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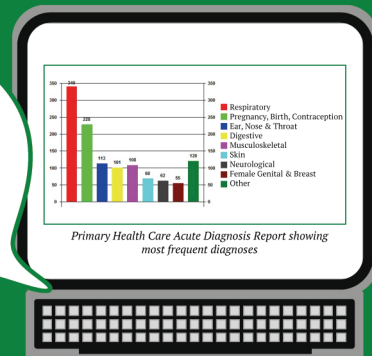


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From the Editor . . .



**Gill Nelson,
Editor-in-Chief**

Although August was Women's Month, we continue our celebration of women in science from our last issue. In this issue, we showcase the women who are members of the National Institute for Occupational Health (NIOH) Research Committee. The Committee is diverse, and each member is unique in terms of her background and the skills that she contributes. It plays an important role in assessing research proposals for scientific rigour and guiding young researchers through the research process.

The scientific papers in this issue are written by researchers from the University of the Free State and Durban University of Technology, on the diverse topics of assessment of hand injuries for return to work, and healthcare waste management.

Physiotherapist, Monique Keller, as part of her PhD, observed her own hand actions and identified 105 hand-related activities of daily living while performing tasks over a 24-hour period. It is not surprising that so many hand grasps are documented in the GRASP Taxonomy,¹ given that our hands have 27 bones and more than 30 muscles,² which need to work in synergy for us to accomplish everyday tasks such as typing on a laptop and washing our faces. The tasks that we perform in the workplace are often more complicated. In most cases, our hands are the most important instruments that we use when working, regardless of the work that we do. Injured hands cannot simply be replaced – injuries need to be appropriately treated before a patient is declared 'fit' to return to work.

Shanaz Ghuman and colleagues present their findings from a study of general practitioners' healthcare waste management knowledge and practice in KwaZulu-Natal. Disposal of waste is a global problem, affecting healthcare workers, waste pickers, community members, and the environment. Many healthcare facilities – an estimated 30% globally and 60% in some developing countries³ – do not manage their waste correctly. This has been exacerbated by the COVID-19 pandemic, which resulted in thousands of tonnes of additional waste such as masks, syringes, and needles, much of which ends up in landfills. Consequences include, amongst others, needle stick injuries, exposure to pathogenic microorganisms, and poor water quality.³ It is encouraging that most of the general practitioners in this study reported that they were knowledgeable about the guidelines and legislation related

to healthcare waste management, and practised due diligence.

In June this year, a new public health journal was launched in Nigeria – *Discoveries in Public Health*. I was asked to write a commentary for the maiden issue, which we have republished as an opinion in this issue of *Occupational Health Southern Africa*. The *Discoveries* journal is a publication of the Faculty of Public Health, College of Medicine, University of Ibadan, and was launched on 1 June 2022. Prof. Godson Ana, Professor of Environmental Health Sciences at the University of Ibadan, is the Editor-in-Chief.

Science and art often go hand-in-hand, and one of our Editorial Advisory Panel members, Dr Andre Rose, together with Prof. Janine Allen-Spies, is currently exhibiting a collection of artisanal mining artworks in Kimberley. We need to remember that artisanal miners, defined as "subsistence miners who are not officially employed by a mining company, but work independently, mining minerals using their own resources, usually by hand"⁴, are not necessarily illegal miners ('zama-zamas'), and should not be viewed with the same distrust.

Last but not least, on our occupational health legislation pages, Bowmans highlights some aspects of the new Code of Good Practice on the Prevention and Elimination of Harassment in the Workplace. A recent podcast, discussing the obligations of employers in terms of the Code, is available from https://www.bowmanslaw.com/podcast_list/employment-matters-episode-428/.

We encourage you to continue your research and your academic writing, despite the challenges of the ongoing and extensive loadshedding to which everyone in our country is currently being subjected.



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Erratum

Prof. Julian Pillay's name was erroneously omitted from a short report that was published earlier this year. The corrected citation is: Govender P, Singh D, Pillay JD, Ghuman S. Low back pain as an occupational risk among supermarket cashiers in KwaZulu-Natal, South Africa. *Occup Health Southern Afr*. 2022; 28(2):59-62.

The paper has been amended accordingly, and is available for download from: <http://occhealth.co.za/index.php?p=issue&i=343>

Institution of Occupational Safety and Health call for research proposals

The Institution of Occupational Safety and Health (IOSH), a leading global chartered professional body for safety and health at work, is reopening its research fund in 2022.

IOSH is making an international call for research proposals (in English) from experienced researchers to explore and influence the adoption of occupational safety and health as a universal, basic and fundamental right at work. The requirement is for diverse and inclusive research that has global reach and focuses on both high-income countries (HICs) and low- and middle-income countries (LMICs). It invites proposals that explore any of the following aspects of occupational safety and health (OSH) delivery:

- organisations from high-, medium- and low-risk sectors;
- services provided for formal and informal sector workers; and
- service delivery from a multi-disciplinary approach.

Background

Despite recognition of OSH as a basic human right, with the recent adoption by the International Labour Organization (ILO) of a safe and healthy working environment as a fundamental principle and right at work, 80% of the global working population still does not have access to basic OSH services, the scope of which is clearly outlined in the ILO's conventions. Where these services are implemented, they

vary in scope, content and quality of service delivery, and disparities are experienced between HICs and LMICs, as well as between occupational sectors and models of work. IOSH has long called for OSH to be recognised as a fundamental right at work.

Research objectives

New research is necessary to explore, globally, the scope, reach, and effectiveness of OSH service delivery to workers in order to understand the influence of country economic status (eg HICs vs LMICs), national policy, laws and regulations (such as the ratification of ILO conventions), organisation size (e.g. large, medium, small and/or micro), models of work (e.g. formal and informal), and occupational sectors. This research will help us support international efforts over the next decade to embed social elements of sustainability, which require decent work, effective OSH management, the prevention of modern slavery, and protection for those in the informal economy.

The call involves a one-stage application process, offering a budget of up to £150,000 (GBP) – approximately R3 million – to deliver the project. The deadline for applications is 23:59 (GMT) on Monday, 28 November 2022. For more information on how to apply, visit www.iosh.com/osh-research22



WHWB surveys healthcare providers who wish to participate in its work

Workplace Health Without Borders (WHWB) is an international non-profit organisation (NGO) that works on a volunteer basis to advance the protection of workers and promote best practices to improve worker safety and health, particularly for vulnerable groups of workers in resource-poor settings. One of WHWB's goals is to provide workers with technical assistance, training, and skills development to help them to develop the capacity and local infrastructure to manage and improve health and safety conditions in their respective workplaces. Another goal is to assist NGOs in developing countries to integrate occupational health into their operations. For more information, visit www.whwb.org.

Although WHWB was founded in 2011 by occupational hygienists, its membership has grown substantially over the years to include other occupational health and safety professionals, many from developing countries. Hence, WHWB has founded a 'Health Care Working Group,'

so that inputs from other occupational health and safety professionals can be included in its occupational health offerings.

There is interest in setting up programmes for healthcare providers who want to learn more about occupational health and through which WHWB members can volunteer to provide training, mentoring and other assistance to those who want to learn. We are therefore conducting a survey to find out about the expertise and knowledge that our members can share, and about whether they would like training or assistance.

This survey can be filled out by any healthcare provider who is interested in taking training, being mentored, or volunteering with WHWB.

If you are interested, please complete the survey at your earliest convenience. Please share it with any other healthcare providers who may be interested.

[Here is the survey link.](#)

Eureka: Delving into artisanal diamond mining

Eureka is an exhibition of artworks by Prof. Janine Allen-Spies and Dr André Rose, currently running at the William Humphreys Art Gallery in Kimberley, that investigates artisanal diamond mining in the Northern Cape province of South Africa. The project is a transdisciplinary collaboration from the respective vantage points of the arts and public health.

Artisanal mining refers, mainly, to subsistence mining (miners who are not formally employed by mining companies). These workers sometimes do not have mining permits and are, therefore, often regarded as 'illegal miners'. There may also be undocumented foreign miners who are not legally authorised to work in the country. Artisanal mining has recently moved into the national spotlight, following several deeply disturbing incidents across South Africa that involve this marginalised community. The artworks interrogate the social, environmental, and occupational health and safety impact on this mining community. David Rees, Professor emeritus at the University of the Witwatersrand, anticipates that the exhibition will initiate discussion on the lives of the miners, highlighting *"the necessary steps to find interventions that are humane, sound and pragmatic to protect them, their families, the surrounding communities and the environment."*

Rose and Allen-Spies used a variety of art mediums to explore the complex narratives. The artists allow the voices of these communities to siphon through the artworks and tell the story of what drives one to engage in such precarious and arduous work. Amongst the dust and dreams, what is unearthed from these miners' psyches is a story of hope and the resilience of the human spirit to persevere against unlikely odds.

Prof. Peter Glendinning, Professor of Photography at Michigan State University, United States, lauded the exhibition, stating, *"[it] is an*

outstanding example of how creative vision, applied to difficult human circumstances, can both share information and provide a viewer with a series of striking visual experiences."

MC Roodt, curator at the William Humphreys Art Gallery, stated that *"an exhibition like this truly legitimises the lived experience of undocumented workers, a large and important community that is shaping Kimberley in numerous ways."* Referred to as 'zama-zamas', their story has mixed narratives and perspectives of criminality and environmental destruction that pervade the discussion. The exhibition explores these constructs but also brings to the surface the everyday struggles of the miners.

The exhibition *"weaves together the thread of their humanity with that of the viewer so that we are left feeling empathy for their plight and their struggle to survive from day to day"*, says Dr André Rose. Prof. Allen-Spies reflects that, *"We get glimpses into their struggle for decent work, improved housing, and access to basic services, and a desire for their humanity to be acknowledged. These communities are often invisible, but the exhibition helps us to touch them and question our stereotypical constructs of the 'zama-zama'"* Prof. Crispin Chinguno, from the Sol Plaatje University, commented, *"The exhibition is important as it puts to the fore informal mining, which often is invisible and portrayed negatively in public discourse."*



Janine Allen-Spies, *Room in the rain*



Andre Rose, *Tjailatyd*

Janine Allen-Spies is an established visual artist based in Bloemfontein, and a professor in the Fine Arts Department at the University of the Free State. She uses traditional media such as painting, drawing, lithography, photography, installation, and performance art, and explores new media such as animation and digital drawing in her art practice. Allen-Spies' work is held in prestigious collections, such as the Luciana Benneton Collection (Venice Biennale), and Modern Art Projects. André Rose is a public health medicine physician and visual artist born and based in Kimberley. His art practice interrogates complex public health issues.

Exhibition dates: 17 August–31 October 2022

Venue: William Humphreys Art Gallery (WHAG), 1 Cullinan Crescent, Civic Centre, Kimberley, Northern Cape, South Africa

For more information:

e-Catalogue: <https://midd.me/Scs2>

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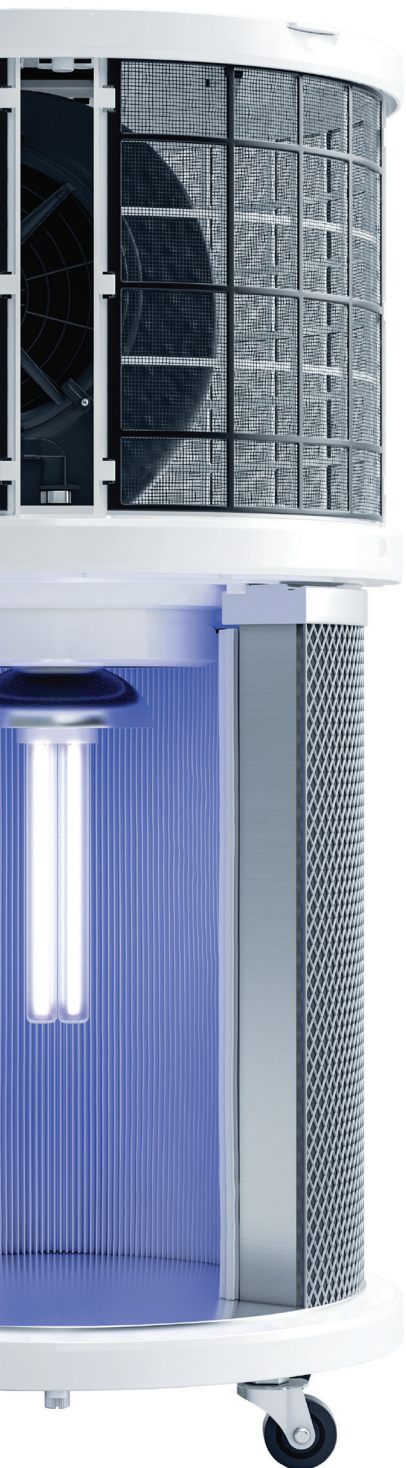
Andre Rose, *That I might hope*

Photographs: courtesy of Andre Rose



Janine Allen-Spies, *Mine with tumble weed*

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NIOH Research Committee: Saluting female research scientists advancing occupational health in South Africa

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Research in South Africa is critical to filling knowledge gaps and discovering new ways of mitigating occupational health burdens and challenges. According to the World Health Organization (WHO), nearly two million people die from occupational injuries and work-related diseases per year. Research in this sector is therefore vital. In commemoration of this year's Women's Month, we take our hats off to female researchers and scientists in occupational health who are advancing knowledge to promote healthy, safe and sustainable workplaces across South Africa and the world. In the 1960s and 1970s, the occupational health sector was dominated by men. However, young, innovative, high-achieving women currently make up 76% of the Research Committee at the National Institute for Occupational Health (NIOH) – a division of the National Health Laboratory Service (NHLS). The NIOH is a Centre of Excellence and a WHO Collaborating Centre. Research by this team is multi-disciplinary and covers a range of areas, including occupational diseases, epidemiology, exposure assessment, toxicology, occupational hygiene, sickness absence management, workplace and worker wellbeing/health promotion, evaluation of occupational health interventions, and health economics, among others. Their research became even more relevant during the COVID-19 pandemic, which saw many projects on SARS-CoV-2 being expedited to gain new knowledge of the impact of the virus on the health and safety of workers – in both the formal and informal economies. Today, we salute them for their hard work and dedication. Thank you for helping all workers in the quest for decent work.

Dr Natasha Sanabria

Dr Natasha Sanabria is the Head of the Toxicology and Biochemistry Section at the NIOH and the Chair of the Research Committee and has a wealth of experience, specialising in biochemical investigations and genetic analyses of disease-related states. These include gene expression during stress-conditions, 'self/non-self' recognition, innate immunity, cellular signal perception/transduction, and the



assessment of nanomaterial toxicity via molecular biology-based techniques. She is currently the Chair of the Research Committee, an Advisory Board member of the Institute for Nanotechnology and Water Sustainability (iNanoWS), an associate member of the American College of Toxicology, and a member of the international NanoSolveIT Consortium for in silico integrated approach to testing and assessment for the environmental health and safety of nanomaterials. Dr Sanabria holds both an MSc degree (*cum laude*) and a PhD in biochemistry, as well as an MSc degree in bioinformatics and computational molecular biology (*cum laude*). She is the recipient of the NRF Prestigious Award for discovering a new gene (GenBank accession number GU196248), and she received the National Research Foundation (NRF) Innovation Fellowship to complete postdoctoral studies, with training at Cold Spring Harbor Laboratory in New York in 2011.

Dr Nonhlanhla Tlotleng

Dr Nonhlanhla Tlotleng is a senior epidemiologist and is involved in research and surveillance activities within the Epidemiology and Surveillance Section. She is the Deputy Chair of the Research Committee and the Surveillance Lead in the Occupational Health Outbreak Response Task Team (OHORT) within the NIOH. Her areas of interest are respiratory health of workers, environmental exposure to hazardous chemicals, occupation-related cancers, and surveillance of workplace-related diseases. She serves as a member on the Occupational Health Surveillance System (OHSS) Steering Committee and Scientific Committee. She holds an undergraduate degree and an MSc degree in biotechnology from the University of Johannesburg (UJ), as well as a PhD from the School of Pathology and an MSc in Epidemiology and Biostatistics – from the University of the Witwatersrand (Wits). Dr Tlotleng is a research associate at the Department of Environmental Health at UJ, where she is supervising Master of Public Health (MPH) students.



