plastics, latex gloves, ultra violet germicidal irradiation, purified protein derivative anti oxidant in rubber (gloves), antiseptics from workplace, and Kathon CG found in nail products. Cases requiring workers compensation were submitted to the Compensation Commissioner. Thirty-seven skin prick tests were done for various occupational allergens. In some cases, samples from the workplace were extracted and prepared in-house for the occupational allergy assessment. Sentinel cases led to workplace assessments which were conducted by a team from the Occupational Hygiene Section and, where warranted, an occupational medicine specialist from the Occupational Medicine Section.

The section expanded its diagnostic capacity and introduced the novel inhibition assay for detection of airborne spice allergen. This section has the only laboratory that currently provides the test for airbourne garlic and chilli pepper allergens in South Africa. Feedback from patients were positive and reinforced the quality of the allergy testing service to workers.

“This is the only lab in South Africa analysing airborne mycobacteria tuberculosis. A partnership with the National Institute for Occupational Safety and Health (NIOSH), Cincinnati, USA, has been established”

This facility is also the only laboratory in the country doing analysis of airborne *Mycobacteria tuberculosis*.

A partnership with the National Institute for Occupational Safety and Health (NIOSH), Cincinnati, USA, has been established to set up an inter-laboratory comparison scheme.

QUERY SERVICES

Queries handled by the sub-section included telephonic consultations and health hazard evaluations. Consultations ranged from information on various workplace exposures to expert advice on appropriate tests for hypersensitivity diagnosis. Several queries involved the provision of risk assessments for hazardous biological agents, which were conducted in a variety of workplaces. A checklist for hazardous biological agents was compiled, which will be used for future risk assessments for biological agents.

RESEARCH PROJECTS

The sub-section delivered on its research agenda. This included nine NIOH-initiated research projects in the areas of occupational allergies, bioaerosols and amoeba-resistant bacteria and one collaborative project. In addition, the sub-section continued its collaboration with the University of Cape Town on occupational asthma studies in both the spice milling and poultry industries. Contribution was made to three special projects, namely TB/HIV, ultra violet germicidal irradiation and GeneXpert TB analyser, further strengthening NHLS strategic objectives.

OCCUPATIONAL ALLERGY UNIT

Concentrations of natural rubber allergens in gloves used by health professionals in South Africa

Study team: ME Ratshikhopha, T Singh, B Bello, A Wadee, M Jeebhay, A Lopata (NIOH, University of Cape Town, Royal Melbourne Institute of Technology, Australia)

Funding: Allergy Society of South Africa

Gloves made of natural rubber latex (NRL) are commonly used by healthcare workers because of their qualities including excellent barrier protection, comfort and competitive prices. However, it is well known that allergic reactions have been associated with the use of NRL gloves, with Hev b 5 and Hev b 6.02 allergens recognised as the major allergens in healthcare workers (HCW), including dental schools in South Africa. Nineteen NRL glove samples consisting of 13 brands were analysed. Only three (16%) of the 19 NRL gloves analysed had the sum of Hev b 5 and Hev b 6.02 levels below 0.05 µg/g, indicative of low allergenic risk. The brands included a high risk exam glove (J tex), a sterile examination glove (Examtex), and a surgical glove (Mortex). Identification of latex gloves with low concentrations of allergens can aid in the organisational goal of reducing the risk of latex sensitisation and allergic symptoms in sensitised individuals in the workplace. Previous studies have shown that using NRL gloves with low allergen reduced the number of new cases of allergy.

A large proportion of gloves tested had the sum of Hev b 5 and Hev b 6.02 above the suggested threshold for medium to high allergenicity. Procurement practices need to be modified to require all potential suppliers of NRL to provide evidence that the gloves are below this threshold before they are purchased.

BIOAEROSOL MONITORING UNIT

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

Study team: T Singh, DO Matuka, E Ratshikhopha, P Dayal, M Jeebhay, A Lopata, G Sekobe, A Wadee (NIOH, University of the Witwatersrand, University of Cape Town, Royal Melbourne Institute of Technology, Australia)

Poultry farm workers are exposed to a wide variety of agents which could cause respiratory disease. This study investigates emerging agents that may lead to sensitisation and asthma in poultry workers which may lead to better management of affected workers. The measurements for this study include a walkthrough checklist on job types and control measures already in place, health and occupational history questionnaire, personal air samples (breathing zone of workers), lung function tests and collection of blood samples for allergy tests (sensitisation and inflammatory biomarkers). Sampling commenced in May 2011 at a poultry farm in the North West Province and will be followed by sampling

on emerging farms. Thus far, environmental sampling has been completed at all selected farms including broiler (7), laying (2), hatchery (3), free range (1) and rearing (1) farms. A total of 218 health questionnaires have been administered. Pre and post weighing of all environmental samples (368 samples) have been completed. Laboratory analysis for endotoxin, allergens and (1-3)- β -D glucan will continue in 2012-2013.

Detection of airborne *Mycobacterium tuberculosis*: chamber study

Study team: Z Kirsten, T Singh, P Dayal, M Schaefer (NIOH, NHLS TB laboratory in Braamfontein, NIOSH-CDC, USA)

Internationally, 9.2 million new cases and 1.7 million deaths from TB occurred in 2006. The transmission of *Mycobacterium tuberculosis* (MTB) is a recognised occupational hazard and the mode of airborne transmission in risk settings needs to be investigated. It has been shown that temperature and humidity play a major role of microbial survival in aerosols. By utilising the bioaerosol chamber for manipulation of temperature and humidity, a comparison of simulated microclimatic parameters can be made effectively. The bioaerosol chamber could be used to change the physical parameters such as temperature, humidity and the velocity of the strain to mimic conditions that are normally found in the environment. The objective is to validate the airborne sampling and detection method and compare the results with that of NIOSH. Sampling at different flow rates with varying MTB concentrations were performed in duplicate in the chamber. One set of samples was shipped to NIOSH for analysis and the other set will be analysed at NIOH. Once analysed the results will be compared.

Determinants of occupational allergy to spices among spice mill workers

Study team: M Jeebhay, A van der Walt, A Lopata, T Singh, R Baatjies (University of Cape Town, Royal Melbourne Institute of Technology, Australia, NIOH)

Funding: Allergy Society of South Africa

Various epidemiological studies have reported obstructive lung disease due to inhalation of spices. This study determined the prevalence of occupational allergic respiratory disease and associated risk factors in spice mill workers. Dust particulate correlated strongly with garlic and chilli pepper allergens. Spice dust-related ocular-nasal symptoms (43%) were more common than asthma symptoms (17%). In multivariate models, spice dust-related ocular-nasal and asthma symptoms were

significant for airborne garlic allergen exposures. A stronger association was observed between probable asthma and chilli pepper sensitisation, as was chronic obstructive pulmonary disease (COPD) in relation to chilli pepper compared to garlic sensitisation. This is the first study to quantify garlic and chilli allergen exposure in the workplace and associate these with health outcomes. Workers exposed to inhalable spice dust particulate containing low grade allergens have an increased risk of work-related lower respiratory symptoms, probable asthma and COPD. The strongest association is with chilli pepper sensitisation, suggesting the involvement of additional non-IgE-mediated mechanisms.

Ultraviolet germicidal irradiation in controlling transmission of *Mycobacterium tuberculosis* in the workplace

Study team: T Singh, M Zungu, B Kistnasamy

There has been an increasing interest in ultraviolet germicidal irradiation (UVGI) as concern about the transmission of TB, multidrug-resistant (MDR) and extreme drug-resistant (XDR) TB is growing. UVGI has been applied in congregate settings, e.g. hospitals, correctional facilities. The South African Military Health Services approached the NIOH to assess the efficacy of UVGI units in reducing the TB bacilli load in preparation for budget allocations for the maintenance of the units. Since the technical committee met in February 2011, another meeting was held at the University of Pretoria. Collaboration between NIOH, and Pretoria University, CSIR and Harvard University regarding the development of a prototype UVGI unit has been established. The University of Pretoria and the CSIR are responsible for developing the prototype and the Immunology and Microbiology Section will do the efficacy testing. The efficacy of two prototype UVGI units in reducing airborne *Mycobacterium tuberculosis* was tested in the laboratory. A proposal to conduct a cluster study to evaluate the efficacy of the UVGI units in field settings has been developed and the field work will continue in 2012-2013. Discussions were held with the chief specialists of two public sector hospitals where interest was shown in the need for such a study.

WATERBORNE PATHOGEN UNIT

Laboratory set-up and validation of methods

Study team: C Bartie, P Muchesa (MTech student) (NIOH, Tshwane University of Technology, University of Johannesburg)

Funding: Water Research Council

The use of amoebal enrichment and amoebal co-culture methods for isolating pathogenic amoeba-resistant bacteria, including *Legionella*, environmental *Mycobacteria*, *Vibrio* and methicillin-resistant *Staphylococcus aureus*, from environmental samples has several advantages. The NIOH recently set up the laboratory and validation of these methods for use on environmental samples. The methods have been validated and species identification using sequencing has been concluded. The student aforementioned submitted his MTech dissertation and has passed.

The occurrence of free-living amoeba and amoeba-resistant bacteria in water storage tanks and taps of households in five areas of Johannesburg

Study team: C Bartie, P Malaka (MTech student) (NIOH, University of Johannesburg)

Funding: Medical Research Council, Water Research Council

The NIOH is participating in the health, environmental and development (HEAD) study, an initiative of the WHO Collaborating Centre for Urban Health. The aim of the HEAD study is to evaluate whether the quality of tap water used in six communities (Hillbrow, Bertrams, Hospital Hill, Riverlea and Braamfishersville) is adequate for human consumption. A total of 199 tap and tank water samples were collected at preselected households and analysed for amoebae and amoeba-resistant bacteria; 98.5% of the samples tested contained amoebae. Amoebal-enrichment and co-culture techniques have been used, together with conventional culture methods, to isolate and identify amoeba-resistant bacteria (*Legionella* species, environmental *Mycobacteria*, *Vibrio*, *Salmonella* and *Shigella*) from these samples. Confirmation tests have been conducted and the student is currently writing up his dissertation. The student has been awarded a New Generation scholarship at the University of Johannesburg to upgrade this project to a PhD.

Investigating the occurrence and impact of amoeba-resistant bacteria in farming communities in Gauteng

Study team: C Bartie, C Kruger (DTech student) (NIOH, University of Johannesburg, Johannesburg Water)

Funding: Water Research Council

This study intends to identify free-living amoebae and amoeba-resistant bacteria of the genera *Legionella*, *Mycobacteria*, *Vibrio*, *Salmonella*, *Shigella* and *Escherichia coli* 0157 from container water and biofilms of 81 houses

of farm workers in the Heidelberg area. Potters for Peace filters have been installed in 50% of these houses, and the water quality has been monitored to determine whether the filters are useful to improve the quality of their drinking water. If the filters are found useful, they will be installed in all the houses. The first sampling was done during March 2011, followed by next sampling during the week of 18-21 April 2011, at which time the filters were installed in randomly selected houses. To date, 162 (81 water and 81 biofilm) samples have been collected and processed. Over 85% of these samples contained free-living amoebae. Amoebal co-culture and enrichment for the isolation of amoeba-resistant bacteria are in progress.

An independent investigation into the purification capacity of small scale water purification units manufactured and supplied in South Africa

Study team: C Bartie, TG Barnard, CA Robertson, MB Taylor (NIOH, University of Johannesburg, Water Research Commission, University of Pretoria)

Funding: Water Research Council

Small scale water purification units are marketed and advertised with promises of reductions in bacterial contaminants of up to 99%. The aim of the study is to assess small scale water purification units manufactured and sold in South Africa, and to provide guidelines to enable consumers to make informed purchasing decisions. The project, initiated in August 2010, has included a literature study, compilation of a questionnaire for distribution to manufacturers and suppliers, and a pamphlet to inform the public on the different units available in the market. Permission was obtained to launch the consumer information pamphlet during the Third Municipal Water Conference held in June 2011. Preliminary investigations showed a general lack of quality standards and information for consumers who use these units in South Africa.

TEACHING AND TRAINING

Staff participated in the section's journal club, which evokes constructive discussions about research methodologies and allows for ongoing intellectual development. During the period under review, the emphasis was on basic learning concepts in the field of immunology and microbiology. Staff attended internal and external training sessions on a variety of immunological and microbiological topics, as well as the NIOH research forum sessions where the medical intern scientists presented aspects of their research.

The Immunology and Microbiology Section provided ad hoc training to NIOH national and international visitors including occupational health nurses, provincial coordinators, trade union representatives and Mine Health and Safety Council (MHSC) members.

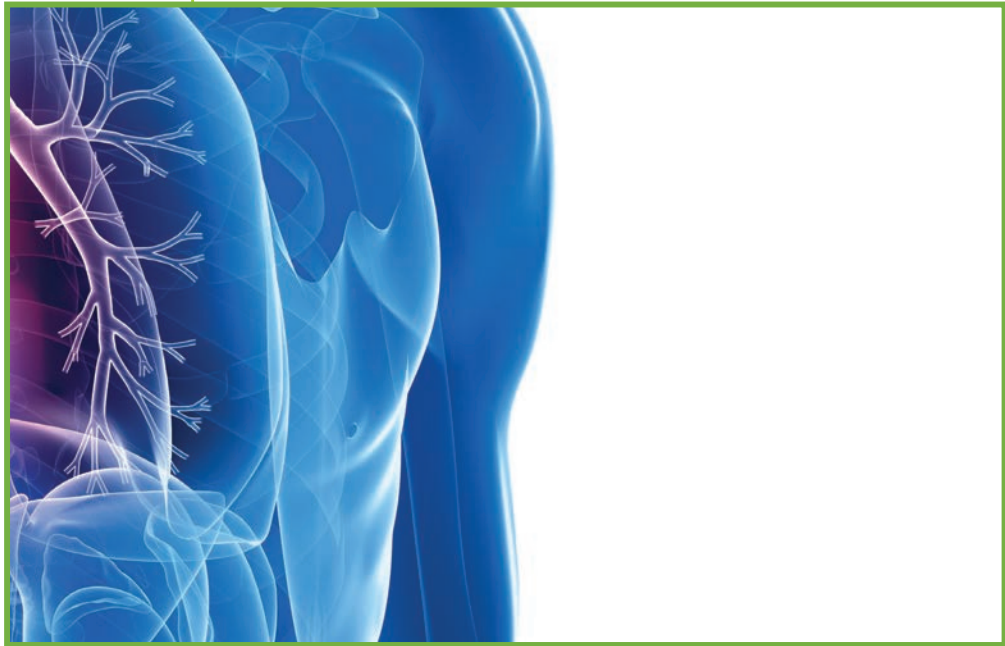
The section also lectured University of the Witwatersrand, University of Johannesburg and Pretoria University undergraduate and postgraduate students. Staff continued to train medical intern scientists as part of the Health Professions Council of South Africa training programme. Three intern medical scientist appointments were made.

The section participated in an orientation and information session of its services and research with the new occupational medicine registrars from the Occupational Medicine Section. It also facilitated an occupational allergy and asthma workshop, in collaboration with the Occupational Medicine Clinic, in the North West Province (24-25 May 2011). A successful dermatology workshop was also held at the University of the Witwatersrand, Dermatology Department. The Section co-hosted a training workshop with the Occupational Hygiene Division on personal protective equipment: gloves and masks, which was aimed at Department of Health officials, occupational nurses, hygienists and occupational health practitioners.

PROFESSIONAL DEVELOPMENT

Postgraduate candidates enrolled: 5 (1 MSc, 2 MTech, 2 DTech)





QUALITY ASSURANCE





Bonginkosi Duma
Quality Manager

QUALITY ASSURANCE

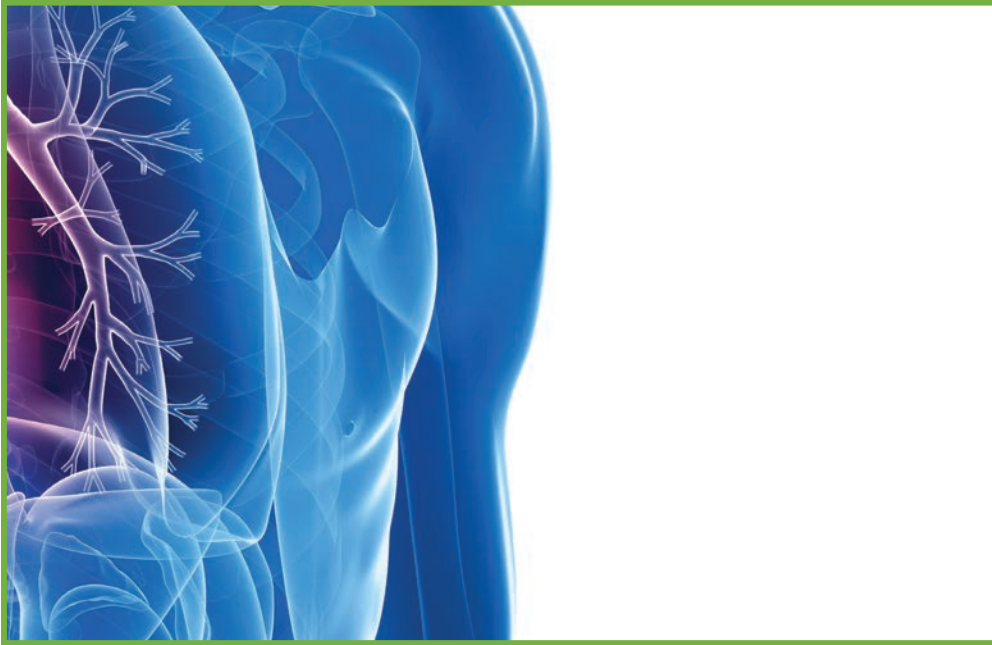
Quality is one of the top priorities for NIOH. This has been demonstrated by increasing the number of laboratories accredited under ISO 15189 from two (Analytical Services and Immunology and Microbiology), to three when the Pathology Section's histology, cytology and electron microscopy laboratories received accreditation status. This makes Pathology one of the few laboratories in the country that is accredited in electron microscopy.

Laboratories performing environmental tests (occupational hygiene and immunology), and water tests (analytical services and electron microscopy) are preparing for ISO 17025 accreditation. This will monitor the laboratories' competency as well as quality of testing.

The Department of Labour (DOL) audited the Occupational Hygiene Section as part of the DOL audits that are done periodically; and reported that the laboratory was of a satisfactory standard to meet their requirements. The National Cancer Registry is preparing for ISO 9001 compliance, which will monitor their conformity as a laboratory through an examination of management systems, and the administration of data being done by the registry. The Toxicology Section, which does research with mining samples, is being prepared for the Good Laboratory Practice (Organisation for Economic Cooperation and Development [OECD]). This grants the section compliance as a research laboratory.

Regular internal audits were done throughout the year to prepare laboratories for accreditation, and staff members were continuously trained to keep them abreast of the NIOH quality management systems.

“Quality is a top priority; one of the few laboratories in the country that is accredited in electron microscopy”



OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT SERVICES





David Jones

**Safety, Health and Environment
Programme Manager**

OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT SERVICES

SERVICES

The NHLS Executive Committee (ExCo) approved a plan to strengthen the occupational health service for employees. The structure making up the safety, health and environment (SHE) department was successfully re-established at the NIOH and now reports to the Executive Director of the NIOH. The advantage of this arrangement is the availability of expert support from the various departments within the NIOH, notably the Occupational Hygiene, Occupational Medicine and Immunology and Microbiology sections. Five SHE officers, an occupational medicine practitioner and one occupational health nurse were appointed to strengthen this service.

Together with support provided by sections of NIOH, the SHE section conducted three noise-related surveys, four formaldehyde measurement surveys at histology laboratories, a laboratory walkthrough assessment of an HIV polymerase chain reaction laboratory, the delivery of a specialist hazardous biological agent risk assessment, the compilation of specifications for a tender for examination gloves to ensure low levels of allergen exposure and occupational medical examinations and advisory services for NHLS employees when requested. The SHE officers also conducted 111 safety, health and environment audits and facilitated 115 risk assessments in NHLS facilities.

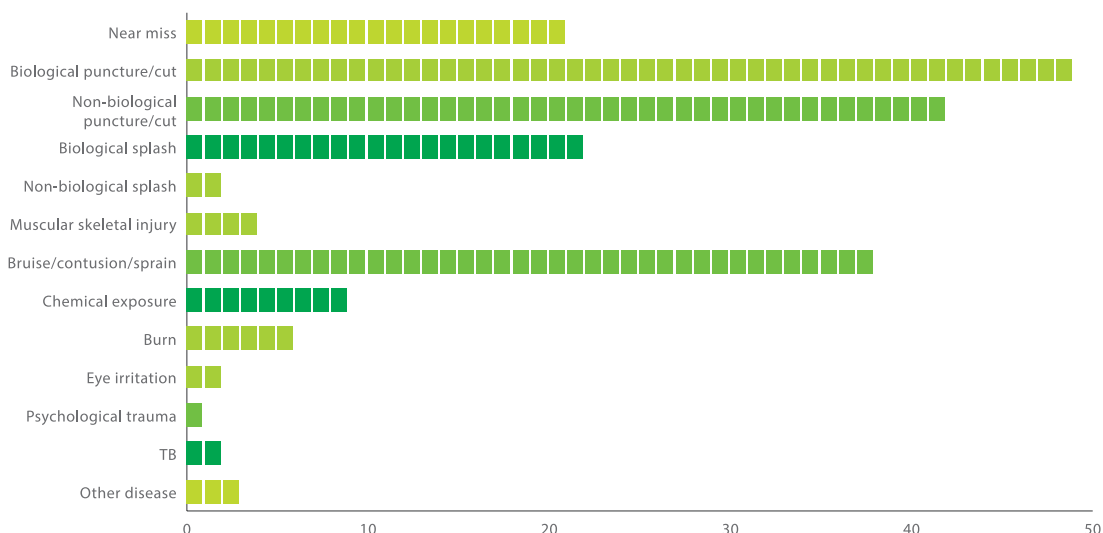
OCCUPATIONAL HEALTH INFORMATION SYSTEM

During the period under review, a decision was taken by the NHLS ExCo to discontinue the development of the in-house health information system, SLIDE (Surveillance of Laboratory Injuries and Diseases), in favour of a new system – the Occupational Health and Safety Information System (OHASIS). OHASIS is a comprehensive occupational health information programme that was developed by the University of British Columbia and is intended for use in varied occupational settings. OHASIS has been piloted in other countries as well as at Pelonomi Hospital in the Free State, in collaboration with the NIOH and the national Department of Public Service and Administration.