Asanda Jekwa



Asanda Jekwa is a data input clerk in the Epidemiology and Surveillance Section of the NIOH. Her role entails administration and data capturing so that the team can execute their strategic objectives. Ms Jekwa obtained her matric certificate in Hlokoma and thereafter completed a training course in computer skills from Border Technikon. She is the Research Committee Secretary and assists with minute taking, project coordination and record-keeping duties.

Dr Annancietar (Noncy) Gomba



Dr Annancietar (Noncy) Gomba is a senior research scientist in the Immunology and Microbiology Section. She holds a PhD from the University of Pretoria (UP), MSc and BSc degrees from the University of Zimbabwe, and an MBA from Midlands State University, Zimbabwe. Dr Gomba joined the NIOH in 2017, where she has been responsible for the management of the Waterborne Pathogen Laboratory, and is involved in

teaching and training through development and management of training programmes, information dissemination, postgraduate student supervision and mentorship, and examination of master's student dissertations. Dr Gomba's research interests include water/wastewater and environmental microbiology, water reuse, and alternative water sources. She is a member of the Water Institute of Southern Africa, and the Legionella Action Group in South Africa, and serves as a member of reference groups on several Water Research Commission (WRC) research projects.

Zandile Hoyi



Zandile Hoyi is a principal medical scientist and manager in the Ergonomics Unit of the Occupational Medicine Section at the NIOH. In this role, she provides specialised services in ergonomics to the National Health Laboratory Service (NHLS) employees and external clients in both the public and private sectors. Hoyi is also responsible for research activities, and teaching and training on ergonomics. She has a BSc (Hons) degree

and an MSc degree in human kinetics and ergonomics from Rhodes University. She also holds certificates in user experience design and occupational health and safety, with training in incident investigation. Her areas of speciality and research focus are physical ergonomics (in terms of anthropometry – human body dimensions in relation to equipment and workstation design), worker safety and performance, and cognitive ergonomics (with an interest in human information processing in relation to situation awareness, cognitive workload, and function). Her work is aimed at understanding how the physical domain may impact the mental domain (and vice versa) and how that influences worker performance, in general.

Babalwa Jekwa



Babalwa Jekwa is a medical scientist, working in the Information Services Section of the NIOH. She holds an MSc degree in biochemistry from the University of Fort Hare. Her responsibilities include facilitating an efficient advisory service through the management of the NIOH query handling service, by receiving and responding to technical occupational health queries. Ms Jekwa plays a crucial role in the management of the NIOH publications and the

dissemination thereof to stakeholders. In her role in the Research Committee, she coordinates and oversees all current research projects, and records and archives all completed research projects. As a member of the Information Services team, Ms Jekwa contributes towards the training of stakeholders on the various sources of occupational health information that are available. While currently not actively involved in research, she is interested in topics related to emotional intelligence and work-life balance.

Dr Jitcy Joseph



Dr Jitcy Joseph is a medical scientist in the Toxicology and Biochemistry Section. She contributes to the effective running of the laboratory and manages the schedule to ensure that instrument calibrations, verifications, and maintenance are adhered to and are easily accessible. She is also involved in teaching, training, research, document management, quality management, and supervising postgraduate science students. Her areas of expertise are diabetes, obesity, and cancer drug discovery, in addition to occupational health.

Dr Joseph is currently collaborating on different research projects with the University of South Africa (UNISA), UJ, and the University of the Free State (UFS). She holds a PhD in biochemistry from UJ, and an MSc degree in biochemistry from Mahatma Gandhi University in India. Dr Joseph is the recipient of an NRF Thuthuka research grant for the 2022–2024 period.

Dr Boitumelo Kgarebe



Dr Boitumelo Kgarebe is the Head of the Analytical Services Department at the NIOH. As a practising analytical chemist with more than 30 years' experience, Dr Kgarebe has been devoted to contributing to aspects of theory and practice of analytical and measurement sciences in the areas of forensic toxicology, measurement science, analytical methodology, experimental methods, experimental protocols, and technical characterisations and instrumentation (sampling, analysis, electrochemistry, separation sciences, spectroscopy, and data processing, among others). She also supervises research in the Division of Forensic Medicine and Pathology at Wits, and lectures in the School of Chemistry. She holds a BSc (Hons) degree in chemistry, and MSc and PhD degrees in analytical chemistry – all from the University

of the Free State (UFS). She holds a PhD in biochemistry from UJ, and an MSc degree in biochemistry from Mahatma Gandhi University in India. Dr Joseph is the recipient of an NRF Thuthuka research grant for the 2022–2024 period.

of London, UK. She has more than 35 years of university teaching and research experience at both undergraduate and postgraduate levels. For seven years, she worked at the Organization for the Prohibition of Chemical Weapons (OPCW), a multilateral body in The Hague, Netherlands. She holds a Certificate of Recognition for her contribution to the outstanding work of the OPCW, which was awarded the 2013 Nobel Peace Prize for its extensive efforts to eliminate chemical weapons.

Dr Kgarebe is a Fellow of the African Academy of Sciences and a recipient of the Outstanding Woman Scientist (who has served the Academy) award for 2018. She is a member of the American Chemical Society and serves as a high-level expert of the African Union Commission. Dr Kgarebe mentors and supervises young scientists who are at various academic and professional levels in their careers. She serves as a referee for the European Union-funded African Research Initiative for Scientific Excellence (ARISE) Pilot Programme, which awards grants of up to €500 000 to 40 emerging African researchers, across 40 African countries, to start their own independent research teams and projects.

Tebogo Maeteletja



Tebogo Maeteletja is a safety, health and environment (SHE) officer for the Free State/North West region of the NHLS. She is a Southern African Institute for Occupational Hygiene (SAIOH)-registered occupational hygiene technologist with vast experience in coordination of the SHE system. Ms Maeteletja holds a BSc (Hons) degree in physiology and environmental health from the University of Limpopo and an MSc degree in public health from UP.

She has practised as an occupational hygiene technologist in an approved inspection authority (AIA) at the NIOH for eight years. This role has allowed her to assess workplace hazards across various industries. Her research interest is the global green economy, where eco-friendly advancements may introduce new workplace hazards.

Lerato Manamela



Lerato Manamela is a medical scientist in the Analytical Services Section. She is responsible for routine analysis of biological and environmental samples for monitoring exposure of chemical hazards in the workplace and public spaces. She is also tasked with the development, validation and accreditation of analytical methods under the ISO/IEC 17025 and ISO 15189 standards. Teaching and training of students and intern medical scientists

for the attainment of Health Professions Council of South Africa (HPCSA) registration is one of her responsibilities. Her research focuses on the chemical analysis and investigation of hazardous inorganic metals in biological and environmental matrices, and the development and validation of analytical assays using specialised techniques for the detection and quantification of chemicals or contaminants in a variety of matrices. She holds an honours degree in medical science from the University of Limpopo, and is currently studying towards her master's degree in chemistry at Wits.

Mantombi Maseme



Mantombi Maseme is a medical scientist at the NHLS National Biobank, housed within the NIOH, and is responsible for research and development, biobanking, and quality management system activities. She holds an MSc degree in bioethics and health law from Wits, a Bachelor of Medical Science (Hons) degree in pharmacology and a Bachelor of Medical Science (Hons) degree in physiology, both from UFS.

She serves on the International Society for Biobanks and Environmental Repositories (ISBER) Education and Training Committee, and was a content contributor to the *ISBER Best Practices: Recommendations for Repositories* (5th edition). Her research interests are diagnostic microbiology (antimicrobial resistance and pharmacogenomics), bioethics (purely normative and ethico-legal studies), and biobanking.

Dr Puleng Matatiele

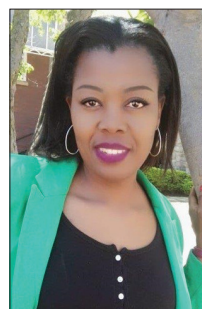


Dr Puleng Matatiele is a principal medical scientist and laboratory supervisor working in the Analytical Services Section's Organic Chemistry Laboratory. She joined the NIOH in 2008, as a senior medical scientist in the Toxicology and Biochemistry Section. In 2016, she joined the Analytical Services Section where she is responsible for conducting tests on biological and environmental specimens for exposure to toxic organic compounds (using HPLC, GC-MS and GC-FID), teaching and training of experiential

students, HPCSA intern scientists and technologists/technicians, and supervising research students at the Division of Forensic Medicine and Pathology at Wits. The Organic Chemistry Laboratory, under Dr Matatiele's supervision, has served as a reference laboratory (hexane exposure analysis) for the German External Quality Assessment Scheme (G-EQUAS) since 2015.

Dr Matatiele holds a PhD in biochemistry from UFS. Her broad research interests are at the interface between toxicology and analytical chemistry, with a focus on biological and environmental monitoring of occupational exposures to hazardous organic chemicals. Her latest work revealed that, due to the COVID-19 pandemic, there has been a shortage of name-brand hand sanitisers, causing some unethical manufacturers to release counterfeit products with toxic ingredients, which can lead to harmful or fatal side effects.

Dikeledi Matuka



Dikeledi Onnicah Matuka is a senior medical scientist, overseeing the Bioaerosol Unit in the Immunology and Microbiology Section at the NIOH. Her areas of speciality are bioaerosols, infection control, hazardous biological agents (HBAs), and microbiological indoor air quality in the workplace. Ms Matuka has 19 years of experience in occupational health and is involved in related research, supervision of medical intern scientists, and training of undergraduates, postgraduates, and other

occupational health professionals. She holds an MSc Med (*cum laude*) degree from Wits, and BSc and BSc (Hons) degrees from Potchefstroom University for Christian Higher Education (PU for CHE), now North-West University (NWU). Ms Matuka is a registered medical scientist (microbiology) with the HPCSA.

Lucia Naddy Mhlongo



Lucia Mhlongo is a medical scientist in the Pathology Division responsible for processing and analysing body tissue (mainly lungs) and bulk samples that may contain asbestos. This is a key function related to compensation for deceased miners, renovations of buildings with asbestos-containing materials, and the compilation of the annual pathology surveillance (PATHAUT) report. Ms Mhlongo is also responsible for research development and support. She has a BSc degree in medical science from the University of Limpopo, a postgraduate diploma in public health from the University of KwaZulu-Natal (UKZN), and an MSc degree in medicine from Sefako Makgatho Health Sciences University. Her area of research is cancer immunology and occupational health.

Ms Mhlongo is also responsible for research development and support. She has a BSc degree in medical science from the University of Limpopo, a postgraduate diploma in public health from the University of KwaZulu-Natal (UKZN), and an MSc degree in medicine from Sefako Makgatho Health Sciences University. Her area of research is cancer immunology and occupational health.

Angel Mzoneli



Angel Mzoneli is the Head of Information Services and Training at the NIOH. She holds a Master of Information Science (MIBL) degree from the University of the Western Cape (UWC), and a certificate in project management from the Cape Peninsula University of Technology (previously Peninsula Technikon). She championed the development of the first NIOH newsletter, *OccuZone*, in 2019 and served as the Chief Editor for two and a half years. She leads the three libraries of the NHLS, which provide essential support to the research function of the organisation. Ms Mzoneli oversees the efficient management of the Institute's research output and provides training on sourcing occupational health information to various stakeholders, including MPH students at Wits and other postgraduate students, and drives the training function of the Institute. She serves on various committees and is a member of the International Labour Organization (ILO) International Occupational Safety and Health Information Centre (CIS), which aims to enhance occupational health and safety knowledge and information networking activities. She has more than 20 years of work experience in the field of information and knowledge management, which includes working in the information services departments of two South African academic institutions.

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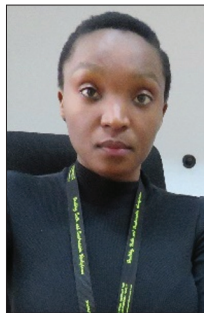
Zethembiso Ngcobo



Zethembiso Ngcobo is a senior medical scientist in the Pathology Division, where she is responsible for co-managing research projects and facilitating the development and validation of new tests. Ngcobo also manages the Electron Microscopy Unit, contributes to the total quality management, carries out laboratory work, and writes reports. She holds Bachelor and Master of Medical Science degrees in medical microbiology (the former, *cum laude*), and a BSc degree in microbiology and biochemistry – all from UKZN.

Ms Ngcobo's current research focus is on occupational and environmental asbestos, and the development of pathological molecular tests. In 2022, she obtained a PhD scholarship from the Institute for Nanotechnology and Water Sustainability (iNanoWS).

Lebogang Ntlailane



Lebogang Ntlailane is an occupational hygienist in the Occupational Hygiene Section. Her role involves conducting occupational health risk assessments and exposure assessments, research, and training various stakeholders, including internal staff, government officials, trade unionists, and occupational health professionals. Her area of research is exposure and control of occupational hazards; she also has interest and experience in nanomaterials.

Ms Ntlailane participates in research activities in the Section, which include the collaborative evaluation of respirable crystalline silica exposure levels in non-mining subsectors in South Africa. She is also currently involved in a pilot study of the applicability of the CytoViva system for the assessment of internal dose of dust particles in mine workers – an interdepartmental collaboration. She has an MSc degree in public health from UP, and BSc undergraduate and honours degrees, both from the University of Limpopo.

Winkie Siebane



Winkie Siebane joined the NIOH as a librarian in the Information Services Section in 2018. She is responsible for promoting the resources and services of the library, using marketing techniques; ensuring that the library collection is current, comprehensive and meets the academic needs of staff and students; and providing research support and reference services to the NHLS community. She is also involved in conducting information literacy training sessions on

using online databases/e-resources (and relevant platforms) to access information. She oversees the library's quality assurance processes, and is involved in the reviewing of existing SOPs/library manuals and writing new ones. Ms Siebane also digitises research output and converts analogue research output into digital format.

She is the Chair of the NIOH Health and Safety Committee, the health and safety representative for the Information Services Section, and a member of the NIOH Operations Committee. She holds a Master of Management degree in governance, a public and development sectors results-based monitoring and evaluation diploma from Wits, and a higher diploma in information science and a BA degree in communication science – both from the University of Limpopo.

Dr Tanusha Singh



Dr Tanusha Singh is the Head of the NIOH Immunology and Microbiology Section, with more than 21 years' experience in occupational health. Her major research interests are hazardous biological agents (occupational allergens, bioaerosols and waterborne pathogens), and their measurement and effects on worker health. Her main research objective is to assess the effectiveness of interventions that reduce biorisks in the workplace. Dr Singh

is revered for pioneering the Bioaerosol Monitoring Unit at the NIOH

(the only one of its kind in South Africa) and the Aspire Laboratory, a unique initiative that does not exist elsewhere in the world, and which serves as a resource for scientists pursuing interests in aerobiological science and research.

Dr Singh was also the Chair of the national ultraviolet germicidal irradiation (UVGI) technical task team and co-authored the South African UVGI guideline 'UVGI disinfection of room air: an evidence-based guideline for design, implementation and maintenance'. She sits on several committees, including the International Commission on Occupational Health (ICOH), the ILO, and the WHO, holds a joint appointment with the Department of Clinical Microbiology and Infectious Diseases at Wits, and actively contributes to undergraduate and postgraduate teaching and supervision in the Faculty of Health Sciences. Dr Singh is also a senior research associate of the Environmental Health Department at UJ. She has a PhD in clinical microbiology and infectious disease and is the recipient of a number of research grants.

Dikeledi Singo



Dikeledi Singo is an occupational hygiene technologist and joined the NIOH in 2015. She is responsible for conducting occupational hygiene exposure surveys and occupational health risk assessments, and participating in capacity building through teaching/training and research activities. Her research interest is asbestos, due to its extensive historical use in the construction industry. She also intends to conduct research related to the knowledge, attitudes

and perceptions on asbestos, specifically within the education sector. Ms Singo is part of a team that is conducting research on health risk assessments in COVID-19 mobile laboratory screening units. She has a BSc (Hons) degree from the University of Limpopo and a postgraduate diploma in public health from UP.

Dr Kerry Wilson



Dr Kerry Wilson is a senior epidemiologist and has worked at the NIOH for 15 years. Her research focus in the Epidemiology and Surveillance Section is on occupational mortality, occupational reproductive health, occupational health surveillance, mental health and staff satisfaction, and information systems in the workplace. She provides epidemiological support to a wide range of occupational health researchers. Dr Wilson is an Honorary Lecturer at Wits, and an

Academic Editor for PLOS one. She supervises postgraduate student research and is currently supervising six students. She obtained an MSc degree in biochemistry, with a toxicology focus, in 2002 from the University of Port Elizabeth, and later obtained her PhD from Wits, her research being based on toxicology and epidemiology.