The University of British Columbia has entered into an agreement with the NHLS that grants the NHLS the rights to implement and support OHASIS anywhere in Africa. Interest has already been expressed in OHASIS, not only in South Africa but also by other African government departments. The NIOH information technology (IT) department has played a key role in the further development of the OHASIS system by loading the HIV and TB modules, developed by the University of British Columbia, onto the local system. The IT department has also developed reports for the employee health module, including a report populated by the system itself that is used to notify the Compensation Commissioner's office of any injuries. An e-mail survey was conducted among laboratory managers relating to the implementation process of OHASIS and it was noted that of the respondents, almost all (96%) had the forms available to report any incident and 97% felt that a standard reporting form was important when it came to dealing with incidents.

On the following page is a breakdown extracted from OHASIS of injuries, diseases and incidents for the period under review, which totalled 201.

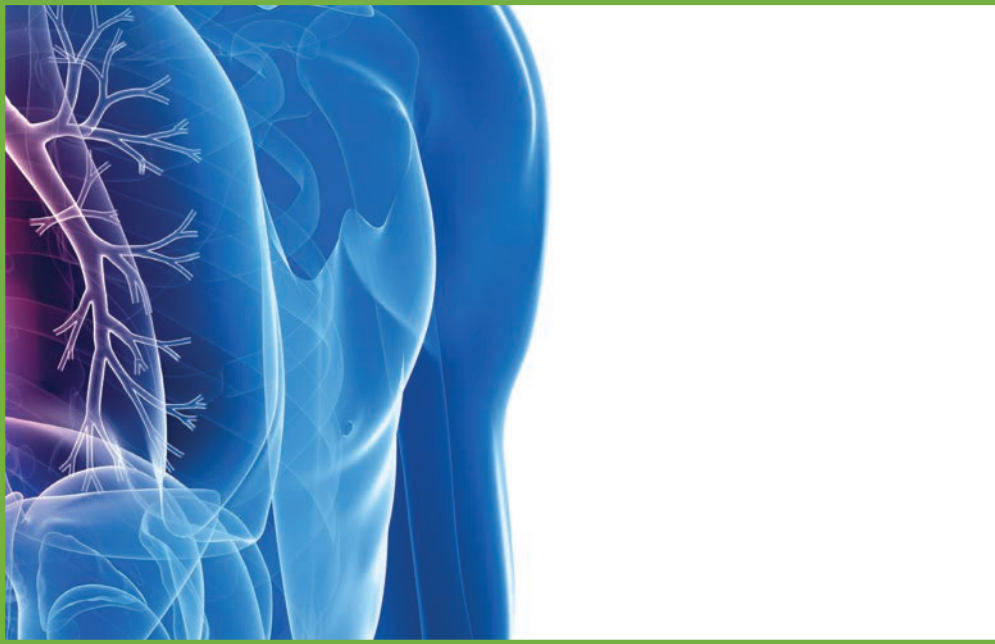
Early in 2011, the NIOH, in collaboration with the Human Resources Department, participated in the launch of a national programme to provide post-exposure prophylaxis and counselling for employees and their immediate families in the event of exposure to body fluids in either an occupational, environment or any other accidental exposure. The programme reflects the wider scope of the NHLS' responsibility to its employees and their families. The national health and safety programme is available to all employees, whether



Incidents recorded in OHASIS, April 2011 to 31 March 2012

they are permanent, contract workers or students. The primary benefits of the programme include an HIV/AIDS prevention programme – HIV preventive treatment and benefits in the event of a workplace exposure to HIV, and trauma assistance – assistance in the event of a traumatic incident such as armed robbery, assault, sexual assault, etc., that may not be work-related. The service ensures that all employees have access to testing and treatment within 24 hours following potential exposure, in a confidential and secure environment. To access the benefits of this programme, an employee needs to contact the Care Centre number and provide their name and ID number. A dedicated case manager is assigned to offer the required support and assistance.

“The NHLS Executive Committee approved a plan to strengthen the occupational health service for employees”



EPIDEMIOLOGY AND SURVEILLANCE





Dr Danuta Kielkowski
Head

EPIDEMIOLOGY AND SURVEILLANCE

The Epidemiology and Surveillance Section's main focus areas are surveillance, research, teaching of occupational epidemiology and consultation. Collaboration with other sections of the NIOH and other institutions was encouraged to support strategic development and research into nationally important needs such as women's health and reproductive health. The section is also involved in conducting independent research and has three research focus areas: occupational reproductive health, mortality studies and surveillance. Identification and quantification of occupational health problems is a key area of investigation. Other areas of expertise are collaborative field surveys, teaching of occupational epidemiology and research on disease and hazards in the workplace. Advisory services to support occupational health practice are offered. Training is provided using freeware software in database development and descriptive analysis of data.

Dissemination of research findings and other occupational health information is also a core function of this section, which produces peer-reviewed publications regularly as well as research reports. The section is able to provide advice on developing a database along with cleaning of the data. Support to government departments in both research and information and data mining is ongoing. The Data Capturing Unit provides support for the National Cancer Registry in the capture of manual submissions of newly diagnosed cancer cases and other data from NIOH surveys.

The section provides study design advice and data analysis advice to sections at the NIOH to assist with research projects.

SERVICES

Consultations to government departments

Work continued on strengthening health information systems by liaising with Statistics South Africa on improving the quality of data and providing basic analysis of data. Following the successful meeting held during the last financial year, the section continued to liaise with the management of the Compensation Commissioner's (CC) office. It was agreed the NIOH/NHLS would support the CC in providing basic information on claims for compensation, by industry and occupation. However, limited data were provided to the Epidemiology Section for analysis during the reporting period. Investigations will be undertaken to establish whether more data are available, and the report of the analysis of the current data will be finalised.

PROJECTS

During 2011, the Centers for Disease Control and Prevention funded two projects coordinated by the NIOH, aimed at strengthening the laboratory services within the NHLS.

Health technology assessment

This project aimed to create a unified, harmonised health technology system within the NHLS with optimal distribution of health technology resources. It was agreed that a description of the policy and legislative framework governing health technology in South Africa is required as well as a situational analysis of health technology management from procurement to decommissioning within the NHLS. Key informant interviews were conducted in a tertiary, regional and a district NHLS laboratory by a health technology consultant. The study demonstrated that the life cycle management of medical devices at the NHLS would benefit from systematic health technology assessment to support informed decision-making for efficient and effective delivery of laboratory services.

Feasibility study on biomedical and other waste management practices within the NHLS and other health services

The aim of this study was to determine the feasibility of developing a biomedical waste management service for the NHLS rather than outsourcing this service. The report describes the local and international policies and best practice guidelines in biomedical waste management, and presents the financial viability of establishing a biomedical waste management service.

SUPPORT OF NHLS INITIATIVES

Point-of-care technology

A multidisciplinary team was convened to assess the feasibility of implementation of point-of-care technology (POCT) diagnostic devices in healthcare facilities. This research resulted in a successful symposium hosted by the NHLS which brought together various stakeholders in the field to discuss pertinent issues regarding POCT in South Africa. Research is ongoing and the following field studies are underway:

- POCT policy for South Africa was drafted and circulated to key NHLS personnel for comment during the reporting period. The final draft will be submitted to the Department of Health as the NHLS contribution to the POCT policy debate.
- POCT per levels of care: At the request of the Department of Health, the NIOH convened a workshop of nominated pathologists from each pathology discipline within the NHLS to present their recommendations for POCT devices appropriate per level of care in the South African public health sector. These recommendations have been collated and shared with the wider pathology faculty and will be presented to the Department of Health.
- POCT field study: Despite budgetary restrictions in the year under review, the field study involving multiple POCT devices has continued. Data collection commenced at the Tshwane field site in 2012.

Private pathology services

The NHLS has entered into an agreement to provide certain pathology services to private sector clients. Internal systems are currently being adapted to this market. Epidemiology staff coordinated the project on behalf of the NHLS.

SPECIALISED RESEARCH PROJECTS

Mine Health and Safety Council Survey

Study team: C Nattey, K Wilson, D Kielkowski

Staff travelled to all nine provinces to inform the mining industry of the occupational health survey being rolled out by the Mine Health and Safety Council (MHSC) and to provide information on the calculation of the rates required to be reported to the MHSC. The survey aimed to collect information directly from the mines on key occupational health indicators. Once data were received

by the MHSC, the Epidemiology and Surveillance Section cleaned and analysed this information. The figures reported by the various mining houses did not correspond and there appeared to be continued confusion around calculation of rates and the time frame of interest. A report was written but not presented at the mining summit in November 2011. The report is being rewritten into discussion documents to promote debate in the mining industry around the figures and reporting of information to the MHSC and Department of Mineral Resources.

OHASIS Evaluation

Study team: D Jones, K Wilson, D Kielkowski, SHE officers

The OHASIS reporting system went live in July 2011. SHE officers and Epidemiology and Surveillance staff received training on the system. SHE officers began capturing data into the system during July and August. The first evaluation of the system was through a focus group with the four current SHE officers and centres on the usefulness of the system and any changes that are required. This was followed by a manager survey, the results of which were reported at the International Congress for Occupational Health in Mexico. A report of the manager attitudes and knowledge is to follow.

Tsumeb exposure and health survey

Study team: B Kistnasamy, D Kielkowski, K Wilson, C Nattey, V Ntlebi

Tsumeb is located in northern Namibia. The NIOH was approached to survey the community for health effects as there is a smelter in the area. A brief questionnaire was developed covering exposure sources and health effects linked to acute and chronic exposure to arsenic and sulphur dioxide - the two main reported contaminants for smelters. Student nurses interviewed the selected households and collected urine and hair samples for analysis. Grootfontein, a town 60 km from Tsumeb, was chosen as an unexposed control. Results of the survey show that there was an increase in respiratory symptoms in Tsumeb compared to Grootfontein.