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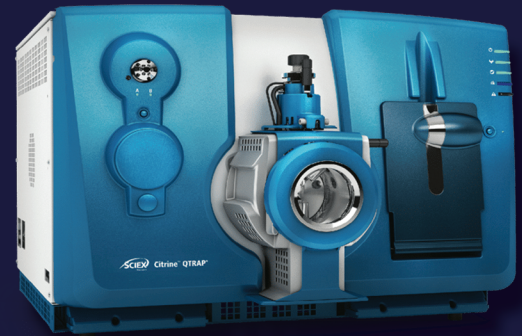
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Evaluation of grip strength and finger forces while performing activities of daily living

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ABSTRACT

Background: Healthcare practitioners guide patients with metacarpal fractures to return to work without enough evidence that the hand has attained the strength that is required for the job. Measuring finger forces and grip strength may be valuable in informing and grading rehabilitation for patients with metacarpal fractures, to ensure safe return to work without disrupting bone healing.

Objective: To estimate normal values for grip strength and finger forces, so as to guide clinical practice in terms of assessing hand strength, for early return to work, of patients who sustained hand fractures.

Methods: Using a cross-sectional study, the grip strength and finger forces of six healthy adults, aged 20 to 59 years, were measured during 105 predetermined activities of daily living (ADLs), which were divided into five categories. The predominant grasp, i.e. the grasp that is most apparent for the longest time during each activity, was identified from the GRASP Taxonomy. Finger forces were measured with 13 mm force-sensing resistors, glued to a glove attached to the dominant and non-dominant hands' fingers. Grip strength was measured with a Jamar hydraulic dynamometer at the beginning of the test procedure, and after performing 25, 50, 75, and all 105 activities. Differences between grip-strength measurements at each data collection point were analysed using paired t-tests. Finger forces were analysed using descriptive statistics.

Results: There were no statistically significant differences in grip strength before and after testing for either the left or right hand. Maximum finger forces ranged from 1–25 Newton (N) for personal care, 1–9 N for transport and moving around, 1–41 N for home environment and inside, 1–26.5 N for gardening and outside, and 1–20 N for office and outside. The predominant grasp type for all ADLs was the thumb in the adducted position.

Conclusion: Grip-strength and finger-force measurements can be used by healthcare practitioners to assess when hand strength is optimal for resuming tasks required in the workplace, which will allow them to facilitate or gauge the appropriate time for a patient to return to work.

INTRODUCTION

Hand function is vital for performing activities of daily living (ADLs) in healthy individuals and is a primary outcome for individuals with hand injuries.¹ Criteria for returning safely to performing ADLs, following second to fifth metacarpal fractures, are not backed by scientific evidence, which can assist in ensuring optimal healing and early return to work. Functioning entails a dynamic and complex interaction between the injury sustained and the personal and environmental factors unique to the individual.² The World Health Organization (WHO) upholds that patient management after injury should not begin and end at body function and structure level, but should also incorporate the activity limitation and participation restriction domains in the International Classification of Functioning, Disability and Health framework.³ The ability to perform self-care activities, occupational activities, domestic life routines, and leisure activities⁴ is imperative after injury. A hand injury may affect the individual's ability to perform ADLs independently, which are divided into basic and instrumental activities.⁵ Basic ADLs are those necessary for functional living and include self-care tasks to manage basic physical needs such as grooming and personal hygiene, ambulating, transferring, eating, and toileting.⁶ Instrumental ADLs are everyday activities that allow individuals to live independently, but require more complex planning and thinking. These include cleaning, doing laundry, cooking, managing finances, taking transport, maintaining the home, and using technology.⁶

Disability, lack of functioning related to hand injuries, and poor management of injuries have direct productivity and healthcare costs to the individual.⁴ In a Dutch study, injuries to the hand and wrists ranked as the most costly type of injury: an annual expenditure of \$740 million for the 2007 and 2008 period.⁴ Finger fractures were the costliest, with a yearly expenditure of \$278 million.⁴ No information is available regarding the costs of managing hand fractures in South Africa, but high costs include those related to loss of productivity when considering delayed return to work or absenteeism.^{4,7}

Although measuring finger and hand forces, using force-sensing resistors (FSRs), is relatively common in the fields of robotics and engineering, only a few studies have been conducted in health sciences. The FSR is a valid, easily accessible, and affordable force-measuring instrument, but has not fully been utilised to inform clinical practices for managing individuals with hand injuries.

Grasps are the subunits of hand ADLs which, when assessed by healthcare practitioners, may guide injured workers' return to work. Research previously focused on biomechanics, rehabilitation, and surgery but, since the development of robotic hands, has shifted to investigating the functioning of the human hand and the grasps used during ADLs. In 2016, Feix et al. published a paper on the comparison of human grasp taxonomies, in which they described the development of the GRASP Taxonomy, which

comprises 33 grasp types.⁸ Grasp types include power grasp with the palm or pad, intermediate grasp with the fingers' sides, and precision grasp with either the pad or sides of the fingers and opposition. For each of these three grasp categories, a distinction is made between thumb abduction and adduction during activities. Prior to the ADL, the hand is set with the wrist in a slight extension position, and is set for object manipulation before the predominant grasp for the ADL is used (predominant grasps are the main grasp types used to execute ADLs).

We assessed the dominant and non-dominant hand forces in six healthy adults, and the predominant grasp produced during basic and instrumental ADLs, to add to the existing knowledge of force-sensor testing research⁹⁻¹³ and to provide evidence to guide clinical practice. The objective of the study was to estimate the normal values for grip strength and finger forces, so as to guide clinical practice in terms of assessing strength, for early return to work, of patients who sustained hand fractures.

METHODS

A quantitative cross-sectional study was performed in Kempton Park, Gauteng province, South Africa. Six participants were purposively selected from the nearby community, based on their age (20–59 years), language (English or isiZulu), and close proximity to the testing laboratory. None had previous upper limb and/or hand injuries, current hand infections, diagnosed developmental delays, or diagnosed cognitive deficits. The age range was chosen because individuals younger than 20 years do not yet have skeletal maturity¹⁴ and those older than 59 years have a low prevalence of sustained metacarpal fractures.¹⁵ A self-administered questionnaire, translated from English to isiZulu, was used to collect demographic and occupational data.

The ADLs for the study were identified through observations of hand movements of one of the authors (MMK) over a 24-hour period and supplemented with tasks listed in the disability of the arm, shoulder, and hand (DASH) questionnaire.¹⁶ Thirty-nine of the 105 identified ADLs were basic and 66 were instrumental ADLs. The 105 ADLs were grouped into five categories: personal care and hygiene ($n = 39$), transport and moving around ($n = 8$), home environment ($n = 39$), gardening and outside the home ($n = 8$), and office and other ($n = 11$).

Grip strength

The grip strength of each participant's right and left hands was measured, using a calibrated Jamar hydraulic dynamometer at the beginning of the test procedure, after 25 activities, after 50 activities, after 75 activities, and after performing all activities. The grip-strength testing was done to ensure that hand fatigue did not affect the finger-force measurements. The Jamar hydraulic dynamometer has been shown to have good reliability and validity.¹⁷ Grip-strength testing was performed according to the American Society of Hand Therapy's recommended testing method.^{18,19} Grip strength was calculated for each hand as the mean of three measurements. If the mean grip strength of both dominant and non-dominant hands differed by two kilograms, the participant was given a five-minute resting period before testing resumed.

Finger forces

The forces exerted on the FSR are distributed through the hand and the healing structures. Flexiforce 13 mm FSRs 5" circle, 10 K 0.25 W resistors, and Arduino Pro Mini 5.0 V-compatible, ESP-01 kit, and Arduino UNO R3-compatible boards were used to measure the

ADL forces. The FSRs were connected in series with 10 kilo-ohm resistors, which were inserted into the Arduino Pro Mini; the FSRs were connected to the Arduino Pro Mini 5 Volt with a USB port. RealTerm 2.0 and Arduino software programmes created a sketch in the software programme, where measured voltages were fed into the software for hardware setup before testing. The FSRs were calibrated before data collection commenced.^{20,21}

Ten FSRs were glued to two gloves, one for the left and one for the right hand. Each of the 105 activities was performed only once unless an error in the reading of the forces occurred, in which case the activity was repeated.

The predominant grasp, i.e. the grasp that is most apparent for the longest time during each activity, was identified from the GRASP Taxonomy.

The Health Sciences Research Ethics Committee of the University of the Free State approved the study: UFS-HSD2019/0046/2602-0002.

Data analysis

The data for each activity were imported into an Excel spreadsheet. Maximum values for finger forces were computed and converted to N using the formula: $0.5917 \cdot \tan(0.3223 \cdot \text{max value})$. Data analysis was conducted using Stata 16.1. Means, standard deviations, and ranges describe the demographic data and the forces produced by the fingers. For comparisons between the grip-strength measurements at each of the data collection points, paired t-tests were performed. The hypothesis tested was that there would be no difference in grip-strength measurements between the left and right hands before and after force-sensor testing.

RESULTS

Six right-handed participants, three males and three females, participated in the study. The median age was 47 (36–58) and 44 (40–48) years for males and females, respectively. Two female participants were domestic workers and one was a teacher. Two of the male participants were gardeners; one was an electrical technologist.

Grip-strength measurements, presented as scores, are shown in Table 1. Although grip strength decreased slightly from the beginning to the end of the test, the paired t-test analysis showed no statistically significant differences before and after testing for the left ($p = 0.543$) or right ($p = 0.480$) hand.

The mean grip strength for the right hand was 28.7 ± 8.517 kg at the start and 28.8 ± 10.318 kg at the end of the testing procedure. For the left hand, the mean grip strength was 27.7 ± 7.520 kg and 27.2 ± 9.889 kg at the start and end, respectively.

The mean maximum finger-force measurements, per ADL category, are shown in Table 2.

The highest mean maximum forces were measured for the gardening and outside ADL category, for most of the digits. The office or other ADL category resulted in measurements that were lower than those for the other categories. The thumb worked the hardest in most ADL categories (up to 9.25 N), and the smallest forces were recorded for the 5th digit.

Twenty-four grasp types were identified during the 105 ADLs (Table 3). The most common grasp type was the adducted thumb ($n = 17$, 16.2%). [Supplementary Table 1](#) provides additional data: the grasp type, intensity of activity, and maximum forces measured per finger for all 105 activities.

Table 1. Grip-strength measurements of the participants’ right and left hands

Participant No.	Left hand grip strength (kg)					Right hand grip strength (kg)				
	Start	At 25 activities	At 50 activities	At 75 activities	End	Start	At 25 activities	At 50 activities	At 75 activities	End
1	27	25	23	20	22	26	27	23	21	24
2	42	39	39	31	31	45	43	40	38	37
3	26	34	38	40	46	32	31	31	38	47
4	19	16	19	17	18	20	15	17	21	20
5	31	27	28	25	29	29	28	27	27	28
6	21	14	18	12	17	20	15	18	12	17

Table 2. Mean maximum finger forces per ADL category

ADL category	Left hand digit force (Newton)					Right hand digit force (Newton)				
	5th digit	Ring finger	Middle finger	Index finger	Thumb	5th digit	Ring finger	Middle finger	Index finger	Thumb
Personal care and hygiene	0.87	2.01	2.79	2.73	3.61	0.41	2.59	2.24	3.13	5.61
Transport and moving around	0.61	2.55	3.59	1.61	2.69	0.57	4.46	2.76	1.87	4.11
Home environment	1.63	4.44	4.71	2.44	3.16	0.55	5.05	1.82	2.57	3.58
Gardening and outside	1.94	4.96	7.11	4.07	9.25	2.68	6.91	5.62	2.28	5.12
Office or other	0.41	1.95	3.11	0.80	1.77	0.31	2.26	1.08	1.55	2.09

Table 3. Predominant grasp types during ADLs* and number of occurrences

Predominant grasp type	n	%
Adducted thumb	17	16.2
Prismatic three fingers	12	11.4
Lateral tripod	10	9.5
Small diameter	9	8.6
Prismatic two fingers	9	8.6
Medium wrap	7	6.7
Fixed hook	5	4.8
Sphere four fingers	4	3.8
Palmar	4	3.8
Parallel extension	4	3.8
Index finger extension	3	2.9
Distal	3	2.9
Tripod	2	1.9
Quadpod	2	1.9
Prismatic four fingers	2	1.9
Lateral	2	1.9
Large diameter	2	1.9
Ventral	2	1.9
Power sphere	1	1.0
Precision sphere	1	1.0
Palmar pinch	1	1.0
Light tool	1	1.0
Inferior pincher	1	1.0
Writing tripod	1	1.0

*as per the GRASP Taxonomy⁸

DISCUSSION

The objective of this study was to estimate the normal values for grip strength and finger forces, so as to guide clinical practice in terms of assessing hand strength, for early return to work, of patients who sustained hand fractures.

Finger forces

In a study published in 1998, finger forces were measured when opening containers, using FSRs.¹⁰ There was a weak positive correlation between grip and pinch strength and the FSR measured for opening the containers. The authors concluded grip- and pinch-strength measures, in isolation, do not conclusively predict successful hand functioning. This supports the importance of measuring forces during a wider variety of ADLs to guide clinical practice, as was done in this study. Riddle et al. (2020) also recommended testing individual finger forces for the ability to cope with ADLs.⁹ To determine the forces during spherically shaped ball grasping with a tripod grasp, Romeo et al. (2015) placed FSRs on the contact areas of the ball to measure the forces exerted by the thumb, index finger, and middle finger. The participants were instructed to grasp, steadily hold the ball, and then let the ball slip out of hand. Forces ranged from 0.3–2.7 N,¹¹ similar to the forces measured in our study. The finger forces measured in our study were similar to those reported by Castro and Cliquet (1997) in a group of 30 normal individuals.¹²

The measured forces for each finger in our study can guide healthcare practitioners regarding which activities should be commenced before others, depending on the finger that is injured. With a 5th finger injury, most ADLs can be performed with advice from the healthcare practitioner, while thumb injuries may need longer to recover.

Grip strength

Grip strengths exerted by the individual fingers of uninjured persons during ADLs also provide a valuable contribution to the understanding of hand function.⁹ The values obtained in this study represent normal functioning, and may provide guidance for hand rehabilitation.

Grasps

The human hand is a highly sophisticated and functional tool used in ADLs and the execution of occupational tasks. Grasps are the subunits of hand ADLs which, when assessed by healthcare practitioners, may guide injured workers' return to work, where hand dexterity is vital. The grasps identified in this study can be assessed by healthcare practitioners in the management of individuals who sustain hand injuries. Although the GRASP Taxonomy⁸ lists 33 grasp types, we observed only 24 during the 105 ADLs. A possible reason for this is that only the predominant grasp for each ADL was identified; the GRASP Taxonomy incorporates tasks other than the 105 ADLs used in this study.

The predominant grasp of each activity can be used as a guide for the healthcare practitioners to assess and grade rehabilitation based on the grasps that the individual can manage, with the end goal of successfully performing the ADL before returning to work.

The sample size used in our study was small, but similarly small sample sizes have been used in previous studies that have investigated forces and pressures on hands and fingers.^{13,22}

It is recommended that future research includes the validation of the FSR testing instrument, a larger sample size, and additional ADLs that include all the grasp types listed in the GRASP Taxonomy. The 105 ADLs, although comprehensive, do not constitute a complete list of basic and instrumental ADLs that involve all the GRASP Taxonomy hand dexterity items. Hand grips and finger forces should be assessed for identified occupation-specific activities, to develop more specific guidelines for occupational medical practitioners.

CONCLUSION

There is a lack of data on ADL hand dexterity and finger forces to support rehabilitation for individuals who sustain hand fractures. This is the first study of finger force measurements of all 10 fingers during the performance of an extensive range of basic and instrumental ADLs. The FSR may prove to be a valuable functional assessment tool for decisions regarding the appropriate time to return to work after injury. Potentially, healthcare practitioners can use grip-strength and finger-force measurements to guide clinical practice.

KEY MESSAGES

1. The forces produced during basic and instrumental ADLs can be evaluated with force-sensor resistors.
2. Force-sensor resistors, together with hand-grip measurements, provide a low-cost, easily accessible and valid outcome measure to assess hand strength.
3. Scientific evidence is needed to guide safe return to work after sustaining a hand injury.

DECLARATION

The authors declare that this is their own work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design of the study: MMK, RB, CB

Data acquisition: MMK

Data analysis: MMK

Interpretation of the data: MMK

Drafting of the paper: MMK, RB, CB

Critical revision of the paper: MMK, RB, CB

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Knowledge and practices of private practitioners regarding healthcare waste management in KwaZulu-Natal, South Africa

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ABSTRACT

Background: Healthcare waste management (HCWM) poses a major risk due to its hazardous nature and deleterious effects on communities and the environment. There is a paucity of research on HCWM among general practitioners (GPs) in South Africa.

Objectives: To assess GPs' knowledge regarding the management of healthcare waste (HCW) and practices in accordance with legislation.

Methods: In this cross-sectional study, 70 GPs in private practice in eThekweni, KwaZulu-Natal province, were randomly selected. Data were collected using administered questionnaires and were analysed using descriptive statistics.

Results: Fifty GPs completed the questionnaires. Most (n = 41, 82.0%) were knowledgeable about where their HCW was disposed; and most (n = 48, 96.0%) reported that they segregated waste according to its composition. Thirty-three (66.0%) and 39 (78%) kept up to date about emerging hazards via seminars/conferences or the literature, respectively. Forty-one (82.0%) reported that infectious waste was generated in their practices. All had experienced needle prick injuries in the past 12 months, but many (n = 18; 36%) did not have copies of the relevant policies available. All separated sharps from other waste products and all used accredited waste disposal companies.

Conclusion: Understanding GPs' knowledge and practices regarding HCWM is important for policymakers. Most of the GPs in this study dealt appropriately with the HCW generated in their practices. The majority knew where the HCW was disposed and reported that they were aware of current HCWM practices.

INTRODUCTION

Healthcare waste (HCW) is waste generated by healthcare facilities, research facilities and laboratories.¹ Management and treatment of HCW, from the point of generation to final disposal, is important to prevent infection or disease in both healthcare workers and the community.¹ Sustainable waste management is identified as a problem in Sustainable Development Goal (SDG) 6 of the United Nations 2030 Agenda (access to water and sanitation for all).²

Research on healthcare waste management (HCWM) in South Africa has been conducted mainly in municipal hospitals; it appears to be almost non-existent in the private sector.³ In South Africa, HCWM guidelines are published by the Health Professions Council of South Africa,⁴ and legislated by, amongst others, the National Environmental Management Waste Act No. 59 of 2008,⁵ the National Health Act No. 61 of 2003,^{6,7} and the eThekweni Municipality's Nuisance and Behaviour in Public Places by-law.⁸

This study focused on private sector practitioners' knowledge and practices of HCWM at their workplaces in eThekweni, KwaZulu-Natal province, South Africa.

METHODS

A quantitative, cross-sectional study was conducted in 2016–2018. Seventy GPs, who were members of the Durban South Doctor's Guild (DSDG) and private medical practitioners in eThekweni, KwaZulu-Natal, were randomly selected. The 36-item interviewer-administered questionnaire included questions on knowledge and practice of HCWM.

Table 1. Demographic characteristics of study participants (N = 50)

Characteristic	Value	n	%
Age (years)	25–35	3	6.0
	36–46	12	24.0
	47–57	10	20.0
	57–60	5	10.0
	> 60	20	40.0
Sex	Male	43	86.0
	Female	7	14.0
Race	Indian	49	98.0
	Coloured	1	2.0
Year qualified	1960–1970	2	4.0
	1971–1981	12	24.0
	1982–1992	20	40.0
	1993–2003	12	24.0
	2004–2016	4	8.0
Years of practice	≤ 15	10	20.0
	16–21	11	22.0
	22–37	22	44.0
	38–53	7	14.0
Period of practice	1960–1970	1	2.0
	1971–1981	7	14.0
	1982–1992	15	30.0
	1993–2003	12	24.0
	2004–2014	14	28.0
	Missing	1	2.0

Table 2. Knowledge about HCWM among study participants (N = 50)

Question	Response	n	%
Is infectious waste generated in your practice?	Yes	41	82.0
	No	9	18.0
Is hazardous waste generated in your practice?	Yes	50	100.0
Is general waste generated in your practice?	Yes	46	92.0
	No	4	8.0
Is all waste generated in your surgery segregated according to its composition?	Yes	48	96.0
	Unsure	2	4.0
Is healthcare waste segregated from general waste?	Yes	50	100.0
On average, how much HCW (in kg) is generated per day at your practice?	1.5	24	48.0
	3.5	4	8.0
	4.0	1	2.0
	Unknown	21	42.0
Is HCW stored according to regulations?	Yes	49	98.0
	Unsure	1	2.0
Do you know where the healthcare waste generated from your practice is disposed?	Yes	41	82.0
	No	9	18.0

HCWM: healthcare waste management, HCW: healthcare waste

Table 3. Practices of HCWM among study participants (N = 50)

Practice	n	%
Protective clothing worn when handling HCW		
Yes	24	48.0
No	22	44.0
Unsure	4	8.0
Sharps separated from other HCW		
Yes	50	100.0
Infectious waste separated from other HCW		
Yes	43	86.0
No	7	14.0
Chemical waste separated from other HCW		
Yes	47	94.0
No	3	6.0
Pharmaceutical waste separated from other HCW		
Yes	29	58.0
No	21	42.0
Type of syringes used		
Disposable	50	100.0
Capacity of HCW bags before replacing		
Half full	6	12.0
Three-quarters full	34	68.0
Completely full	10	20.0
Waste bags stored in safe, secured environment		
Yes	48	96.0
Unsure	2	4.0
Do you use an accredited waste collection service?		
Yes	50	100.0

HCW: healthcare waste, HCWM: healthcare waste management

Ethical clearance was provided by the Durban University of Technology Research and Ethics Committee (IREC Number 125/16). The study was approved by the Faculty of Health Sciences Research Higher Degrees Committee (RHDC) of the Durban University of Technology.

All data were captured in Microsoft Excel, and coded, cleaned, and analysed in SPSS version 28.0. The data were analysed using descriptive statistics.

RESULTS

Questionnaires for 50 of the 70 doctors who were invited to participate in the study contained complete information (71.4% response rate). As shown in Table 1, 86.0% of the participants were male (n = 43) and almost all (n = 49, 98.0%) were Indian. Forty percent (n = 20) were older than 60 years, and 58% (n = 29) had been practising for more than 21 years.

Knowledge

Forty-one (82.0%) of the study participants knew where the HCW was disposed, and 98.0% (n = 49) stored it correctly (Table 2). Of the 29 who were able to estimate how much daily waste they generated, 24 (82.8%) said 1.5 kg. Two-thirds of the study participants (n = 33, 66.0%) kept up to date regarding knowledge about HCWM via conferences, whilst 39 (78.0%) did so by reading the literature (data not shown).

Practice

Reported practices regarding HCWM are shown in Table 3. Forty-eight percent of the participants (n = 24) used personal protective equipment (PPE) when handling HCW. Eighty-six percent of the participants (n = 43) reported that they separated the infectious waste from general waste; 94% (n = 47) separated chemical waste, and 58.0% (n = 29) separated pharmaceutical waste from other HCW at their practices. All used disposable syringes, and all reported that they used accredited waste collection services.

Most of the study participants favoured gloves to protect themselves against infection (n = 44, 88.0%), while two (4.0%) used no PPE at all (data not shown).

Needle stick injuries

All practitioners reported needle stick injuries in the last 12 months, and almost all ($n = 47$, 94.0%) reported more than 10 incidents ($p < 0.001$). In most cases ($n = 47$, 94.0%), those who had needle stick injuries did not treat themselves. Thirty-six percent ($n = 18$) of the practitioners did not have copies of either a health and safety policy regarding sharps, or an injection safety policy; 32.0% ($n = 16$) had both. The remaining study participants were either unsure or had only one of the two documents.

DISCUSSION

We aimed to evaluate HCWM knowledge and practices of a group of GPs. Most of the participants were knowledgeable and followed guidelines and legislation when dealing with HCW.

Knowledge

Almost 20% of the GPs stated that their practices did not generate infectious waste. This indicated a lack of knowledge regarding categories of waste. A similar lack of knowledge about different types of healthcare waste was reported amongst healthcare workers at two hospitals in Tanzania in 2016.⁹ In our study, GPs were knowledgeable regarding the segregation of HCW, according to its composition, and reported that they segregated their HCW correctly at their practices. This might have been influenced by their awareness of the consequences of non-compliance.

Not all of the participants kept up to date about HCW by attending seminars and conferences, or by reading the literature. These sources of information are available to all healthcare practitioners, and they should be encouraged to remain up to date about HCWM procedures via freely available webinars, social media posts, and other platforms. While contributing to the right to health for all, healthcare workers also have the right to healthy and safe working conditions. Unsafe working conditions can result in occupational illness, injuries, and absenteeism, and add significantly to financial costs incurred.

Practice

Practising occupational health and safety from generation to final disposal of HCW can prevent infections (e.g. HIV), diseases (e.g. typhoid and cholera), injuries, and associated financial costs.¹ Since the GPs in this study owned their practices, it is likely that extra care was taken with regard to HCWM. This may differ in the public sector. Private and public facilities have been shown to have different HCWM practices in a number of developing countries. In Brazil, both public and private healthcare facilities have been reported to have poor hazardous waste practices, due to a lack of managerial and implementation skills, and inadequate economic resources.¹⁰ Similarly, a study in Pakistan, published in 2010, showed poor HCWM in both private and public sector hospitals.¹¹ However, a study in Bangladesh showed that HCWM was better in private facilities,¹² while one in India showed that awareness of HCWM was higher amongst hospital staff than private medical practitioners.¹³

All the GPs in our study used accredited waste collection services, which might have been related to affordability.

Personal protective equipment

Less than 50% of the GPs used PPE when handling HCW. Similar findings were reported in a study on community health workers in KwaZulu-Natal province.¹ Our study participants were knowledgeable about HCWM and the associated implications,

and considered wearing gloves to be the most essential PPE to avoid infections or diseases associated with HCWM. Gloves are the most common type of PPE used by healthcare practitioners, as regularly reported; for example, in a study in two hospitals in Tanzania, most (80%) of healthcare workers used gloves more frequently than other PPE.⁹

Needle stick injuries

Within the 12 months prior to data collection, needle stick injuries had been experienced by 94% ($n = 47$) of the study participants. This is not unusual. Research in Ethiopia in 2011 showed that there was a high rate of needle stick injuries amongst staff working in laboratories and onsite waste storage areas.¹⁴ It is important to keep records of needle stick injuries, which place GPs at risk of infection if appropriate treatment is not administered timeously. In the city of Shiraz in Iran, needle stick injury reporting was found to be extremely poor in both public and private healthcare facilities.¹⁵

Limitations

The external validity of our findings was limited by the small sample size. In addition, it was conducted only in the private sector. A larger study in a more diverse group of healthcare workers with regard to age, race, and sector (private and public) should be conducted, and should include incidents of contamination, environmental hazards, and infections. Another limitation of the study is that the questionnaire was not self-administered, which increased the potential for information bias.

CONCLUSION

The GPs in private practice who participated in this study largely conducted HCWM correctly and in accordance with South African legislation, regulations, and policies. Findings about knowledge and practice in healthcare facilities assists policymakers and others to identify areas where there is a need for tighter regulation of legislation, and training and awareness programmes.

KEY MESSAGES

1. Most general practitioners in this study were knowledgeable about policies and regulations, and were compliant.
2. HCWM training should be frequent and regular.
3. The right to health for all includes healthcare practitioners.

DECLARATION

The authors declare that this is their own work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

AUTHOR CONTRIBUTIONS.

Conception and design of the study: LB

Data acquisition: LB

Data analysis: DS, SG, LB

Interpretation of the data: DS, SG, LB

Drafting of the paper: SG, LB, DS

Critical revision of the paper: DS, SG, LB

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Working towards better health in Africa: Where should we concentrate research efforts?

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Occupational health often falls off the agendas of company executives, unions, and workers themselves, as other issues, such as increasing wages and improving safety, are seen to be more immediately important. While these issues certainly cannot be dismissed as being irrelevant, worker health, specifically ill health, which can lead to death, needs to be taken more seriously. Infectious diseases, such as tuberculosis, HIV/AIDS and, more recently, COVID-19, have received much attention and scientific publicity, including in the mining industry. Although the prevalence rates of non-communicable conditions and diseases such as noise-induced hearing loss and pneumoconiosis are high, these more insidious conditions seldom find their way into the boardroom unless litigation is pending.

Some researchers have dedicated their lives and careers to studying the pathogenesis and/or epidemiology of specific occupational diseases, and much is now known about these aspects, as well as about control measures to mitigate the exposures that slowly but surely debilitate workers. For several reasons, diseases that have high incidence rates in large industries have been more frequently studied. First, if an exposure that is associated with disease can be controlled in a large industry, many workers will potentially be protected. Second, large numbers of relatively homogenous workers are required for research findings to be valid. Third, the 'larger' the problem, the more likely it is that research will be funded. Therefore, it makes sense to concentrate research efforts in industries where many people are potentially affected by the chemicals, fumes, dusts, etc. that are emitted during the various production processes. Such research is also more likely to be of interest to a global audience and, therefore, published in scientific journals. Consequently, much has been published about exposures and the health (and causes of disease) of workers in large industries such as mining, construction, and iron and steel, etc.

The most researched mine workers are those employed in gold, coal and asbestos mining (despite the ban on asbestos in many countries). Mine workers in other commodities, such as nickel, copper, uranium,

ABSTRACT

Research efforts are targeted towards infectious diseases that affect large numbers of people globally, outstripping research into non-communicable occupational diseases in smaller worker populations. Much health research has been conducted in the mining and construction industries, while the large agricultural and services sectors have been largely neglected. This is due, somewhat, to the geographical dispersal of agricultural workers, and diversity of those in the services sector. Africa's large and vulnerable informal worker populations – many of whom are women or children – also deserve attention, to reduce their exposure to modifiable risk factors that affect their health. As technology progresses, opportunities for employment in new industries emerge, together with unique health and safety risks. Africa needs high-quality research to protect workers and safeguard countries' economies.

cobalt, iron, silver, tanzanite, etc. have received little attention in terms of occupational health research. One commodity that has gained interest over the last few years, however, is manganese. Most of the world's manganese resources and mines are in South Africa, although some manganese is mined in Gabon and the Birimian district of west Africa.¹ Approximately 12 000 manganese mine workers were employed in South Africa in 2020.² Research on the neurological effects of manganese exposure has shown that parkinsonian signs are associated with estimated cumulative manganese exposure.³ There is also evidence that environmental exposure to manganese from a ferro-manganese smelter in South Africa is associated with reduced cognitive performance,⁴ and may also be associated with clinical parkinsonism.⁵

While research into occupational diseases has concentrated on large industries, it is important to remember that there are other large employment sectors in Africa, e.g. agriculture and services. The International Labour Organization projected that employment in the agricultural sector in 2021 would be 50.3%, with 36.4% of workers employed in the services sector, and 13.4% in industry.⁶ The projected proportion of workers employed in the agriculture sector in southern Africa in 2021 was about 25% of that in Africa as a whole, however, at 9.1%. The projected proportion of workers in the services sector in 2021 in southern Africa was 68.6%.

Despite high employment in the agricultural sector, workers are not concentrated in locations in the same way as they are in the mining industry, for example. Consequently, access to research participants, who are widely dispersed, is challenging. Under these circumstances, there is likely to be 'little return for maximum effort', which translates into a lot of time and money with no guarantee of valid or generalisable findings that could influence policymakers to improve working conditions. Thus, workers continue to be exposed to extreme heat, ultra-violet radiation, chemicals (including pesticides), and other hazardous substances. The other large employment sector – the services sector – is diverse, and includes tourism, vehicle repair, healthcare,

teaching, transport, banking, advertising, film and media, apparel, and beauty, amongst others. The majority of worker groups (other than healthcare workers) are under-researched in terms of health. Another important occupational group to consider is employed in the large informal economy in Africa, which is the largest in the world.⁷ In 2019, pre-COVID-19, the rate of informal employment in Africa was 85.8%, and 40.2% in southern Africa.⁶

These three sectors have something in common, which is the employment of vulnerable workers, including women and children. For example, about 40% of agricultural labour in Africa is provided by women,⁸ and an estimated 80% of workers involved in waste management in Uganda are women.⁹ About the same proportion of women work in the garment industry in Ethiopia,¹⁰ and the *kayayei* of Ghana and *alabaru* of Nigeria (or head porters) are all young women.^{11,12} Waste pickers/recyclers are most often homeless, living near waste dumps where the risk of exposure to hazardous biological and other waste is high.^{13,14} Many workers in the agricultural sectors, and those involved in tourism, are seasonal workers who have short contracts and no job stability.^{15,16} There are many other examples of vulnerable worker populations.