HIV/AIDS prevalence survey in NHLS employees

Study team: M Zungu, C Nattey, O Abrahams

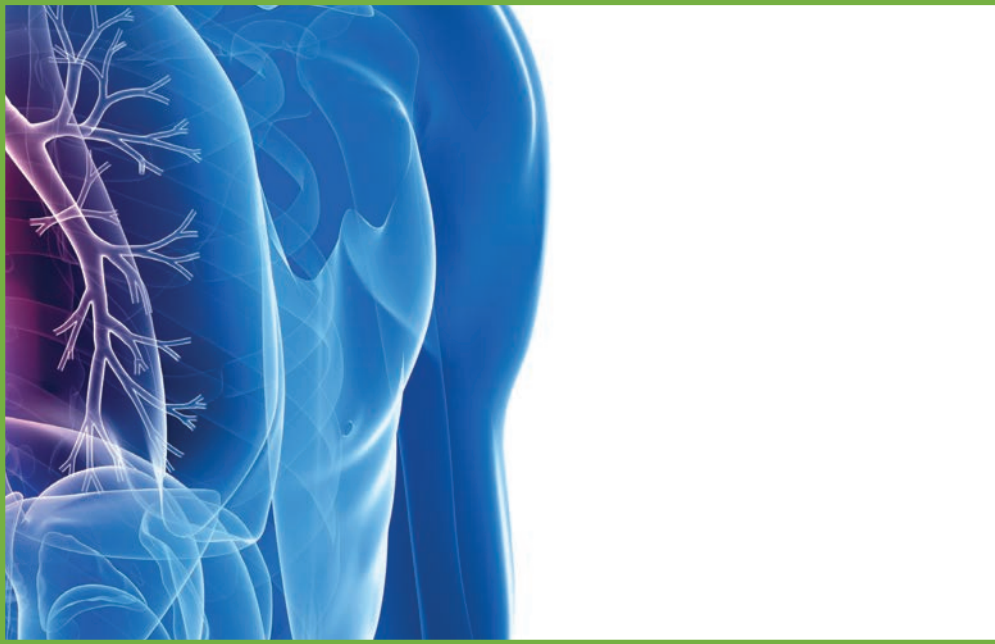
HIV and TB are main contributors to the high mortality rates and decrease in life expectancy in the developing world, including South Africa. South Africa has one of the highest co-infection rates with an HIV prevalence of

almost three-quarters among people with incident TB. The study aimed to determine the knowledge, attitudes, perceptions and behaviour of NHLS employees with regard to HIV- and TB-related issues. The study was conducted in the 265 NHLS laboratories in the four regions. The response rate was 21% with 1,497 employees participating.

TEACHING AND TRAINING

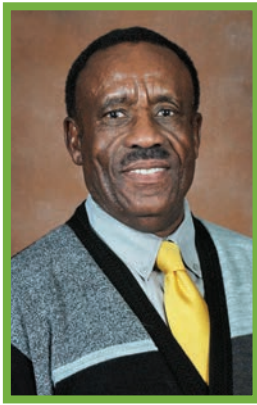
Two introductory statistical analysis computer package (STATA) training courses were offered to NHLS staff by the Epidemiology Section in the reporting year. These provided STATA analysis skills to allow these staff to conduct simple data analyses in their sections. Collaboration with the School of Public Health at both the University of the Witwatersrand and the University of Pretoria continued with the section staff providing lectures in epidemiology throughout the year. Two MSc students in Epidemiology and Biostatistics were supervised, three MSc theses and four theses from Public Health Medicine registrars were examined by staff.

“Subject matter experts drafted a Point-of-Care technology policy for submission to the National Department of Health”



OCCUPATIONAL HYGIENE





Gopolang Sekobe
Head

OCCUPATIONAL HYGIENE

The Occupational Hygiene Section provides professional occupational hygiene services to national and provincial government departments, industry, private clients as well as support for occupational health and safety initiatives within the NIOH and the NHLS.

The section has made a considerable investment in facilities, equipment and skills over the last few years and is now in a strong position to provide valuable input into the occupational hygiene needs of the SADC region. Accreditation with SANAS as required by the Department of Labour is in progress. The section will be continuing its efforts to provide occupational hygiene support in the form of training, advice, risk assessments and exposure monitoring to the national and provincial departments of Health, Labour, Minerals and Energy, National Defence, and Environment.

SERVICES

Occupational hygiene risk assessments, audits, surveys and advisory services were provided to 43 organisations and companies, including the NICD/NHLS, Gauteng provincial Department of Health, Department of Labour, and the FEDUSA trade union federation. Occupational health and safety services were provided to several private clients. The section is also participating in two international quality control schemes. In view of the NHLS financial challenges, revenue generation has been pursued more vigorously than ever including bidding for tenders and concluding service level agreements with clients.

The section produced 19 reports on conditions in a wide range of work places including foundries, laboratories, offices, and informal business in Soweto, Johannesburg and Alexandra, in Gauteng.

The X-ray diffraction (XRD) and Fourier infrared spectrometry (FT-IR) laboratory identified, quantified and analysed 13 respirable crystalline silica (on filters) and 132 asbestos filter samples. This is of national importance to the departments of Labour, and Minerals and Energy to eliminate occupational diseases caused by silica and asbestos. The laboratory analyses samples received from private sector clients on a fee paying basis. The laboratory participates annually in the WASP (workplace analysis) scheme for proficiency testing of the United Kingdom, as required by Control of Substances Hazardous to Health regulation for quality purposes. The laboratory recently participated in the scheme to measure crystalline silica with FT-IR equipment using the direct-on-filter method. Having competed with international laboratories, the section's results confirmed that the method (MHDS 101 from HSE) and equipment are well within range.

The asbestos laboratory analysed 69 samples for asbestos fibres and 30 asbestos slides were counted as part of the international proficiency counting scheme of the Health and Safety Laboratory, UK.

RESEARCH PROJECTS

The hygiene section provided support for ongoing NIOH research projects, including nanoparticles, allergies in poultry workers, and measurement of exposure to TB organisms in air. These research projects are managed by the Toxicology and Immunology and Microbiology sections. A member of the Occupational Hygiene Section serves on the South African Asbestos Forum which is dedicated to improving the asbestos regulations. A project is underway to develop a national reference centre for asbestos fibre counting, assessment and control for SA and the SADC region. Due to the history and use of asbestos in this region, these risks will remain an occupational health priority in South Africa for many years to come.

Respirator fit test

Study team: J Manganyi, K Wilson, S Maloisane, C Lekgetho, D Vuma, T Ramusi, W Fortune

This is an ongoing project testing respirator fit and facial dimensions in respirator users in the NHLS. During the 2011/2012 period, reports with respirator size and brand

recommendations were sent to the relevant managers. The preliminary data were analysed for a presentation at the South African Society of Occupational Medicine conference. To date, 186 participants have been measured and tested for the study and 32% passed the fit test with their current mask. The size most recommended by this study is small.

Reproductive health risk evaluation in histopathology laboratories of the NHLS

Researcher: G Mizan

The purpose of this study is to identify and prioritise reproductive health hazards that workers within the histopathology laboratories of the NHLS might be exposed to. This project also seeks to develop a simple self-assessment tool that would assist managers in the process of health hazard identification and risk prioritisation in their laboratories.

Study of noise-induced hearing loss in the primary iron and steel industry

This project is run in conjunction with other NIOH sections including Occupational Medicine and Epidemiology. The iron and steel industry is the largest manufacturer in South Africa and has been identified by the Department of Labour as being among the highest risk industries in terms of noise induced hearing loss. The purpose of this study is to investigate the current noise exposure levels and hearing loss found in eight main manufacturers of the iron and steel industry in South Africa and make recommendations on effective hearing conservation practices. The study includes noise surveys, personal noise measurements, and audiometric testing conducted on representative sample of workers.

Human exposure risk assessment of engineered gold particles

Principal investigator: G Sekobe

As part of a wider research project on risk assessment of engineered gold nanoparticles, undertaken by the Toxicology Section under the auspices of the Organisation for Economic Co-operation and Development, the Occupational Hygiene Section is conducting an assessment of human exposure to these materials. The required equipment has been procured and measurements are being undertaken at MINTEK's gold laboratory, to be followed by the one at Rhodes University.

TEACHING AND TRAINING

Undergraduate

The annual short practical training courses for environmental health and BTech third year students

from the University of Johannesburg were continued with 90 students completing their training.

Postgraduate

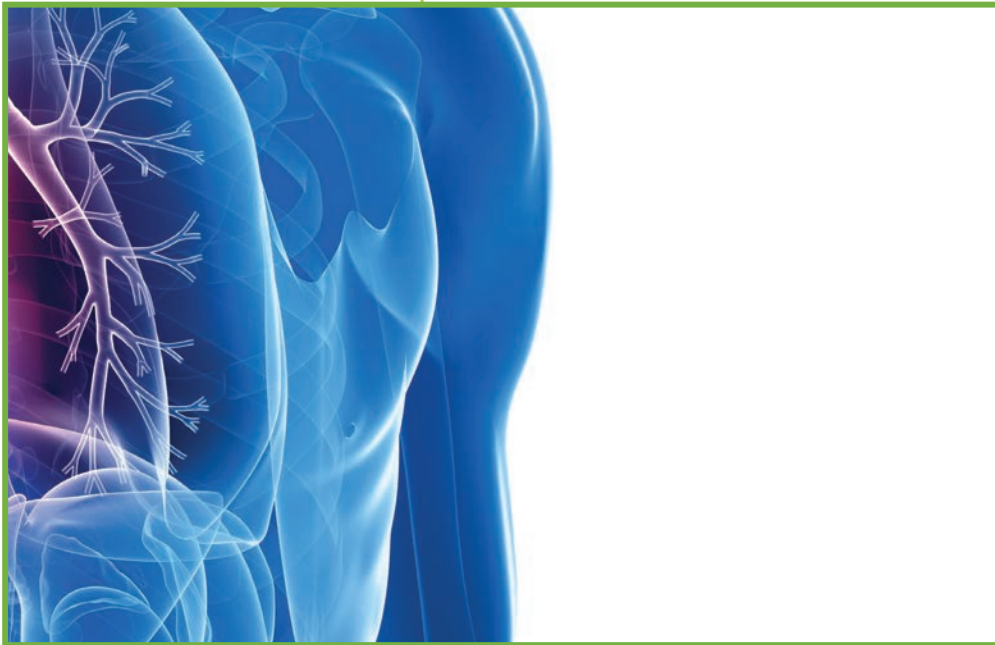
Training was in the form of academic and practical support for the Masters in Public Health Occupational Hygiene degree from the University of Witwatersrand. The section continued teaching and giving practical support for the Diploma in Occupational Health offered by the University of the Witwatersrand.

Other training

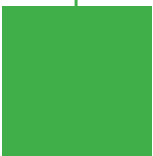
A one-day training module on asbestos counting was provided to 12 Approved Inspection Authorities asbestos contractors. This module forms part of a series of one-day workshops on asbestos training being run by the section. The aim of these courses is to raise awareness, promote safe practices and improve the quality of assessments provided by asbestos analysts and surveyors.

Three one-day health risk assessment training courses were provided to NHLS laboratory managers and health and safety personnel in Bloemfontein, Nelspruit, Potchefstroom, Medunsa and at NICD in Sandringham.