In recent years, occupational health (and other public health) researchers have been turning their attention away from large industry workers to investigate the health (and safety) risks to which these lesser-researched worker groups are exposed.

The advent of the 'green economy' is providing new opportunities for employment in Africa and beyond, related to water, waste management, sustainable energy, tourism, agriculture, and forestry.¹⁷ We cannot assume that workers in these novel occupations will escape exposure to hazards that may pose a threat to both their health and safety. It is our responsibility, as health researchers, to identify risks and prevent disease and other ill-health effects in this sector too.

While it is true that much research is funder-driven, as public health researchers we must convince funding organisations to look beyond the popular, highly financed health issues and support research in smaller enterprises, and amongst workers and other neglected groups, about whom we know very little but who have the right to work in healthy environments where the risk of illness is negligible. There is plenty of opportunity for occupational health research, and other public health research in Africa. The continent is in dire need of trained and committed researchers (and robust research) to improve the health of all workers, in all sectors, in all countries.

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Regional technical support for the establishment of occupational hygiene analysis laboratories in Malawi and Zambia

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INTRODUCTION

The Southern Africa Tuberculosis and Health Systems Support (SATBHSS) project targets underserved populations with high TB and/or TB/HIV burdens, including mining communities, and transport corridors and cross-border areas, focusing on three key components, viz. 1) innovative prevention, detection and treatment of tuberculosis (TB); 2) regional capacity for disease surveillance, diagnostics, and management of TB and occupational lung diseases; and 3) regional learning, innovation, and project management. The project is implemented in Lesotho, Malawi, Mozambique, and Zambia, with spill-over benefits across the Southern African Development Community (SADC) region. The project contributes towards achieving outputs set in the United Nations Sustainable Development Goals (SDGs), the SADC Protocol on Health, the African Union (AU) Catalytic Framework to End AIDS, TB, and Eliminate Malaria in Africa by 2030, the SADC Mining Protocol, and the AU Mining Vision. The project, which has adopted a regional multi-stakeholder and multi-sectoral approach to responding to TB, is funded by the World Bank. The African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD), and Eastern, Central and Southern Africa Health Community (ECSA-HC) collaborate to provide technical support and regional coordination.

The project has procured several occupational health and safety inspections and monitoring and analysis equipment. Various inspection and occupational hygiene professionals have been trained on their use. However, occupational hygiene analysis laboratories are lacking. As per the project's focus on occupational lung diseases and TB, the Governments of Malawi and Zambia have procured crystalline silica dust analysis equipment. The Zambian Government procured two X-ray diffraction (XRD) machines, and the Malawian Government procured the Draker tabletop XRD analysis machine to analyse mine dust for quartz or respirable crystalline silica. It is important to note that, in the region, only South Africa has such sophisticated analysis capabilities. Until now, the Governments and private sectors shipped samples for analysis to either South Africa or countries overseas. This process is costly and time consuming. Moreover, the analysis process is technically challenging without a well-trained analysis technician. Hence, this training was necessary.

The training programme now capacitates a cadre of occupational hygiene analysis technicians who will support the strengthening, development, and implementation of the occupational hygiene analysis laboratory programmes in Malawi and Zambia.

METHODOLOGY

An occupational hygiene analysis laboratory meeting was held, in person, at AUDA-NEPAD headquarters in Johannesburg, South Africa. Data for the report were collected from the meeting concept note, meeting agenda, presentations, observations, and dialogues.

The meeting was attended by 12 participants from Malawi, South Africa, and Zambia. The South African participants were from the University of the Witwatersrand (Wits), the National Institute for Occupational Health (NIOH), the Durban University of Technology (DUT), and Sedulitas. Malawi and Zambia were represented by laboratory technicians from the ministries responsible for labour and mines.

Instrumentation

The Governments of Malawi and Zambia have purchased occupational hygiene monitoring and analysis instruments (Table 1), which have been used to strengthen inspection and enforcement endeavours. However, some instruments have not been used adequately due to limited analysis capabilities. To fast-track the analysis capabilities, AUDA-NEPAD and partners organised training for occupational hygiene laboratory technicians. Although technicians have been trained on how to use most of the equipment, there is a need to continue the training to reinforce how to correctly use and handle the equipment.

FTIR Spectrum Two and Nanozen Dust Count 9000 training

Participants received comprehensive training on the portable Fourier-transform infrared spectroscopy (FTIR) Spectrum Two and Nanozen Dust Count 9000 equipment (Figures 1 and 2). The training comprised the software installation, set up of the instrument, and operation of the equipment. The Nanozen Dust Count 9000 is a robust and intrinsically safe monitoring device. It measures both the mass concentration and particle size distribution (PSD) (number concentration), making it an impressive instrument for workplace management, as it enables prompt decisions based on the effectiveness of existing control measures. The FTIR Spectrum Two is a portable desktop device. It does not require a controlled environment and can analyse up to 200 samples concurrently, depending on the experience of the technician. In the training, there were two colleagues from the Wits School of Public Health and one from DUT who are currently conducting research using this device.

During the training on the FTIR and Nanozen dust counter, the use of the equipment and analysis of samples were demonstrated.

The FTIR uses only polyvinyl chloride (PVC) filters, and site-specific QA standards with known concentrations, obtained through XRD analysis for the determination of correction factors. After the overview of the FTIR, a demonstration of the FTIR Spectrum Two was conducted, which included an explanation of how to handle samples during analysis, and how to conduct the analysis using the National Institute for Occupational Safety and Health (NIOSH) field analysis of silica tool (FAST) software.

Laboratory establishment quality management documents

A quality management system (QMS) ensures competency, impartiality and consistency in the operationalisation of the laboratories. Laboratories should not be influenced by commercial, financial, or other pressures that could compromise impartiality. Practices, including standard operating procedures, should be established to ensure that valid and reliable results are generated.

Table 1. Occupational health and hygiene equipment available in Malawi and Zambia

No.	Device	Malawi n	Zambia n	Total N
1	Realtime digital dust sampler (personal)	3	-	3
2	Personal dust sampler (Envirotech)	3	-	3
3	Respirator fit-test equipment (qualitative, 3M)	3	-	3
4	Respirator fit-test equipment (quantitative, Sebata)	1	-	1
5	Sound level meter	3	24	27
6	Noise dosimeter	-	6	6
7	Radiation survey meter	2	-	2
8	Vibration meter (Larson Davis)	1	-	1
9	Luxmeter	3	2	5
10	RAE air quality meter (multigas)	2	-	2
11	Bruker XRD analysis machine	1	-	1
12	X-ray diffractometer	-	2	2
13	Airflow meter (Kestrel)	3	1	4
14	Detector tubes (Gastec)	2	-	2
15	Personal dust sampler	3	4	7
16	Personal dust sampler (SKC)	10	-	10
17	Laboratory scale	2	-	2
18	Heat stress meter (Extech)	3	-	3
19	Portable diesel particulate matter monitor	2	-	2
20	Multi-gas detector	3	2	5
21	Apex2 Plus I.S personal sampling pump	-	5	5
22	Micro Dustpro (Cassella)	-	5	5
23	Diagnostic audiometry machines	-	2	2
24	Lung function testing machine for spirometry	-	8	8
TOTAL		50	61	111

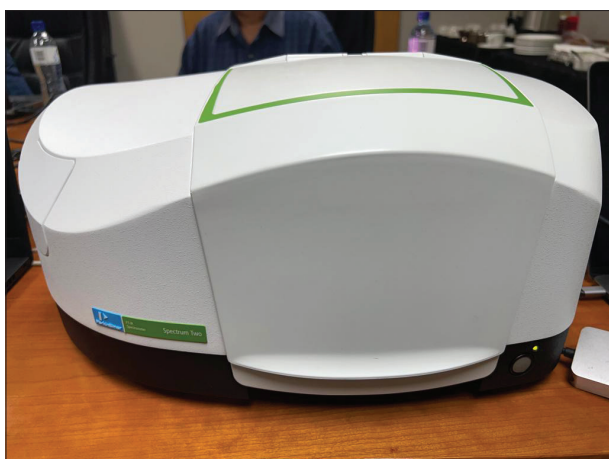


Figure 1. PerkinElmer FTIR Spectrum Two Nanozen Dust Count 9000 Photograph: courtesy of Norman Khoza

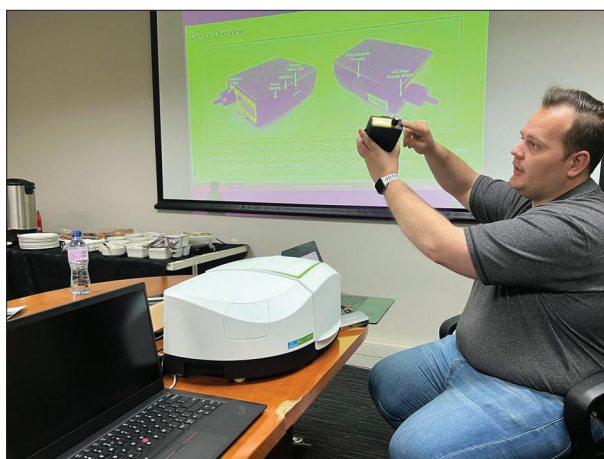


Figure 2. Zarco (from Sedulitas), demonstrating the Nanozen Dust Count 9000 Photograph: courtesy of Norman Khoza

Laboratory personnel need to communicate with their clients to keep them informed about the progress of the laboratory analysis. The laboratory should have the appropriate personnel, facilities, equipment, and support services for the activities performed. Laboratory personnel should have the necessary qualifications, training, technical knowledge, skills, and experience.

Measuring devices should be calibrated to establish the metrological traceability of results. A calibration programme should be established and documented. Figure 3 is a schematic representation of the laboratory process, extracted from ISO 17025 (2017): General requirement for the competence of testing and calibration laboratories.¹

The laboratory results should be presented in a logical manner, and include the date of analysis, the method used, the unique identification of the sample analysed, and the signature of the authorised person. The report must contain all the salient points about the sample analysed.

Site visit to the National Institute for Occupational Health

On 9 September 2022, some of the meeting participants were introduced to the National Institute for Occupational Health (NIOH) by the Executive Director, Dr Spo Kgalamono, who outlined the three pillars of the Institute, viz. routine diagnostic services, research, and internal and external training, which capacitate the National Health Laboratory Service (NHLS), Government, and the general workforce.

The NIOH's primary responsibility is to develop and support occupational health initiatives to improve and maintain the health of the South African workforce, estimated to be about 11.5 million workers. Dr Kgalamono indicated that, while working on the mandate, the NIOH also works with multinational, regional and international partners on occupational health and safety (OHS) issues. These include the implementation of the occupational health and safety information system (OHASIS), providing technical assistance to AUDA-NEPAD as part of the signed memorandum of understanding on several OHS issues, and

being a World Health Organization (WHO) collaborative centre, thereby contributing to the WHO global burden of diseases programme. The NIOH is accredited for ISO 17020 and 17025 and provides both occupational hygiene inspection and laboratory analysis services to the Department of Health and other external entities.

The Head of the Occupational Hygiene Section, Jeanneth Manganyi, outlined the various activities of the Section. She introduced the persons who were responsible for leading the tour of the Section. The group visited the gravimetric weighing room, the occupational hygiene monitoring laboratory, and the sample analysis room. In these sub-areas, the group was introduced to the different activities for which each area is responsible. Figure 4 shows the sample handling flow process, adapted from the Occupational Hygiene Section. In the gravimetric weighing room, the lead person explained the importance of the quality control process (including the environmental conditions, anti-static mat and anti-vibration table), and standard operating procedures such as weighing and handling of filters, analysis methods, recording procedures, etc. Thereafter, the occupational hygiene laboratory analysis and sampling processes, standards, and procedures to be undertaken for field preparation, namely the preparation, calibration, transportation and analysis of samples, were explained. It was mentioned that the XRD can analyse silver and PVC filters, while the FTIR can only analyse PVC filters. Jonas Shai and Tebogo Nthoke emphasised the importance of contacting an occupational hygiene analysis technician before sampling to verify the sampling methods and procedures. When an occupational hygienist takes samples, use of the correct sampling media is critical to save time and avoid wasteful expenditure.

As a way forward, AUDA-NEPAD, the NIOH, and partners agreed that countries should identify their occupational hygiene needs and inform the NIOH, as a collaborator, through AUDA-NEPAD. The NIOH staff indicated their willingness to assist but this will be based on

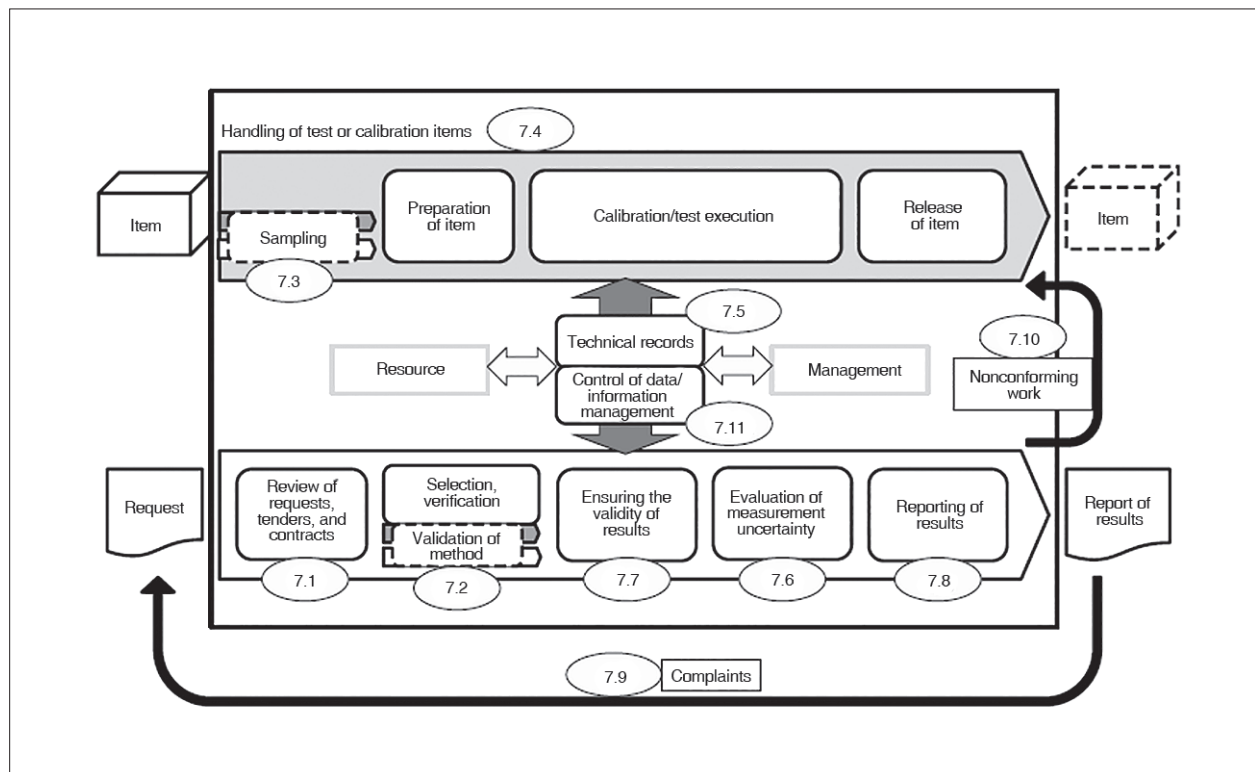
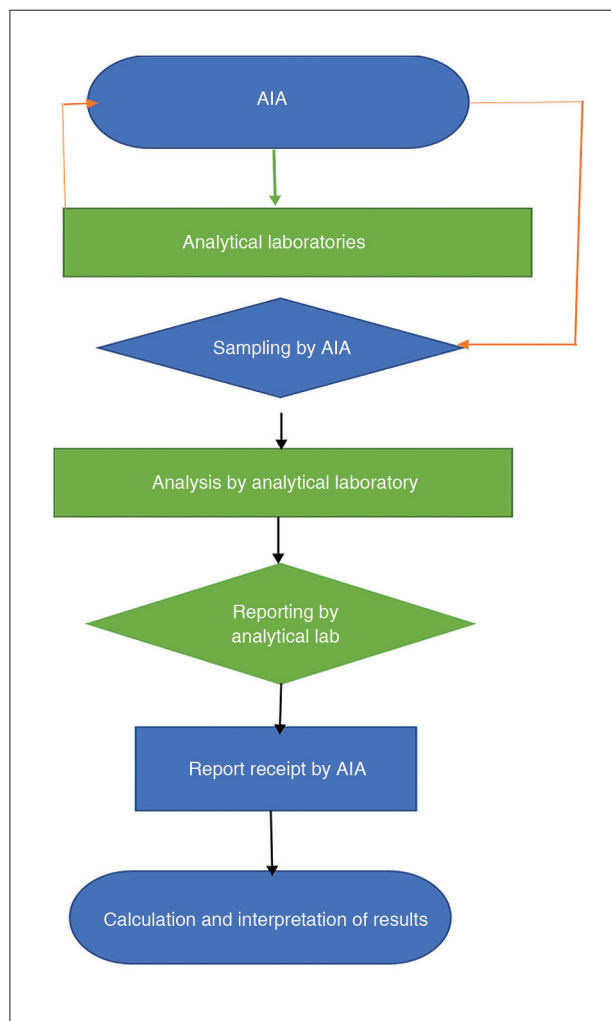


Figure 3. Schematic diagram of a typical laboratory process

Source: ISO 17025 (2017), p. 28¹



AIA: approved inspection authority

Figure 4. Sample handling flow chart

Adapted from the NIOH Occupational Hygiene Section

cost-recovery measures, where the countries will be responsible for payment of transportation for NIOH staff to provide technical assistance. Some of the technical assistance will be done virtually and will proceed prior to the setting up of laboratories in the two countries.