“Eliminating occupational diseases caused by silica and asbestos is of national importance to the departments of Labour and Minerals and Energy”



ANALYTICAL SERVICES





Ina Naik
Head

ANALYTICAL SERVICES

The Analytical Services Section consists of three units staffed by scientific and technical staff: Metals, Organic, and Quality Assurance. The section provides specialised laboratory services, research, advisory services and training to support the practice of occupational and environmental health. A core function is the responsibility for building capacity in analysis of hazardous substances in environmental and biological media to assess workplace exposure and making the services available to a wide range of users to meet the requirements of the Regulations of Hazardous Chemical Substances.

The section supports research projects of national importance, provides advice to private and public sectors and trains under- and postgraduate students on biological monitoring for chemical exposures. The training targets occupational health professionals through seminars, workshops and lectures and also includes in-service programmes for students completing the diploma in biotechnology and analytical chemistry, as well as internship training for students with BSc (Hons) degrees in chemistry, with the aim of preparing them for employment in the laboratory setting.

The advisory services component encompasses advice to occupational health practitioners and employers on matters relating to environmental and biological monitoring of chemical exposures in the workplace. The section also manages a national quality control programme on lead and cadmium in blood samples.

DIAGNOSTIC SERVICES

A total of 19,020 tests (for diagnostic and research purposes) were booked and analysed. The tests included analyses on serum, blood, urine, soil and water samples. Organic assays requested on biological samples were mainly for dichloromethane, hexanedione, hydroxy pyrene, mandelic acid, methyl hippuric acid, methyl ethyl ketone, methyl isobutyl ketone, o'cresol, phenol, toluene diamine isocyanates, organophosphate metabolites and pyrethroid metabolites. Assays requested on toxic metals were mainly for aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium and zinc in serum, blood, soil and water samples.

All the water, soil and urine samples, taken from technical support for a health and environmental impact assessment conducted in Namibia, were analysed in the Metals Unit during early 2012.

The hair and vegetation samples were subcontracted to the Department of Agriculture and private laboratories due to lack of capacity within the section.

New developments

New methods were developed to measure cadmium, lead, arsenic and zinc in soil samples and beryllium in water samples. These methods are all validated on an inductively coupled plasma mass spectrophotometer.

Accreditation

The Organic and Metals Units maintained the ISO 15189 accreditation status. A total of 11 tests were accredited in the Metals Unit and six in the Organic Unit. The Metals Unit tests include aluminium in serum; cadmium, lead, mercury, chromium, creatinine and arsenic in urine and mercury, lead, cadmium and manganese in whole blood. The Organic Unit accredited tests include mandelic acid, phenol, o'cresol, hexanedione, 1 hydroxy pyrene and methyl hippuric acid in urine.

External Quality Assurance (EQA) programme participation included NY State Department of Health for lead, cadmium, chromium, arsenic, manganese and mercury in blood and urine; German EQA programme for nickel, mandelic acid, phenol, o'cresol, hexanedione, 1-hydroxypyrene and methyl hippuric acid in urine and aluminium in serum; Thistle EQA programme for creatinine in urine; and the LAMP Program CDC-USA for blood, lead, cadmium and mercury. Regular internal audits were conducted throughout the year to maintain quality in the laboratories.

RESEARCH PROJECTS

The section collaborated with the South African Medical Research Council (MRC) on the research project investigating heavy metal concentrations in the blood of pregnant women ingesting non-nutritive substances. Two hundred and twenty samples were analysed as pesticide measurements for a research project investigating health effects due to pesticide exposure among rural women in the Western Cape. This study was conducted in collaboration with the Centre for Occupational and Environmental Health Research, School of Public Health and Family Medicine, Health Sciences Faculty, University of Cape Town.

HONOURS

The Analytical Services Section was invited to serve as a reference laboratory by the German External Quality Assessment Scheme due to continued good performance in the determination of 2,5-hexandione in urine.

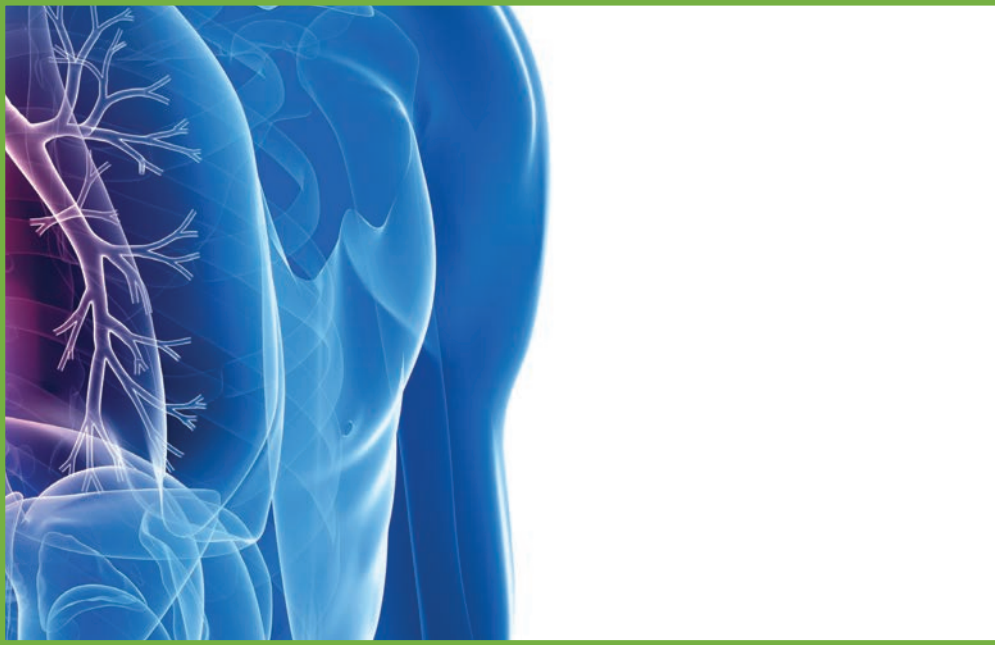
TEACHING AND TRAINING

The Analytical Services Section, in partnership and collaboration with Arbo Unie, Netherlands, hosted a one-day workshop titled: "Effective management of occupational chemical exposures, providing cost effective solutions". The workshop was attended by 55 delegates from the private and public sector who were mainly occupational health nurses, doctors, hygienists or other occupational health professionals. The aim of the workshop was to introduce the delegates to the web-based chemical risk assessment Stoffenmanager tool, its usefulness and cost effectiveness in the management of chemical exposures in the workplace. The training, which aimed at building capacity in occupational health, was directly in line with the overarching aims of the current Global Network Plan of the WHO CC in occupational health (2009-2012), which is driven by the Global Plan of Action for Workers' Health (2008-2017) and falls within Priority 2.1: Develop practical toolkits for the assessment and management of occupational health risks (chemical, physical, biological, psychosocial).

PROFESSIONAL DEVELOPMENT

- Vaal University of Technology experiential training towards Diploma in Analytical Chemistry or Biotechnology: 2 in Organics and 2 in Metals Laboratory (completed);
- Intern scientists trained in clinical chemistry (analytical chemistry) discipline: 2 (completed);
- Registration of medical scientist: 1 (completed).

"The Analytical Services Section was invited to serve as a reference laboratory by the German External Quality Assessment Scheme"



TOXICOLOGY





Prof Mary Gulumian
Head

TOXICOLOGY

The Toxicology Section has continued working in the nanotoxicology and risk assessment of nanomaterials programme within the NIOH Nanotoxicology Strategic Plan, established in 2009.

RESEARCH PROJECTS

Research in projects initiated in 2009 within the Nanotechnology Strategic Plan has continued. These projects focused on investigations of the toxicity of incidental as well as engineered nanoparticles. Investigations on incidental particles included those collected from different gold, platinum, coal and diamond mines and from a manganese smelter, as well as from gold mine dump tailing in and around Johannesburg. In addition, the Mine Health and Safety Council has funded four research projects, led by the NIOH.

Adverse health impacts associated with dust emissions from gold mine tailings

Funding: Mine Health and Safety Council

This is a collaborative project between the NIOH, and the Universities of Pretoria (UP) and Johannesburg (UJ). C Andraos, registered at the University of the Witwatersrand, will complete her PhD degree on this project.

The perception is that pollution related to gold mine tailing impoundments (mine dumps) may pose risks to the surrounding communities. It is known that these tailings are major generators of windblown dust, which may travel long distances because of its small size. It is therefore imperative to establish the hazardous nature of

these pollutants (gaseous or solid dust particles), assess exposure level of the communities to these pollutants, identify health effects and finally establish a cause-effect relationship, in order to confirm or negate this perception. The application of the health risk assessment paradigm scientifically investigate a cause-effect relationship, between exposure of nearby communities to gold mine tailing dust and adverse health effects experienced by these communities. Bulk dust samples were collected from different sites, fractionated into different size ranges and their toxicity was assessed using different assay systems. A major concern was the interference of the particles tested in number of test systems. The latter was, however, rectified using the xCELLigence system, which has allowed for label-free and real-time monitoring of cellular processes such as cell proliferation, cytotoxicity, adhesion, viability, invasion, and migration. In addition, the uptake of these particles by bronchial epithelial cells in culture was assessed using the CytoViva Hyperspectral Imaging system.

Characterisation of the size distribution of manganese dioxide (MnO₂) dust particles collected from SAMANCOR: cytotoxicity and mobilisation of manganese nanoparticles and ions from MnO₂ dust particles to neuronal cells in culture

Funding: Mine Health and Safety Council

LA Koekemoer was awarded a short-term grant to visit the laboratories of Prof M Aschner of Vanderbilt University Medical Center and was trained on specialised uptake studies of manganese dioxide nanoparticles into astrocytes and other cells. This training has been completed and the relevant knowledge and expertise pertaining to the isolation of astrocytes from mice have been shared with the section.

Investigation of the surface activity of dust collected from selected gold, diamond, platinum and coal mines

Funding: Mine Health and Safety Council

This study is conducted by X Masoka in collaboration with the National Centre for Nano-Structured Materials of the Council for Scientific and Industrial Research and University of the Witwatersrand. N Matiwane has finalised a Master of Technology degree at the University of Johannesburg with this project.

Surface properties of dust were collected from gold, diamond, platinum and coal mines to alter different cellular functions. The physicochemical properties, toxicity and genotoxicity of the dust samples were then studied where the contribution of the different physicochemical properties of crystalline silica containing respirable mine dusts to the overall toxicity of these dust was identified. These toxicological effects of mine dusts will indicate different cellular metabolic functions and will explain the inter-mine specific differences in respirable mine dust toxicity, which affects the prevalence of silicosis.

Assessment of DNA methylation in a group of silicosis, lupus and scleroderma patients

Principal investigator: P Matatiele

Funding: Medical Research Council

Blood samples were collected for the isolation of T lymphocytes. The promoter methylation status of the 12 genes commonly associated with promoter hyper- (or de)methylation of CpG islands in autoimmune diseases and cancer was determined for control subjects. The genes were selected in view of their involvement in many collagen diseases, whose common characteristics include inflammation, autoimmunity and/or fibrosis as well as cancer. The global methylation status of the control subjects were determined followed by gene-specific analysis of CpG islands hypermethylation/hypermethylation using DNA microarray analysis. The principle investigator will commence collecting blood samples from lupus, scleroderma, and silicosis to assess global methylation as well as CpG islands hypermethylation/hypermethylation and compare them to hypermethylation/hypermethylation patterns of the control subjects.