CONCLUSION

The establishment and strengthening of occupational hygiene laboratory capacity and capability is a long and overdue health and safety endeavour in the region. The exciting news is that member states are integrating the mass concentration and particle size distribution (PSD) (number concentration) approach, using real-time measurement instruments and gravimetric measuring and analysis instruments. Occupational hygiene is a key primary health intervention that informs other interventions and occupational health and safety management systems. At the end of the meeting, the following documents were developed as per its objectives: generic field and laboratory sampling sheets and laboratory establishment roadmaps. Members shared several quality technical documents and procedures for countries to adapt. Through the project, three laboratories are being developed: one in Malawi and two in Zambia. The process is in its infancy due to delays in renovations and deliveries or incomplete deliveries of some of the equipment. Member states need technical support from partners such as the NIOH and academic institutions. One of the technical support items identified during the meeting is the development of a regional occupational hygiene peer-review mechanism, to be led by NIOH.

ACKNOWLEDGEMENTS

The World Bank funds the SATBHSS project: P155658 and P173228. For more information, visit www.satbhss.org and www.nepad.org. AUDA-NEPAD acknowledges the member states, Wits, DUT, the NIOH, PerkinElmer, and Sedulitas for their invaluable contributions.

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Zambian and Malawian laboratory technicians visit the NIOH – Front row, L-R: Dr Ivan Niranjana (DUT), Jonas Shai (NIOH), Dr Spo Kgalamono (NIOH), Lerato Sebula (NIOH), Gerald Mbewe (Zambia); Middle row, L-R: Peter Kavalo Phiri (Malawi), Chimwemwe Bandazi (Malawi), Jeanneth Manganyi (NIOH), Norman Khoza (AUDA-NEPAD), Kamwi Mutata (Zambia), Dikeledi Singo (NIOH); Back row, L-R: Karen Du Preez (NIOH), Gabriel Mizan (NIOH), David Mulungushi (Zambia), Mphatso Kapokosa (Malawi), Absalom Ndlovu (Zambia), Tebogo Nthoke (NIOH), Lebogang Tlailane (NIOH)

Photograph: courtesy of Norman Khoza

The logo for the British Occupational Hygiene Society (BOHS) features the letters 'BOHS' in a bold, blue, sans-serif font. The letter 'O' is stylized with a white circle inside it.

British Occupational
Hygiene Society



IOHA



OCCUPATIONAL
HYGIENE SOCIETY
OF IRELAND

13th IOHA International Scientific Conference

Dublin, Ireland
June 2024

The Occupational Hygiene Society of Ireland (OHSI) and the British Occupational Hygiene Society (BOHS) are privileged to jointly host this conference and to contribute to its successful outcome.

The conference theme has been confirmed as - 'Protecting workers from health hazards: Advancing in this changing world'.

The conference aims to promote occupational hygiene and worker health protection by the minimisation of worker exposure to hazardous agents globally through plenary sessions, keynote lectures, parallel talks, workshops, poster presentations and

professional development as well as networking opportunities and social functions.

A strong Global media campaign will publicise the main causes of occupational disease throughout the conference.

More information including venue, dates and abstract submission arrangements will be announced very soon. Please mark your diaries for June 2024 in Dublin, Ireland!

GLOBAL EXPOSURE MANAGER

Edited by **Dr Thomas P Fuller**: IOHA Past President
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Memorandum of understanding signed between Asbestonomy and the International Occupational Hygiene Association

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A memorandum of understanding has been signed between Asbestonomy and the International Occupational Hygiene Association (IOHA). Asbestonomy, a new organisation with the mission to enhance global asbestos awareness, promotes the safe handling and elimination of asbestos to reduce risks to health from occupational and environmental exposure. The goal is to provide a platform for collaboration and communication between labour organisations, victims' organisations, employers, governments, and other professional organisations.

The first international conference of Asbestonomy was held on 16 and 17 June 2022 in London, United Kingdom. The event hosted 16 international keynote speakers from different fields, who brought their expertise to more than 150 attendees from more than 10 different countries from Latin America, North America, Europe, and Oceania. Some of the special presentations included:

Sven DeMulder, the Project Team Manager at OVAM Belgium: 'The current asbestos-safe programme being conducted in Flanders for 2040'

Dr Yvonne Waterman, Director of Waterman Legal Consultancy and President of the European Asbestos Forum: 'Looking backward at past asbestos exposures and forward towards new innovations being used to fight asbestos exposure today'

Charles Pickles, independent campaigner for the practical improvement of UK asbestos management: 'Asbestos regulations and controls'

Simone Stevenson, CEO of Victoria Asbestos Eradication Agency: 'Practical and digital solutions to manage asbestos in situ at a state level'

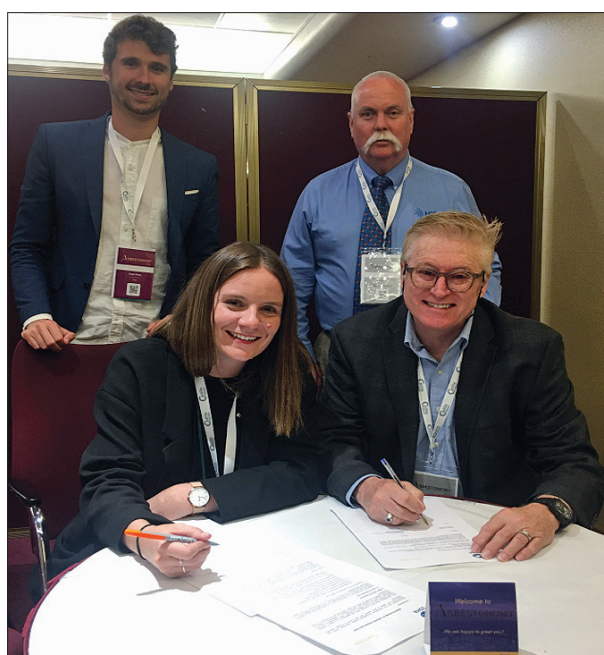
Sean Fitzgerald, internationally recognised in the asbestos testing field with more than 35 years of experience: 'Asbestos testing and management'

Mavis Nye, asbestos survivor: 'The status of the fight to eliminate asbestos exposure around the world today'

Many other speakers provided interesting and informative presentations. Please visit the conference website for additional information at <https://asbestonomy.com/>.

The MoU between Asbestonomy and IOHA was signed at the conference on 17 June 2022. Asbestos causes an estimated 255 000 deaths (243 223–260 029) annually, of which work-related exposures are responsible for 233 000 (222 322–242 802).¹ The rationale for supporting the work of Asbestonomy by IOHA is clear as it relates closely to worker health. The MoU will provide opportunities for support and collaborative projects between the two organisations.

Moving forward, Asbestonomy has plans to become a registered non-profit organisation and to have opportunities for general professional membership. It plans to continue to work and support stakeholders, globally,



Signing the MoU between Asbestonomy and IOHA – Front: Elise Bouthemy and Thomas Fuller; Back: Hugo Perez and Philip Hibbs Photograph: courtesy of Thomas Fuller

on topics of asbestos management, control, disposal and elimination. Its goals are to:

- help raise awareness about asbestos hazards and controls;
- enhance work practices for those who are dealing every day with asbestos in situ;
- give momentum, financial support and a stimulating environment to experts who do research to get new insights, improve work practices through new technology such as artificial intelligence (AI), and develop the best tools to reduce asbestos exposure risks.

The second Asbestonomy conference is planned for June 2023, in Brussels, Belgium. A call for speakers will soon be published on social media and the Asbestonomy website. If you would like to be part of and support Asbestonomy, please e-mail contact@asbestonomy.com to receive information and updates.

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Updates from the Italian Association of Industrial Hygiene (AIDII)

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The 38th National Congress of Industrial and Environmental Hygiene, organised by the Italian Association of Industrial Hygienists (AIDII), was held from 22 to 24 June 2022 in the beautiful city of Cagliari in Sardinia, Italy. After three years as a virtual event, due to the COVID-19 pandemic, this year's congress was held in person. The Conference Committee delivered a high-quality event, with more than 50 scientific presentations and 24 poster presentations, seven presentations for the 'Young Industrial Hygienists' competition, and more than 150 attendees.

The conference was dedicated to traditional industrial hygiene topics such as 'health risks in non-industrial living and working environments', and also to innovative ones like 'environment and health: natural sources and environmental pressures from anthropogenic activities on the population', 'emerging risks and methodological innovations for occupational hygiene', and 'human factors, perception and communication of risk'. One session, titled 'Exposure to noise, auditory and extra-auditory effects', was organised in collaboration with the Italian Acoustic Association (AIA).

The conference gave the AIDII and the AIA the opportunity to embrace a closer collaboration and to foresee future events by

sharing their respective expertise. The President of AIA delivered one of the four conference keynote addresses, on the correlation between acoustic quality of classrooms and extra-auditory health damage in scholastic environments.

The other three keynotes covered a study of vehicular emissions based on big data, and the impact on the environment and health; a new method for hexavalent chromium determination in particulate samples; and new strategies and application tools for risk perception. The 'Young Industrial Hygienists' competition award ceremony was very inspiring. This year, the winner was PhD student Marta Keller, registered at Insubria University in Varese, Italy. Her presentation was titled 'Air quality assessment in restaurant kitchens'.

The conference also hosted the annual AIDII Members' Assembly. One of the points on the agenda was a discussion about the evolution of occupational hygiene training in the context of global changes, also correlated to the upcoming modification of Italian national laws.

The next National Congress of Industrial and Environmental Hygiene will be held in June 2023 in Genoa (Liguria region, Italy), where we hope to reach the same levels of participation from the members, and to have more international attendees.



Conference attendees during the social event, 'Cagliari by night' Photograph: Andrea Martinelli

Harassment Prevention Pack – helping employers to prevent and eliminate harassment in the workplace in South Africa

All employers are under a legal obligation, in terms of section 60 of the Employment Equity Act No. 55 of 1998 (EEA), to take proactive and remedial steps to prevent and eliminate all forms of harassment in the workplace. Failure to do so may result in unfair discrimination and other claims instituted by employees, which may lead to financial liability and reputational harm.

In order to give effect to this legal obligation, the new Code of Good Practice on the Prevention and Elimination of Harassment in the Workplace (Code) places various obligations on employers, including:

- to conduct a risk assessment of the harassment that employees may be exposed to;
- to implement awareness training initiatives and ongoing awareness programmes;
- to adopt a harassment policy; and
- to develop clear procedures to deal with harassment.

To assist employers in taking these steps, Bowmans has compiled a 'Harassment Prevention Pack'. It provides the full suite of documents and training materials that employers require to comply with the provisions of the Code.

The pack caters for all employers and contains the following materials:

- guidance note on the application of the Code;
- template risk assessment;
- template harassment policy;
- poster on the different forms of harassment, which can be placed in prominent areas in the workplace/on the employer's intranet page; and
- an eLearning training module to be completed by employees, which is made available through a secured Bowmans webpage.

The eLearning training module is an online and interactive training programme and includes an assessment that employers can use to test their employees' understanding of the key legal principles and provisions of the employer's harassment policy.

Contact Bowmans for further information: HarassmentPack@bowmanslaw.com.

Hazardous Biological Agents Regulations, 2022, promulgated under the Occupational Health and Safety Act No. 85 of 1993, as amended

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Hazardous biological agents (HBAs) are a major health threat to employees in the workplace. Exposure is no longer limited to workplaces where HBAs are deliberately handled, produced, stored or transported, such as food production companies, laboratories, and healthcare institutions. With the COVID-19 pandemic, it became apparent that employees are at risk of being infected, even in workplaces where they do not handle HBAs, or where their work activities do not expose them to HBAs. It is important that the control measures that are put in place to protect employees from exposure to HBAs take into consideration those that can be imported into the workplace. Consequently, the scope of application of the HBA Regulations has been extended to include all workplaces.

The importance of infectious and non-infectious biological hazards is becoming increasingly apparent in both workplaces and communities, and it is recognised that workplaces can help prevent and control global health threats such as tuberculosis, HIV/AIDS, malaria, and influenza, as well as pandemics such as COVID-19.¹ The workplace might provide an ideal place for the proliferation of microorganisms and the spread of diseases as employees spend most of their time indoors. According to the French Research, Development, Studies, and Statistics Directorate (Dares), “more than 4.8 million (22%) workers declare that they are exposed to biological agents as part of their occupational activities.”²

Occupational health and safety (OHS) legislation requires the employer to “provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risks to the health of his employees” and to take “such steps as may be reasonably practicable to eliminate or mitigate the hazard or potential hazard to the safety or health of employees.”³ The new HBA Regulations have been drafted in a manner that provides a regulatory framework in lieu of pandemics that might encroach into the workplace.

The Department of Employment and Labour established a Technical Committee to review the Regulations for Hazardous Biological Agents (2001) in 2017. The committee comprised representatives from organised business, organised labour, and Government, and technical specialists in the field. The work of the Technical Committee culminated in the promulgation of the Regulations for Hazardous Biological Agents in April 2022,⁴ after approval from the Advisory Council of the Minister for Occupational Health and Safety (ACOHS) and the Minister of Employment and Labour.

The prevention of exposure to HBAs in the workplace, arising out of or occurring during the course of work, should involve everyone concerned about health and safety, including those responsible for the design of the workplace, work organisation, manufacturing of equipment, and the handling, storage and disposal of waste material.

The HBA Regulations define a biological agent as “any microorganism, microbial by-products or metabolites, cell or organic material with plant, animal or human origin, including any which have been genetically modified.”⁴ HBAs mediate their adverse health effects through four main pathological mechanisms: infection, allergic, toxic/inflammatory, and carcinogenic.⁵

Risk assessment is one of the fundamental regulatory prevention principles. In terms of the HBA Regulations, employers must conduct and document the risk assessment, which must be carried out by a competent person. A team approach is recommended when conducting the risk assessment, so that all the competencies in the workplace are utilised. The competent person must have extensive knowledge of the activities and processes taking place at the workplace and must take into account the current control measures in place, their effectiveness, and any reasonable deterioration or failure thereof. The health effects of the HBAs on pregnant women, immunocompromised, and vulnerable employees must also be considered.

An employer must ensure that employees are comprehensively informed, trained, and instructed before they are exposed to HBAs. They must be aware of the measures that the employer has put in place to protect them, including good housekeeping and personal hygiene. The outbreak of COVID-19 has taught us to go back to basic personal hygiene.

The employer should engage all employees who might be exposed to HBAs in the training, which must focus on the measures that the employer has provided to reduce exposure and, thus, the adverse health effects of HBAs. This entails the proper use, wearing, storage, and maintenance of protective clothing and equipment. The limitations of personal protective equipment must be included, as this is regarded as the last resort in the hierarchy of control. Employees also have a responsibility to safeguard their health at the workplace in terms of section 14 of the OHS Act of 1993. The importance of reporting the failures of engineering controls and participating in medical surveillance programmes must be communicated to employees, as these are required as part of the risk assessment.

The employer must ensure that the information, instruction, and training are provided before an employee is potentially exposed to HBAs. Refresher training must be conducted annually or at intervals that may be recommended by the health and safety committee or the health and safety representative. It is a common practice that when employees become familiar with the work they are performing, they become comfortable and disregard the health and safety measures put in place to protect their health and wellbeing.

An employer must establish and maintain an exposure monitoring programme at the workplace, which is representative of the employees' exposure to HBAs. The programme must be conducted by a competent person and in accordance with a validated procedure, sufficiently sensitive, and of proven effectiveness. Occupational hygiene surveys conducted by approved inspection authorities (AIAs) can evaluate the effectiveness of control measures, thus reducing the risk of infection and/or allergic sensitisation caused by HBAs. The employer must, in terms of the exposure monitoring, consider the recommendations identified in the exposure monitoring report, and develop a documented action plan for the implementation of those recommendations.

An employer must establish and maintain a documented system of medical surveillance of employees, which is overseen by an occupational health practitioner, to complement the occupational hygiene surveys. All tests and examinations must be conducted according to a written medical protocol, following current best practice, national or international guidelines.

*"The diagnosis of an occupational disease in a worker implies that measures at the workplace are inadequate and pose a potential health risk to co-workers similarly exposed, so prompt investigation and action is required"*⁵ The new definition in lieu of control measures has been expanded to address the hierarchy of controls, including non-invasive interventions and vaccination against infectious diseases. The standard precautions implemented to reduce risk of transmission of HBAs in the workplace may include hand hygiene, gloves, face or eye protection, protective clothing, and respiratory protective equipment.

Additional measures include:

- Separation of different infectious processes from each other and from persons
 - Barrier isolation of a process or agent
 - Local exhaust ventilation and general ventilation
 - Air and surface disinfection
 - Positive static air pressure differential from infectious processes to human occupied zones
- Regular cleaning of machinery and work areas with vacuum cleaners fitted with air filters with an arrestance (the ability to remove synthetic dust from the air) of not less than 99.95%
 - The availability of effective vaccines to employees who are not immune to the biological agent(s) to which they are exposed or are liable to be exposed

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News from the SASOM National Office

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SASOM Annual Congress 2022 – A virtual event in four sessions

The first two sessions of the Annual Congress of the South African Society of Occupational Medicine (SASOM) were held virtually in July and August 2022. Statistics, regarding participants, are shown in Table 1.

Table 1. Registrations, participants and countries represented at the SASOM Annual Congress 2022

No. registrations	No. participants (attendance rate)	Countries represented by participants and presenters
<i>Session 1 – Updates on chemical exposures and medical surveillance, 29 July 2022</i>		
124	90 (73%)	Botswana, Democratic Republic of the Congo, India, Mozambique, Namibia, South Africa, The Netherlands, United Kingdom, Zimbabwe
<i>Session 2 – Lessons learned from the COVID-19 pandemic, 26 August 2022</i>		
106	76 (72%)	Botswana, Mozambique, Namibia, South Africa, United Kingdom, United States, Western Sahara

Session 3 – Updates on ergonomics, musculoskeletal disorders, and psychosocial factors at work was held on 16 September 2022, and the presentations were as follows:

- Dr Tessa Bailey (The OPUS Centre for Psychosocial Risk, Adelaide, Australia) – ‘Guidance for psychosocial interventions in the workplace: Experience from international organisations’
- Dr Odette Volmink (Department of Occupational Medicine, National Institute for Occupational Health (NIOH), Johannesburg, South Africa) – ‘Impairment and fitness for work: An educated guess?’
- Al-Mari Botes (Function First Assessment and Rehabilitation Practice, Cape Town, South Africa) – ‘Challenges in the mental health decision-making process at work: Solutions from an occupational therapy perspective’
- Dr Jorge Barroso Dias (President: Portuguese Society of Occupational Medicine (SPMT), Lisbon, Portugal) – ‘Alcohol, tobacco, obesity, and sleep in occupational health services: A perspective from Portugal’

CPD-accredited joint workshop in the Northern Cape

SASOM and its Northern Cape Chapter, the Asbestos Relief Trust, the Kgalagadi Relief Trust, and Cipla, sponsored and/or co-organised a continuing professional development (CPD)-accredited hybrid workshop at the Red Sands Country Lodge near Kuruman, on 24 August 2022. Sixty-five delegates participated – 24 in person

and 41 online. This was the first hybrid event co-organised by the SASOM National Office. The occupational health professionals who attended, mainly from the mining areas around Hotazel, Kathu, Kuruman, and Lime Acres, gained a greater understanding of, and appreciation for, current legal issues in occupational health and the pathology and radiology of pneumoconioses. The SASOM Chair, Prof. Daan Kocks, was invited to attend in person, introduce speakers, and give a presentation. The event was co-chaired by Drs Jim teWater Naude (public health medicine specialist at Diagnostic Medicine, Western Cape) and Louis Ellis (Chair: SASOM Northern Cape Chapter). The presentations were as follows:

- Prof. Daan Kocks – ‘Updated legal obligations of occupational medicine practitioners in South Africa (2022)’
- Dr Deepna Govind Lakhoo (Head of Pathology, NIOH, Gauteng) – ‘Importance of post-mortem examinations to miners and their families’
- Dr Qonita Said-Hartley (Clinical Unit Head of Radiology, Groote Schuur Hospital and University of Cape Town, Western Cape) – ‘When the dust settles: Imaging in pneumoconiosis’

Occupational medicine recognised as a speciality by the Board of Healthcare Funders

Following numerous queries from SASOM members, Prof. Daan Kocks approached the Board of Healthcare Funders (BHF) to request the creation of a category for the medical doctor speciality in occupational medicine, as recognised by the Health Professions Council of South Africa (HPCSA). The main reason for the request is that there are around 50 occupational medicine specialists in the country, registered with the HPCSA, who have been unable to deliver healthcare with the assistance of medical schemes, managed care organisations, and other administrative systems. SASOM has more than 250 members who are medical practitioners with postgraduate qualifications in occupational medicine and provide accessible, affordable, and quality healthcare to employees.

The BHF replied that its Practice Code Numbering System (PCNS) created a discipline that caters for healthcare practitioners registered with the HPCSA, under the occupational medicine category. The supplied information and the relevant application form to be completed and submitted by occupational medicine specialists were shared with SASOM members.

SASOM annual general meeting – November 2022

The SASOM annual general meeting (AGM) will be held in a fully virtual format on Friday, 25 November 2022. It is not feasible for the event to be organised in a hybrid format because of the escalating costs related to travel, accommodation, and venue hire in

the post-COVID-19 era. This will be the first time in recent years that no academic event (half-day conference) will be held in association with the AGM and ExCo meeting. SASOM will continue its offering of CPD-accredited webinars for its members until further notice.

NEWS FROM THE GLOBAL OCCUPATIONAL HEALTH ARENA

Global Tuberculosis Community Advisory Board (TB CAB): 10-year milestone

In 2011, the Global TB CAB was created to act in an advisory capacity to product developers and institutions conducting clinical trials of new TB drugs, regimens, diagnostics, and vaccines, and to provide input on study design, early access, regulatory approval, post marketing, and implementation strategies. To celebrate this milestone, TB CAB has released an evaluation report spanning the first 10 years and an accompanying three-part podcast series, 'Agents of change: How the global TB Community Advisory Board transformed history's oldest pandemic'. This is available from:

<https://www.treatmentactiongroup.org/publication/tb-cab-10-year-anniversary-evaluation-report-2011-2021-and-podcast/?eType=EmailBlastContent&eId=f05df5f0-329d-4ee6-8fdb-c20ee3354906>

SASOM invited as a partner organisation for the ICOH International Conference on the History of Occupational and Environmental Health in 2023

The 7th International Conference on the History of Occupational and Environmental Health was planned to be held in Durban, KwaZulu-Natal, South Africa, in May 2020. The global COVID-19 pandemic forced the indefinite postponement of the conference, organised by the Scientific Committee on the History of Prevention of Occupational and Environmental Diseases of the International Commission on Occupational Health (ICOH). The conference organisers, led by the Conference Chair, Prof. Rajen Naidoo – Head of Discipline: Occupational and Environmental Health, University of KwaZulu-Natal, have set a new date for the event to be held in person in Durban on 15–17 November 2023, and have invited SASOM to be a conference partner. Claudina Nogueira (SASOM ExCo member and ICOH Vice President for Scientific Committees) will represent SASOM on the Conference Organising Committee; this will be the first time that the conference is held in Africa.

Virtual MEDICHEM Congress 2022

The Congress was held on 1 and 2 September 2022, to coincide with MEDICHEM's 50th anniversary. Associated events included the MEDICHEM General Assembly and the Board meeting. Aligned with the congress theme *Sankofa/Sustainability, the need to reflect on the past to build a successful future*, the programme included the following presentations, as well as a forum on attaining sustainability in the chemical industry:

- Keynote 1: Sustainability/continuity of operations in the chemical sector – Dr Carlos Santos Burgoa Zarnecki (Brazil)
- Keynote 2: Occupational health risk assessment and risk factors related to health and industrial hygiene monitoring data on chemical exposure of industrial workers – Dr Sunisa Chaiklieng (Thailand)
- Controversy and best practice: Navigating crisis communication in the COVID-19 era – Dr Max Lum (USA)

- Genotoxicity: Environmental pollution and prenatal development – Dr Elpida-Niki Nikoloussi (Cyprus)
- OSH capacity building using e-learning and microlearning in underserved areas of the globe – Dr Janvier Gasana (Kuwait)
- Minimum exposure: Lessons from pharma – Dr David Miedinger (Switzerland)
- McIntyre for MEDICHEM – Dr Tee Guidotti (USA)

The ICOH Scientific Committee on Occupational Health in the Chemical Industry introduced its new Chair for the current triennium to congress participants: Dr R Rajesh from India (past ICOH National Secretary for India and past President of the Indian Association of Occupational Health, IAOH). Claudina Nogueira presented a brief overview of the ICOH Scientific Committees, and Dr Martin Hogan (Ireland), ICOH Vice President for National Secretaries, delivered a concluding message.

Occupational Safety and Health Staging Framework for Decent Work

Hot off the press is the joint publication, *Occupational Safety and Health Staging Framework for Decent Work*, authored by Schulte et al., 2022,¹ from the ICOH Working Groups on 'The Future of Decent Work' and 'Demographic Changes and Occupational Health' and their collaborators. The Framework is aligned with Goal 8 of the United Nations' Sustainable Development Goals: 'Promote inclusive and sustainable economic growth, employment and decent work for all' and is intended to serve as guidance for practitioners, researchers, employers, workers, and authorities.

ICOH Statement on Protecting the Occupational Safety and Health of Migrant Workers

The ICOH Statement on 'Protecting the Occupational Safety and Health of Migrant Workers' was approved by the ICOH Board on 27 May 2022 and submitted under agenda item 15: 'Human resources for health' to the 75th World Health Assembly (WHA), held from 22 to 28 May 2022 at the headquarters of the World Health Organization (WHO) in Geneva, Switzerland. ICOH was represented at the WHA by the Secretary-General, Dr Diana Gagliardi (Italy). The ICOH Statement calls for the inclusion of occupational health and safety services in all health and care facilities to promote the protection of health workers' physical and mental health and wellbeing; it can be accessed on the ICOH website: <https://www.icohweb.org/site/multimedia/news/pdf/Occupational%20health%20of%20migrant%20workers.pdf>

ICOH2022 Congress report

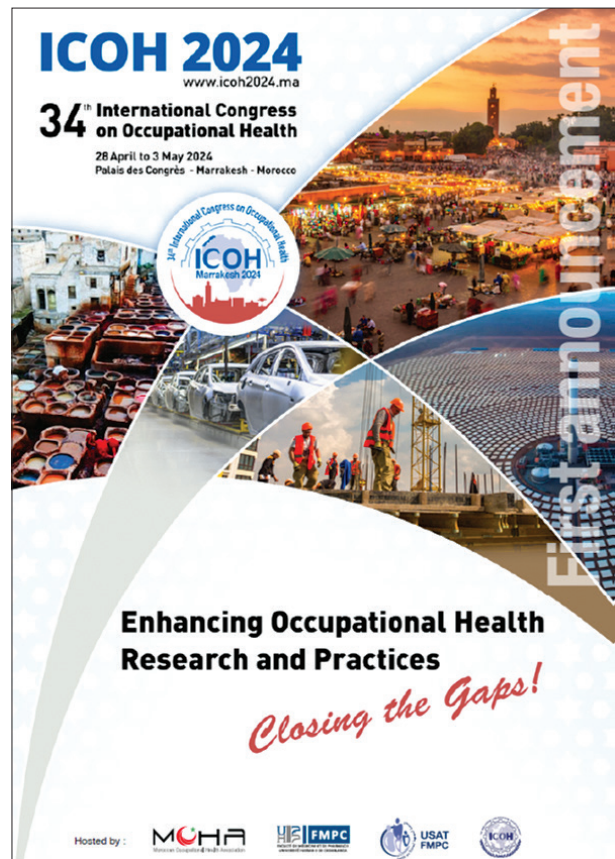
The official report on the 'ICOH2022 – The Melbourne-Rome Global Digital Congress, 6 to 10 February 2022' is now available for consultation and free download from the ICOH website. The congress, held for the first time ever as a virtual event, was a resounding success, with more than 1 400 delegates from 98 countries, including 107 grant recipients (ICOH members from developing countries). Twelve keynote and plenary sessions, 23 semi-plenary sessions, 146 oral communications, 56 special sessions, and 581 e-posters enriched the scientific programme. Access the report here: www.icohweb.org/site/multimedia/news/pdf/ICOH%202022%20-%20CONGRESS%20REPORT.pdf

ICOH2024 Congress – 28 April to 3 May 2024

The second planning meeting of the ICOH2024 Congress organisers was held in Marrakesh, Morocco, on 5 and 6 September 2022, and included a site visit to the conference venue. The first announcement for the congress has been published and can be accessed on the ICOH and ICOH2024 Congress websites. Be sure to register your interest on the official congress website (www.icoh2024.ma) for more information and to receive updates as the scientific programme is developed. ICOH invites you to share the first announcement with your networks: www.icohweb.org/site/multimedia/news/pdf/ICOH%202024%20-%20First%20Announcement.pdf

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SASOHN Conference 2022: Pre-conference workshops and conference day presentations

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The SASOHN Conference 2022, with the theme *Four Seasons*, will be hosted by the Western Cape Region at the Blaauwberg Beach Hotel in Cape Town. The academic content will consist of three pre-conference workshops and the conference day of eight presentations.

The pre-conference workshops are as follows: 'Weather the storm': equipping the occupational health nurse practitioner (OHNP) with basic ergonomic skills. The workshop will be presented by Dale Kennedy of Ergomax and aims to re-visit the ergonomics regulations and any changes thereto. Further, it aims to incorporate these changes into practice to comply with the Regulations and ensure a working environment that considers the potential impact of ergonomics; and seeks measures to prevent and address ergonomic inconsistencies in the workplace.

The 'El nino' workshop, presented by Henk Blignaut, will explore the mental health of the OHNP through promotion of self-care and self-caring practices. The impact of the Pandemic is ongoing, and it is important to promote sound self-care practices amongst all healthcare workers. This interactive workshop will include activities regarding personality typing, ways to deal with work stressors, and responses to stress and burnout.

The 'Winds of change' workshop seeks to look beyond COVID-19. The workshop will be presented by Benjamin de Waal and will include information about statistical predictors of COVID-19 waves, vaccination protocols and schedules, chronic effects of COVID-19, and the way forward.

The conference presentations will be facilitated in three sessions. Session One will comprise three presentations. Justin Malherbe, Senior Associate at Webber Wentzel, will provide insight into the Protection of Personal Information Act (POPIA) and its implications for the OHNP. The implementation of the Act has had far-reaching consequences for individuals and organisations alike; understanding the intent of the Act, as well as compliance with it, is imperative. Dr Zahiday Sondag will share expertise relating to the management of hazardous biological agents (HBAs) in the workplace. Risk assessment for HBAs will be included in the presentation, as the knowledge gained during the Pandemic about HBAs should not be put aside, nor should the protocols adopted during this time be rejected in their entirety. Tanya Bothma, a bilateral lung transplant recipient, will share her journey from childhood to the time of surgery and beyond. This poignant and brutally honest window into a life lived with chronic illness is sure to both educate and inspire. Tanya will also touch on how her illness has impacted her ability to work, which will prompt the delegates to think about accommodation in the workplace.