Organisation for Economic Cooperation and Development/Department of Science and Technology research projects

Investigations continued on engineered nanoparticles (mainly on gold nanoparticles); this project was initiated within the Organisation for Economic Cooperation and Development (OECD) sponsorship programme. Projects initiated within this programme have involved the following research centres: NIOH (Prof M Gulumian), Mintek (Dr R Tshikhudo), National Metrology Institute of South Africa (S Prins) and Universities of Johannesburg (Prof Victor Wepener) and North West (Prof A Grobler). The programme was funded by the Department of Science and Technology. The following research projects are in progress or are newly initiated during the reporting period:

Testing of manufactured gold nanoparticles: Health risk assessment of gold nanoparticles manufactured in South Africa

For human toxicity studies, M Vetten has conducted the *in vitro* studies using bronchial epithelial cell lines to assess the toxicity of 14 nm and 40 nm citrate-capped colloids, as well as 14 nm core size with different monolayer and mixed monolayer clusters or coated with peptides to these cells. She has utilised the xCELLigence System to monitor their effect on cellular cytotoxicity, adhesion and viability. In addition, she has assessed their ability to cross cell membranes using the CytoViva Hyperspectral Imaging system. Results have shown that toxicity is size- and surface-property-dependent.

The biopersistence of nanomaterials

Investigator: MS Xaba (for PhD)

Co-supervisors: M Gulumian and S Prins (National Metrology Institute of South Africa)

A new project was initiated to investigate the degradation half-lives of core AuNPs as well as their surface ligands in simulant biological fluids *in vitro* over a period of 90 days. Results will give an indication to the long term pathological effects of the studied particles. The degradation process is to be monitored using a number of methodologies such as DLS, TEM, HrTEM, FTIR, hyperspectral imaging, ICP, N, and UV vis. spectral analysis.

Exposure assessment to nanoparticles in research laboratories

This project, initiated at the NIOH by the Toxicology Section with collaboration and assistance from the Occupational Hygiene Section, involved exposure assessment of nanoparticles during their synthesis and/or use in a research laboratory involving gold nanoparticles. The scope of the project involves the characterisation of the processes/tasks and identification of potential emission sources that could lead to exposure, evaluation of potential workplace exposures using the particle number concentration counters, and collection of filter-based samples for nanoparticle characterisation. As risk is a product of toxicity and exposure; it is imperative to assess exposure in the risk assessment of nanoparticles.

Comparative acute aquatic toxicity of nano-gold using a species sensitivity distribution approach

Investigator: T James (for MSc)

Supervisor: V Wepener

This new project involves the determination of the acute toxicity of gold nanoparticles and elemental gold using standardised OECD protocols for standard (*Daphnia magna*) and indigenous (*Caridina nilotica*) aquatic invertebrate species and for standard fish (*Danio rerio* and *Poecilia reticulata*) and indigenous (*Oreochromis mossambicus*, *Barbus trimaculatus*, *Tilapia sparrmanii*) fish species.

Aquatic ecotoxicology of nano-gold

Investigator: TL Botha (for PhD)

Supervisor: V Wepener

This project has involved the determination of the acute and chronic toxicity of gold nanoparticles and elemental gold using a suite of standardised OECD bioassays and also the determination of sub-lethal effects of gold nanoparticles and elemental Au in the model fish, *D. rerio*, using a suite of cellular biomarkers and 'omics' procedures.

HONOURS

Prof M Gulumian has been appointed by the Minister of Agriculture, Forestry and Fisheries to chair the Ministerial Task Team for the registration of pesticides in South Africa and has been invited by the WHO to join the Committee on Health Risk Assessment Training in Developing Countries, especially Africa. She was also appointed chairperson of the new Professional Advisory Committee: Toxicological Science in accordance with the Natural Scientific Professional Act, 2003 (Act 27 of 2003).

TEACHING AND TRAINING

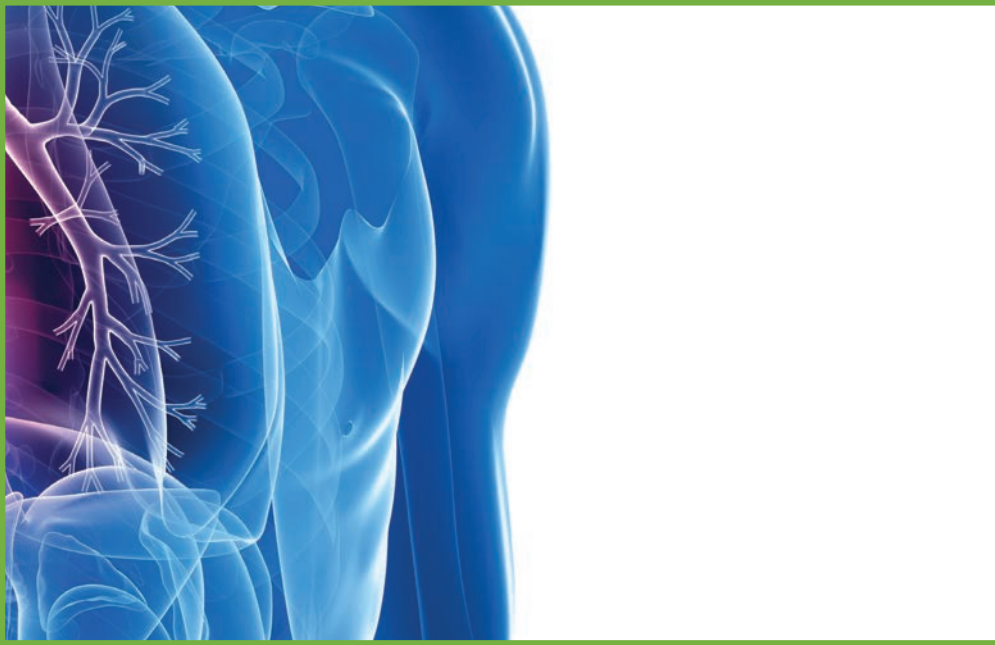
The section trains and supervises postgraduate students for Masters and PhD degrees and was involved in organising a two-week course titled: 'Health risk assessment certificate course' at the University of the Witwatersrand. The course provided an understanding of the basics of toxicology and human health risk assessment. It has also developed a common base of knowledge and terminology on human health risk assessment and provided a framework for developing risk-based management decision-making as well as discussed scenarios relevant to African countries through the presentation of case studies. The course, which was

funded by the International Council for Science and the National Research Foundation, trained 20 students from South Africa, Kenya, Tanzania and Nigeria.

PROFESSIONAL DEVELOPMENT

Postgraduate candidates enrolled: 10 (6 PhD, 3MSc, and 1 MTech)

“Prof Gulumian has been invited by the WHO to join the Committee on Health Risk Assessment Training in Developing Countries, especially Africa”



INFORMATION SERVICES





Angel Mzoneli

Head

INFORMATION SERVICES

The Information Services Section comprises South Africa's national reference library for occupational health; a query handling service providing technical and scientific information on occupational health to practitioners throughout South Africa and internationally; a resource centre with various publications from international agencies; and a SADC clearing house for occupational health information. During the reporting period, the libraries of the National Institute for Communicable Diseases (NICD) and the NHLS were incorporated into the Information Services Section. These three libraries now form an amalgamated NHLS Library Service.

SERVICES

The section continued its principal function of accessing and disseminating information in support of occupational health services throughout South Africa and the SADC region. It further developed capacity for occupational health professionals, university students, workers, management, health and safety representatives and trade union officials to source information on occupational health and safety.

The query handling service saw an increasing number of queries for technical and scientific information in occupational health issues. An extensive amount of queries were received from external stakeholders and students via the website which is linked to the in-house ticket query system, telephone, fax and through e-mail. The majority of the requests came from government departments from all nine provinces with a few originating from other countries.

Similarly, the national reference library, the only specialist reference library in the country dealing exclusively with occupational health and safety, continues to improve its holdings to respond to current issues in the broad field of occupational health, as well as support the newer research areas of TB and HIV in the workplace, mental health in the workplace, disability management and nanotechnology. The library has grown its electronic journal collection for access by users nationally.

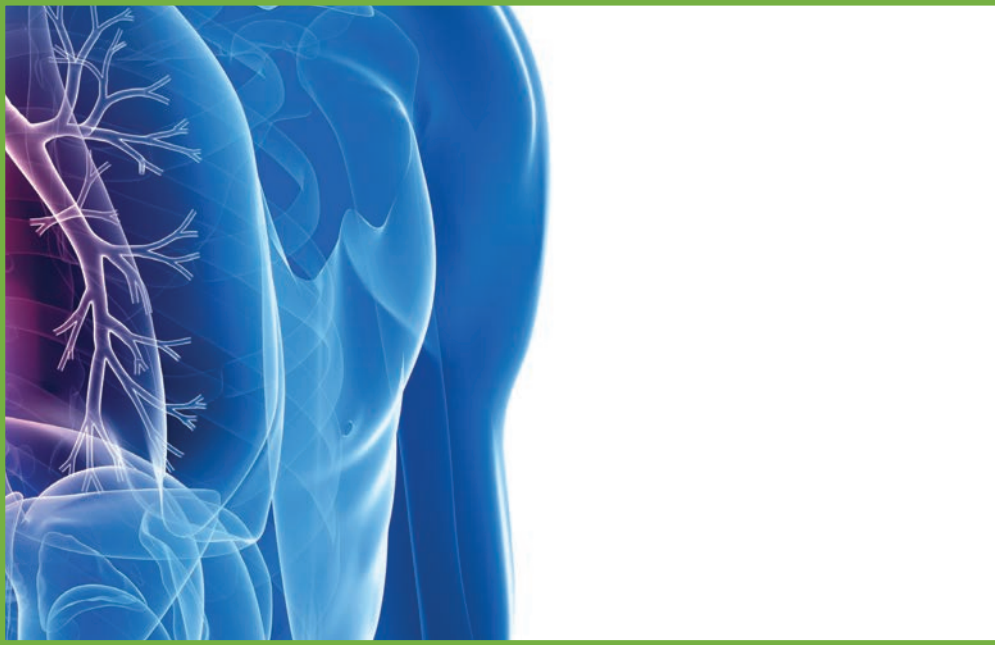
During the year under review, staff in the section consolidated and finalised policies and procedures for the consolidation of NHLS libraries. The libraries also continued to support the research function of the organisation by providing researchers with relevant literature necessary for their research projects. Information was sourced using the print scientific journals collection as well as the electronic resources, such as TDNet and other databases. The section held a month-long exhibition on HIV/AIDS awareness to commemorate World AIDS Day.

TEACHING AND TRAINING

The libraries provided training to new employees on information research tools such as the use of TDNet, electronic journals portal as well as Endnote reference management software to enhance their research skills in sourcing information. Library staff ran introductory sessions on Web 2.0 tools, including Zotero citation builder tool, to staff of the NIOH and NCR. These sessions will be extended to the staff of NICD and NHLS. The section provided ad hoc library orientation sessions to international visitors and local stakeholders including occupational health nurses, registrars, officials from provincial government departments of labour and health, trade union representatives, health practitioners and university students. The staff of the section published a paper in *Liasa In-Touch*, a newsletter of the South African Professional Association of Librarians, about the challenges faced by librarians in the preservation of library collections and the provision of access to digital library resources.

PROFESSIONAL DEVELOPMENT

Postgraduate candidate enrolled: 1 Msc (Epidemiology and Biostatistics).



COMMUNICATION AND INTERNATIONAL LIAISON





Claudina Nogueira
Head

COMMUNICATION AND INTERNATIONAL LIAISON

The section provides a support function to the NIOH and NCR as well as the NHLS, and the main objectives are the promotion of occupational health and safety and the development of human resources in the SADC region, through international training and outreach programmes. The section coordinates training programmes run by the NIOH, organises programmes for visitors and provides an event management, marketing and communications and a graphic design function for the institute – internally and externally, locally and internationally. Additionally, the section manages and coordinates the NIOH programme for continuing professional development through the Health Professions Council of South Africa.

Staff members attended and participated in two international and three national conferences, two international meetings and provided support at the 2012 WHO CC network meeting held in Cancun, Mexico.

SERVICES

Staff contributed to the management, content and design of the websites of the NIOH, NICD and NHLS, as well as the NHLS intranet. The NIOH intranet was consolidated with the NHLS intranet and re-launched as a single entry point for all employees. The three websites were also modified, redesigned and developed to reflect the corporate identity of the company.

The section's staff are members of the NHLS Communications Forum and attended the monthly meetings which brought together communications representatives from the NHLS, NIOH and NICD. The

aim of these meetings was to develop and implement a common communications and marketing strategy across the NHLS as one organisation. Staff also attended the first editorial committee meeting that was convened by Communications Unit in Sandringham with the intention to unify and align all support units with the revised corporate identity of the NHLS as well as to enhance relations between units from a communication perspective.

The section was involved in the planning of the Laboratory Medicine Congress (LMC) and attended various meetings of the Steering Committee, representing the NHLS and the NIOH. The section contributed to the logistic arrangements and the scientific programme of the LMC, at which the NHLS was the diamond sponsor. The section was responsible for many aspects and facets of the congress, including extensive pre-conference preparation and planning and one staffer managed and negotiated all of the following NHLS aspects linked to the congress:

- Designing and managing all the technical specifications and design elements for all facets of the stand;
- Managing relations with congress organiser for the NHLS exhibition stand, which was custom built;
- Creation of an NHLS newspaper in commemoration of the 10th birthday celebration, which highlights the great work done by NHLS as well as its sister institutes, the NIOH and NICD;
- Organisation of the 60th Anniversary Society of Medical Laboratory Technologists of South Africa gala dinner, which was sponsored by the NHLS, from concept generation to execution; and
- Design and development of a composite video for the NHLS, NIOH and NICD to be displayed at the congress on the AV equipment.



The NIOH was allocated an exhibition stand for marketing and networking purposes at the Health and Safety Construction Seminar organised by the Inspection and Enforcement Branch of the Department of Labour in February 2012. The two-day seminar was the ideal platform for NIOH staff members to network and re-establish contact with occupational health and safety professionals in the construction and related sectors.

STAKEHOLDER ENGAGEMENT

Staff members were responsible for co-ordinating and providing the logistic arrangements for visits by key stakeholders which aimed to re-establish links and initiate new collaborative endeavours. During the reporting year, meetings were held with representatives from: trade unions (COSATU, FEDUSA, and NACTU); the Department of Labour and the Compensation Commissioner; provincial occupational health coordinators; the Chamber of Mines; the International Cooperation Branch of the Organisation for the Prohibition of Chemical Weapons (The Hague, Netherlands); the Cancer Council (New South Wales, Australia); NIOSH-CDC (USA); the International Atomic Energy Agency; the Institute of Child Health at University College London Centre for International Health and Development; the Australian Volunteers International; the Safework International Labour Organisation and SHE managers from the AVENG infrastructure development group. In March 2012, a declaration of a statement of intent between the US Environmental Protection Agency and NIOH was signed with the intention of working closely on the development of risk assessment training programmes.

The section coordinated visitor programmes for occupational health nursing students from the Universities of the Witwatersrand and Johannesburg; oncology nursing students from the University of the Witwatersrand; a lecturer from the College of Health Sciences, Zimbabwe; three students from the University of Nairobi, as well as one grade 11 pupil from Holy Rosary Convent, as part of a job-shadowing and community service programme of the school.

The NIOH hosted a Wellness Day for NIOH and NCR staff in August 2011.

LOCAL AND INTERNATIONAL COLLABORATIONS IN OCCUPATIONAL HEALTH

The Section has contributed extensively to collaborating, networking, fostering and maintaining links with international organisations (WHO, International Labour Organization, International Commission on Occupational Health, NIOSH-CDC, USA, Finnish Institute for Occupational Health, Health and Safety Laboratory UK, International Association of Cancer Registries) as well as local societies and stakeholders: the national and provincial Departments of Health, Labour and Mineral Resources, the South African Society of Occupational Medicine, African Regional Association for Occupational Health, South African Society of Occupational Health Nurses, Mine Medical Professionals Association, academia, union representatives, employers, employees, and public and private sector interests.

Three NIOH staff attended an international one-day course on the prevention of needlestick injuries entitled 'Occupational health for healthcare workers in the healthcare setting', held in March 2012 at the Mexico Convention Centre, prior to the opening of the International Commission for Occupational Health congress. The aim of the course was to look at good practices in the healthcare setting that will reduce illnesses contracted from needlestick injuries. The course was presented in both English and Spanish with 80 participants attending, including nurses from primary healthcare facilities in Cancun, Mexico. This course was presented by representatives from WHO headquarters (Geneva) and NIOSH (USA), and had a significant impact for NIOH staff as it is directly aligned with the WHO Global Plan of Action for Workers Health, Priority 3: National programmes and good practices for occupational health and safety of healthcare workers, which the NIOH CC will be contributing towards.

Section staff lectured to occupational health nursing students attending the OCSA Diploma in Occupational Health Nursing in May 2011, on the functions of WHO CC in Occupational Health, the NIOH and the NCR, and represented the NIOH at African Regional Association for Occupational Health and South African Society for Occupational Medicine ExCo meetings throughout the year and on the International Commission for Occupational Health Working Group for Occupational Infectious Agents.

WORLD HEALTH ORGANIZATION

WHO recognises that workers' health, safety and well-being are vital concerns to hundreds of millions of working people globally. However, the issues extend beyond individuals and their families. They are of paramount importance to the productivity, competitiveness and sustainability of enterprises, communities, and to national and regional economies. In 2007, the World Health Assembly endorsed the Workers' Health: Global Plan of Action (GPA) to provide impetus for action by Member States to promote its implementation, and to maintain and strengthen the network of WHO CCs for Occupational Health (OH) as an important mechanism for its implementation.

As a WHO CC in OH from 2005 to 2009, the NIOH continued to be an integral part of the WHO CC in OH Global Network Plan (2009-2012). The NIOH has recently been re-designated a WHO CC in OH for a second four-year term, largely due to the section's efforts and contributions, as a designated WHO CC in OH.

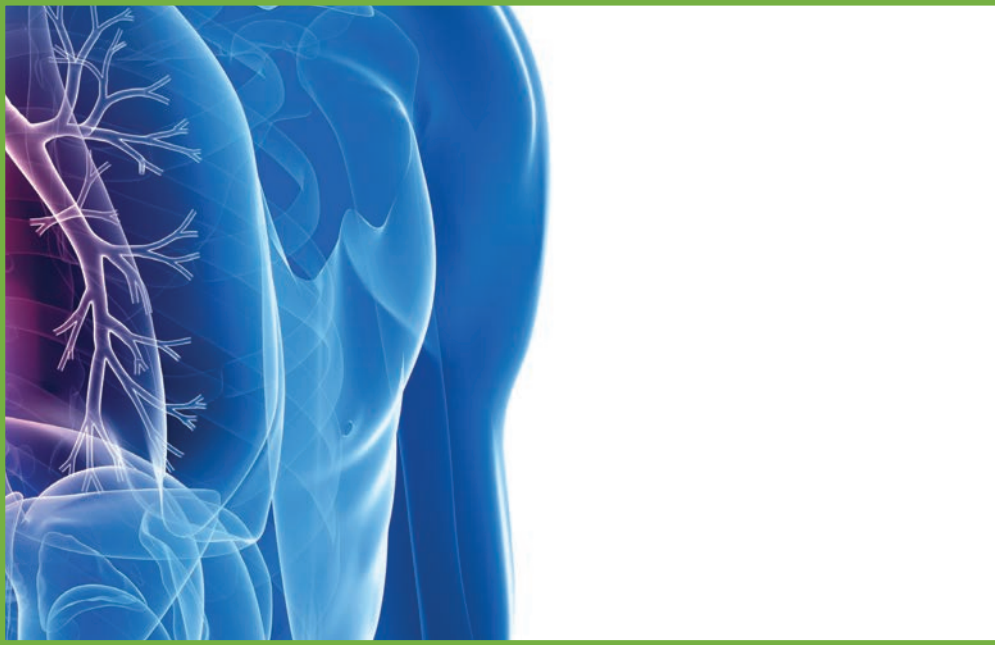
Staff contributed to WHO initiatives, mainly by continuing to provide a global management role for Objective 1: To devise and implement policy instruments on workers' health, within the current Global Network Plan (2009-2012), based on the Global Plan of Action (GPA) for Workers' Health. Dr B Kistnasamy (NIOH/NCR Director) appointed Dr T Singh (Immunology and Microbiology) as the new international liaison officer for the NIOH. Future submissions and liaison with initiative leaders of GPA Objective 1 will be the responsibility of Dr Singh, as well as the submission of NIOH progress report, in line with NIOH-WHO CC in OH terms of reference.

The section, together with Immunology, participated in monthly teleconferences for the GPA Objective Managers, to discuss and keep abreast of new developments within the Global Network Plan, and the gradual translation of the current projects into the next Global Network Plan (2012-17). This new plan was presented at the 9th Global Network meeting, Cancun, Mexico in March 2012. The impetus and objectives were to review the progress made by WHO and its CCs in implementing the GPA, and to develop a strategic and focused work plan for further implementation of the GPA objectives for the period 2012-2017. The meeting was attended by 63 participants representing collaborating centres, non governmental organisations (NGOs) and businesses from 18 countries from all six WHO regions, including occupational health and safety experts, government officials, business representatives,

representatives of NGOs, and representatives of various United Nations agencies. The section provided support to the WHO for this meeting and was involved in writing the report for it.



“Collaboration, networking and fostering and maintaining links with international organisations is a focus point of the Communications sector”



NATIONAL CANCER REGISTRY AND RESEARCH





Dr Danuta Kielkowski
Manager

NATIONAL CANCER REGISTRY

The National Cancer Registry (NCR) collates and analyses newly diagnosed cancer cases and reports on annual incidence rates. The NCR is a pathology-based registry whose source of data is public and private histopathology, cytology and haematology reports within South Africa. In April 2011, a new cancer regulation, 380 of the National Health Act 2003, was gazetted, making cancer reporting a legal requirement using the newly promulgated cancer reporting form. All private pathology laboratories are now obliged to report cancer incidence to the NCR at the point of diagnosis, by the oncologists who treat cases as well as clinicians who suspect cancer and request specialised tests. Additional information collected on the new form includes geographical, residential and occupational information as well as health information such as smoking and alcohol history, and HIV status.

Several meetings were held with cancer interest stakeholders to discuss the implementation of the new cancer regulations, including the national Department of Health (Chronic Diseases Directorate), the Cancer Association of South Africa, the Cancer Research Initiative of South Africa, the Oncology Society, and various NGOs.

Data for 2003 and 2004 cancers have been published and made available on the NHLS website. Data from 2005 have been captured, coded, and cleaned; additional records are being requested from the NHLS IT Data Warehouse to complete the 2005 records. Staff is preliminarily cleaning data for 2009/2010 on request of the Department of Health but completeness of records has to be addressed before reports can be provided to the department and the public. Cancer trends were presented to the Department of Health in September 2011.

SPECIAL PROJECTS

New initiatives were formulated to establish hospital-based cancer registration in the Ekurhuleni municipality in Gauteng to collect cancer cases using the new cancer reporting forms. Ekurhuleni is the preferred municipality to pilot this project as it has three million inhabitants of all social and ethnic groups with six public hospitals and 21 private health providers, including two private cancer treatment centres. This project will involve both public and private health facilities. Data collection started in January 2012. Another initiative is to establish a childhood cancer registry with reporting by specialised child oncologists on new juvenile cancer cases to the NCR. A national report will be available in 2013 on the 2012 childhood cancers reported.



*Melvyn Freeman, Cluster manager: Non-communicable diseases
Department of Health, holding up new cancer reporting regulations*

International collaboration

It was established and agreed upon in early 2011, through collaboration with Bern University (Switzerland) and the International Epidemiologic Database Evaluation of AIDS funding agency that a study will be done on the changing patterns of cancers among adult patients on antiretroviral treatment. The study will link 10 HIV treatment cohorts from South Africa to the NCR database. The project is funding a PhD student, M Sengayi who, began preparation for the study in June 2011. The student will do the record linkage of cohorts and the NCR data and use the research funding for her postgraduate degree thesis.

TEACHING AND TRAINING

Dr Kielkowski attended the 33rd annual meeting of the International Cancer Registries in Mauritius (11-13 October 2011) where she presented a paper on prevention of cervical cancer in developing countries. Pre-conference training courses on cancer analysis methods were also attended by NCR staff. M Sengayi has registered her PhD project with the University of Bern and attended a course titled 'Advanced survival analysis for cohort studies at the University of Bristol, Switzerland.

HONOURS

M Sengayi was awarded the University of the Witwatersrand Faculty of Health Science Prestigious Postgraduate Degree Award (MSc by course work and research report) 2011 and the W Harding Le Riche Medal in Epidemiology 2011 for her MSc Epidemiology and Biostatistics project 'Predictors of loss to follow-up in children receiving antiretroviral treatment in Johannesburg, South Africa'.

NHLS/MRC CANCER EPIDEMIOLOGY RESEARCH GROUP

The mandate of the Cancer Epidemiology Research Group (CERG) is to identify and quantify the causes of human cancer in South Africa, particularly those that are potentially preventable, in order to inform policy on cancer prevention and control. Additionally, the CERG assists the NCR with the publication of scientific reports on incidence of cancers. Ms M Urban, acting manager of CERG, is a member of the Technical Advisory Committee of the NCR.

Since September 2011, seven cancer epidemiology research meetings have been organised by CERG staff members. These meetings are designed to increase interest in cancer research and in collaboration with various interested parties, inter alia the NIOH Department of Epidemiology and the University of Witwatersrand (Wits) School of Public Health.

RESEARCH

The foundation of the CERG's research is a large-scale cancer case-control study which began in 1995 in order to collect data on causes of cancer among black South Africans. During the year under review, 1,325

new patients were added to the database and blood specimen collection.

Collaborators: M Urban, Dr C Babb (CERG); Prof P Ruff, Prof M Hale, Prof M Patel (Departments of Medicine, Anatomical Pathology, Haematology and Medical Oncology, Chris Hani Baragwanath Hospital, Charlotte Maxeke Johannesburg Academic Hospital and Wits); Dr V Sharma (Department of Radiation Oncology, Wits); Prof F Sitas (Cancer Council New South Wales, Sydney, Australia)

Ongoing and concluded projects within the Johannesburg Cancer Case-Control Study (JCCCS) include:

International collaborative study on risk factors for squamous cell carcinoma of the oesophagus (InterSCOPE)

Study team: M Urban, Prof F Sitas; Drs T Waterboer and M Pawlita (Virology Section, German Cancer Research Centre, DKFZ)

This international collaboration included collaborators from six studies and involving nine countries. The first paper, on human papillomavirus (HPV) involvement, concluded that these viruses play a very small role in causing oesophageal squamous cell cancer. CERG

"April 2011, a new cancer regulation, 380 of the National Health Act 2003, was gazetted, making cancer reporting a legal requirement"

assisted Prof M Hale of the NHLS/Wits Department of Anatomical Pathology with obtaining ethics clearance and the development of a material transfer agreement for the corresponding histology blocks from those Johannesburg patients with very high HPV antibody levels in order to test for HPV integration into the tumours, which is the next phase of the collaboration.

Injectable and oral contraceptive use and cancers of the breast, cervix, ovary and endometrium

Study team: M Urban; Dr E Banks (National Centre for Epidemiology and Population Health, the Australian National University); S Egger, Dr D O'Connell, Dr K Canfell and Prof F Sitas (Cancer Council New South Wales, Sydney); Prof V Beral (Cancer Epidemiology Unit, University of Oxford, UK)

This work found that women recruited within the JCCCS from 1995 to 2006 who used either or both types of hormonal contraceptives had about a 1.7 times higher risk for developing breast cancer and 1.4 times higher risk for developing cervical cancer than women who had never used hormonal contraception. Although an increased risk has been shown before for the Pill, this is the first time that a similar risk has been confirmed for the Injection. The increased risk decreased to the background risk by 10 years after last use. It was also found that use of these preparations has a protective effect against ovarian and endometrial cancers. These findings may assist the Medicines Control Council when they next revise their guidelines for use of these preparations. Funding was received from the Cancer Council New South Wales to travel to Sydney to finalise the paper for publication in September 2011.

Collaborative groups on hormonal factors in female cancers

Contributing scientist: M Urban

The CERG is part of this large international collaboration which is being coordinated by the Cancer Epidemiology Unit at the University of Oxford UK. CERG has submitted the data used in the analysis referred to above and will soon submit an additional two years of data. The collective data set will be large enough to allow for the exploration of many possible risk factors and subdivisions relating to both endogenous and exogenous hormones. Funding was received from the University of Oxford to attend a collaborators meeting in Oxford July 2011.

Tobacco and cancer - snuff use

Study team: Dr C Babb, M Urban; Associate Prof OA Ayo-Yusuf (Department of Community Dentistry, Faculty of Health Sciences, University of Pretoria)

Analysis of accumulated data is in progress. A supplementary questionnaire is being used to obtain additional information from cancer patients who use this form of tobacco. This is yielding interesting results particularly in relation to why a person begins to use snuff. Final analysis results could help to motivate for better regulation of this type of tobacco.

Risk factors for liver cancer

Study team: M Urban; Dr B Sartorius (School of Public Health, Wits)

Cases have been matched to appropriate controls and preliminary analysis done based on questionnaire data. The corresponding serum specimens will be tested for hepatitis B and C; existing information on HIV status from earlier testing will also be incorporated prior to final data analysis.

Genetics of cancer in black South Africans

Investigator: Dr C Babb

An agreement has been reached with the NHLS/Wits Human Genetics Department to use laboratory space and equipment for the 'wet work' this new research thrust will require. Black Africans are genetically the most diverse populations in the world. Very little is known about their heritable risk for cancers. This is a 'hot' research topic, especially in the USA. The CERG/JCCCS has a head start as it has been collecting whole blood specimens for DNA extraction since 1997 with approximately 16,000 specimens being stored. In January 2012, ethics clearance was obtained to begin the extractions.

Progress has been made on the following genetic projects using archived JCCCS data and specimens:

- Men of African descent and Carcinoma of the Prostate (MADCaP) Consortium: this multi-institutional collaboration of epidemiological studies addresses the high burden of prostate cancer among men of African descent. The principal investigator is Prof TR Rebbeck, University of Pennsylvania, and collaborators are from Cape Town, Johannesburg (CERG), Senegal, Nigeria, Bahamas, Uganda and USA;
- Replication of a GWAS (genome wide association study) for breast cancer in the black South African population: this is a collaboration with Prof O

Olopade of the University of Chicago who has worked with US and Nigerian data and specimens;

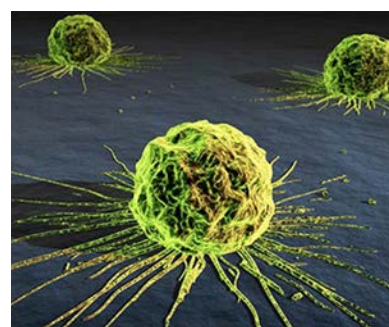
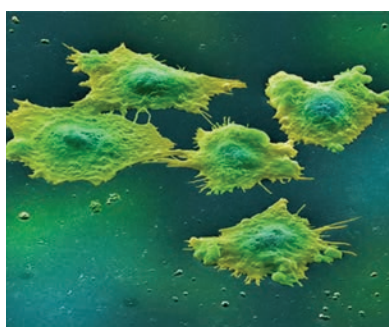
- BRCA1 and BRCA2 mutational status of ovarian cancer patients: this is an additional University of Chicago collaboration;
- Genetic susceptibility for colorectal cancer in South African black patients.

TEACHING AND TRAINING

Lectures on epidemiology of cancers were presented in the Graduate Entry Medical Programme (GEMP) at Wits. Tutorials on the epidemiology of cancers in South Africa and cancer cytogenetics and pharmacogenetics

were presented to honours students at Wits' Division of Human Genetics, and material for cancer epidemiology lectures was provided to the University of Cape Town Medical School.

A staff member participated in a three-week course in Italy entitled 'The European Educational Programme in Epidemiology'. The course covered study design and statistical analysis and cancer epidemiology. Another staffer attended a one week course on the use of Statistics Canada's G-Link Software for probabilistic record linkage where no unique identifier is available. The software can potentially be used for linking large databases.



RESEARCH OUTPUT

Publications

Journal articles

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