Session Two will include a review of case studies by Ernst van Biljon, a Director at Legal Compliance Services. The case studies aim to illustrate the need for organisations and OHNPs alike to ensure that legal compliance is ongoing and that measures to enforce compliance are implemented. Dr Greg Kew, an occupational medicine specialist, will talk about screening for substance abuse. The policies and procedures



Image: courtesy of SASOHN

that should accompany the screening, as well as legislative requirements, will be included in the discussion. The session will close with a presentation on cultural diversity – a topic requested by the members of the Western Cape region on many occasions. The awareness of cultural diversity in the context of the workplace, and specifically in the rendering of an occupational health service, will be addressed by Siyabulela Sabata.

Session Three will consist of matters relating to toxic workplaces and the different personality types within the work environment. Delegates can expect to be both enlightened and empowered by the information shared by the session presenter, Anwar van der Schyff. Dr Frank Magwegwe will close the day by sharing his extensive knowledge of resilience, arguably a concept that is defined differently by many but, without a doubt, is required in the specialisation of occupational health.

It is anticipated that an exciting time of learning and networking, intermingled with moments of relaxation and refreshments, await those who attend this conference. To register for the conference, please visit the SASOHN website at www.sasohn.co.za and follow the relevant links.

SAIOH newsletter

SAIOH PRESIDENT'S ADDRESS

Hennie van der Westhuizen: SAIOH President
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As part of our service to members, in this newsletter we provide feedback on the latest Southern African Institute for Occupational Hygiene (SAIOH) developments. SAIOH exists for its members and is reliant on them to continue to serve our noble profession, ethically. We therefore invite your participation and feedback on any matters communicated below.

SPACE WEATHER AND OCCUPATIONAL HYGIENE

Overview

To whet the appetites of our members, in preparation for a paper to be presented by a speaker from the South African National Space Agency at the 2023 SAIOH Annual Conference in Cape Town, here is a brief overview of the concept of space weather and its effects on humans in space. It is followed by a brief discussion on the National Aeronautics and Space Administration (NASA) approach to managing hazards and risks to which astronauts are exposed, and views on the relationship between space weather and occupational hygiene. The information is by no means comprehensive.

Introduction

"And how is the weather down your way?" we may ask, to close those awkward gaps that sometimes punctuate conversation. When discussing space weather, however, one is most certainly not indulging in small talk. Imagine dealing with answers such as: "The solar winds are blowing strong today. I wonder if the Aurora Australis is going to be as spectacular as the Aurora Borealis!" Or, alternatively, "A wayward cosmic ray sped through our computer and spontaneously caused bit no. 13 in the memory to flip, resulting in 4096 extra votes for one candidate in our regional election." Although a bit dramatised, an actual incident like this took place during an election in Belgium on 18 May 2003, where the cause of a bitflip was allegedly a cosmic ray.^{1,2}

Thanks to the generosity of my colleague and friend, Dr Sibongeseni Myeni, I was introduced to this new concept of 'space weather'. I was fascinated by this discipline and, instinctively, the question arose as to whether there is a relationship between space weather and occupational hygiene. Naturally, some feverish page flipping followed.

Space weather

The United States Department of Commerce: National Oceanic and Atmospheric Administration (NOAA) clarifies space weather as follows: "Space weather describes the conditions in space that affect Earth and its technological systems". NOAA proceeds by saying that space weather is a consequence of the behaviour of the sun, the nature of Earth's magnetic field and atmosphere, and our location in the solar system. Weather, as we know it down here

on Earth, manifests itself by way of water, air, and temperature. In comparison, the elements of space weather are particles, electromagnetic energy, and magnetic fields.³ These elements present a high radiation hazard to astronauts and, to a lesser extent, pilots flying at high altitudes.³

Discussion

From an occupational hygiene perspective, the hazards and risks associated with travel in space and high altitudes need to be managed. NASA recognises the space radiation risks to astronauts; their controls are aimed at reducing the risks to the lowest achievable level.⁴ The technologies that they are developing are aimed at keeping exposure to space radiation below permissible exposure limits (PELs), whilst increasing the duration of flights. The aims are focused on the following aspects, which, to avoid misinterpretation of NASA activities, are copied verbatim from the NASA website:⁴

1. Risk assessment modelling: Reduce uncertainty in assessing the risk of death due to radiation exposure and improve cancer risk assessments as well. Include circulatory and central nervous system (CNS) effects in assessments.

2. Radiation mitigation and biological countermeasures: Extend the number of safe days in space by developing biological countermeasures that reduce radiation health risks by 50% for the mission duration through small, low-mass, low-power, crew-friendly sensors that monitor the radiation environment.

3. Radiation environment modelling: Improve the ability to predict future space weather events and their duration to prepare and protect the crew.

Knowledge of space weather events is essential in the control of the exposure of astronauts. Ultimately, the aims and actions are focused on the protection of astronauts against stressors – in this case, radiation from the space environment. These aims and actions resonate in the definition of occupational hygiene, of which the aim is to protect workers against stressors in the work environment. Our future SAIOH President, Naadiya Mundy, also did some page flipping, and is responsible for the phrase that has been capped for occupational hygiene in space: 'astronautical hygiene'.^{6,7}

Conclusion

All workplaces, whether on land, underwater, or in space have stressors to a greater or lesser extent. The approach of anticipating, recognising, evaluating and controlling these stressors is entrenched in the definition of occupational hygiene and may be applied to manage those stressors. Radiation hazards and their fluctuating intensities are related to space weather, and knowledge of space weather is essential for the protection of astronauts.

Readers seeking more information on the topic may consult the NASA website on the use of manikins in the unmanned flight of Artemis 1.⁵ Information on astronautical hygiene research can be found in the article by Tran et al., 2018.⁸

Acknowledgement

I wish to thank Lee Doolan and Naadiya Mundy for their valuable contributions in finalising this section of the Presidential Report.

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NATIONAL COUNCIL FEEDBACK

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Strategic plan

The current SAIOH strategy (5-year plan) is steered by Jaco Pieterse. The strategy is discussed, and progress thereof evaluated, at each monthly SAIOH Management Board meeting, and at the quarterly Council meetings. The revised 5-year strategy will be circulated to all SAIOH members and launched at the annual general meeting (AGM) on 27 October 2022.

Ethics

As previously mentioned, SAIOH entered into an agreement with well-known legal advisors, NGO Law, to represent the Institute when required.

The first task, i.e. to develop a memorandum of incorporation (Mol) to replace our current Constitution, was received and final comments are in preparation. This will be circulated to all SAIOH members and approved at the AGM on 27 October 2022.

Our legal advisor's next task will be to review the SAIOH Ethics Policy and Procedure(s), thus enabling the Ethics Committee to start its work in earnest. The Ethics Plan forms an important part of the SAIOH strategy.

Please note

From January 2023, all SAIOH-certified members will be required to provide proof that they have completed an acceptable occupational hygiene ethics training course. A one-year phase-in period was allowed during 2022. The recording of the ethics webinar presented by Terry McDonald of the British Occupational Hygiene Society (BOHS), during the 2021 annual virtual conference, was sent to all attendees of the 2021 webinar and persons who purchased the recording.

A multiple-choice questionnaire, based on Terry McDonald's webinar, which was presented at the 2021 annual virtual conference, will be forwarded to all participants and members who purchased the recording during 2022, in a format similar to the Survey Monkeys that SAIOH uses. There will be a time limit of 30 minutes to complete the questionnaire, and only the members who attended the 2021 ethics webinar, or purchased that recording, will receive a passcode to access and complete the test. Members will be allowed three attempts at weekly intervals, with the system automatically marking the paper and notifying the candidate of the outcome. The required pass rate is 60%. The successful candidates will be able to download their certificates from the website.

There will be a hybrid ethics professional development course (PDC) at the 2022 SAIOH Annual Conference in Gauteng on 26 October 2022.

SAIOH branch activities

Virtual meetings and workshops present numerous opportunities to SAIOH members. All SAIOH members are invited and may attend any SAIOH branch meeting (or event), regardless of their branch affiliations. We encourage all our members to support their branches, and to participate in branch activities and earn continuing professional development (CPD) points. Members can submit topics for discussion to the various branch Chairs for consideration for future webinars/meetings and/or workshops.

On 10 June 2022, the Western Cape branch hosted its second in-person meeting. Rinus Kriel gave an exceptionally interesting presentation on ototoxicity. Thirty-seven occupational health professional (OHPs) attended. The KwaZulu-Natal branch held their second virtual meeting on 23 June 2022. Four branch members presented talks on the new Hazardous Chemical Agent Regulations, and 51 persons attended. The Gauteng branches held a successful virtual meeting on 24 June 2022. Sean Chester gave an excellent presentation on toxicology (human biology and target organs); 53 persons attended.

The Botswana branch held a virtual meeting on 14 July 2022. A new branch committee was elected, with Patrick Baleseng as the new Chairperson. There were two presentations: mine ventilation during COVID-19, and the health effects experienced by women working in open-cast mines. Thirty OHPs attended. More branch meetings are scheduled for September 2022.

SAIOH wants to revive stagnant branches, starting with the Mpumalanga and Namibian ones. Members who would like to assist with or contribute ideas towards this initiative are requested to contact Moses Mokone (SAIOH Branch Co-ordinator) at Mokonemoses2@gmail.com.

OHTA and IOHA feedback

The Occupational Hygiene Training Association (OHTA) and the International Occupational Hygiene Association (IOHA) continue to publish individual newsletters. SAIOH e-mails the links to the newsletters to all its members and, for ease of reference, uploads these links to the SAIOH website: www.saioh.co.za.

Please note

OHTA has a new website: www.ohtatraining.org

SAIOH's representative, Garth Hunter, is on the IOHA Board and its National Accreditation Recognition Committee (NARC), and continues to be very involved in all activities. Garth's continued participation provides SAIOH and the Professional Certification Committee (PCC) with valuable feedback from the IOHA and IOHA NARC meetings.

SAIOH Technical Committee feedback

The SAIOH Technical Committee's research on welding fumes, i.e. the measurement and analyses thereof, is ongoing. We anticipate finalising this project and publishing a SAIOH technical and position paper in the near future.

Another SAIOH technical sub-committee of selected experts, in conjunction with the Department of Employment and Labour (DoEL), held a workshop on 28 July 2022 to address the correct use of the wet bulb and globe temperature (WBGT) formulae as per the Environmental Regulations for Workplaces. A SAIOH position paper was generated and used by the DoEL to publish a resolution regarding the use of the WBGT heat stress equations. Both the SAIOH position paper and the DoEL's resolution were circulated to our members and stakeholders, and posted on the SAIOH website. This committee will continue doing research on heat stress. The focus is two-fold, i.e. to develop a technical paper and to enable SAIOH to give appropriate comments on the soon-to-be-released new Physical Agents Regulations (the old Environmental Regulations for Workplaces).

The intent of the Technical Committee is to continue setting up sub-committees to address topical occupational hygiene stressors. In this regard, the Council's Technical Co-ordinator is busy with a position paper on real-time monitoring of occupational hygiene stressors.

Annual SAIOH Scientific Conference

The 2022 Annual SAIOH Scientific Conference is scheduled for 26–28 October 2022, taking place at the Birchwood Hotel and Conference Centre in Gauteng. The conference will be a hybrid event, i.e. face-to-face and via live streaming, and will be hosted by the Gauteng branch(es). As previously mentioned, the theme will be centred around control, i.e. *Occupational hygiene controlling the future*. SAIOH has forwarded a comprehensive conference notification flyer/Mailchimp with registration, sponsorship, exhibitor invitation details, and relevant links. This was followed by a second reminder, with photographs and biographies of the confirmed international speakers.

A call for abstracts on the conference theme was circulated. Significant interest has been shown with several abstracts already received from SAIOH members.

Appreciatively, SAIOH has received sponsorships for the conference from several supporting companies.



New SAIOH website and online payment platform

SAIOH engaged website developers to completely overhaul the SAIOH website, specially to allow integration with the Member Management System (MySAIOH). The SAIOH administration teams are progressing well with the implementation and population of the new website.

SAIOH has started the process of implementing an online credit card payment system on a well-known international platform, like PayU, to make electronic payments easier for members. As soon as this is finalised, SAIOH will notify all members with a guideline on how to use it. A special 'thank you' goes to Kate Smart for her work in this regard.

Communications

SAIOH publishes its newsletter and President's Address in two electronic mediums, namely *Occupational Health Southern Africa* journal, and the *African Occupational Safety and Health* magazine (A-OS&H). These publications are issued bimonthly, and the links are sent to all members via a Mailchimp and posted on our website. Four issues of these two publications have already been sent to all SAIOH members this year.

SAIOH communicates daily with its stakeholders via e-mails, phone calls and virtual meetings, imparting important news, technical information, legislation revisions, new Standards, and announcements of webinars, to name a few.

Some recent interactions

- SAIOH hosted a virtual *Occupational Health Southern Africa* Editorial Board meeting on 10 June 2022.
- Workplace Health Without Borders (WHWB) held several occupational hygiene-related webinars during the past three months.
- The International Labour Organization (ILO) held a virtual information session on 11 July 2022.
- The Occupational Hygiene Approved Inspection Authority (OH AIA) Association held a virtual meeting on 15 July 2022.
- A virtual presentation on SAIOH and the certification system was delivered to University of Pretoria 3rd- and 4th-year students of occupational hygiene, on 11 August 2022.
- SAIOH, DoEL, and OH AIA Association held a liaison meeting, in person, and online, at our Broadacres offices, on 18 August 2022.

Table 1. SAIOH PCC certification assessment results (18 August 2022)

Certification category	Written assessments				Oral assessments			
	Assessed	Passed	Failed	Pass rate	Assessed	Passed	Failed	Pass rate
	n	n	n	%	n	n	n	%
OH assistant	88	79	9	89.8	88	79	9	89.8
OH technologist	35	22	13	62.9	28	20	8	71.4
Occupational hygienist	37	11	26	29.7	20	13	7	65.0
Total	160	112	48	70.0	136	112	24	82.4

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Certification assessments

A summary of results from assessments, as of 18 August 2022, is provided in Table 1.

The third and final rounds of PCC written and oral assessments are scheduled to take place on Friday, 23 September 2022 and Friday, 21 October 2022, respectively.

Oral assessment improvements

The PCC technical team continues to work on revising the PCC oral assessment format and questions, in line with the occupational hygiene self-assessment tool. Two PCC technical teams are working in parallel to 1) update the SAIOH self-assessment tool and revise the PCC oral assessment format, and 2) develop questions and required answers. The first sub-committee, chaired by Garth Hunter, has been meeting bimonthly. The second sub-committee, to be chaired by Nico Potgieter, will be starting in earnest soon, with eight volunteers.

Improvements in the assessment format are to ensure that the growing field of occupational hygiene is covered, and that the assessment format and tools continue to remain relevant and current.

Occupational Hygiene Skills Forum (OHSF)

The SAIOH Occupational Hygiene Skills Forum (OHSF) was initiated to coordinate all aspects related to the recognition of occupational hygiene training materials. Examples of this are the asbestos training courses, occupational hygiene training providers and institutions, evaluating the OHTA's approved training providers (ATPs) in southern Africa, as per our memorandum of understanding (MoU) with OHTA, and the development and management of assessment and examination systems, where required.

Another important function of the OHSF is to evaluate applications from tertiary institutions for recognition of their occupational hygiene-related qualifications. The OHSF is progressing well with these accreditations. A recently developed matrix is used to evaluate the occupational hygiene qualifications' content in line with the 50% occupational hygiene subject requirement.

North-West University and the Tshwane University of Technology offer four-year bachelor's degrees that are recognised by the OHSF as meeting the qualification criteria at the registered occupational hygienist (ROH) level. The OHSF is currently evaluating the University of the Witwatersrand's and CPUT's programmes.

All tertiary institutions that offer occupational hygiene qualifications are encouraged to contact the PCC Administrator for information regarding application for recognition (lee@saioh.co.za). Details of recognised training providers and recognised qualifications will soon be available on the SAIOH website (www.saioh.co.za). This will make it easier for students and certification candidates to select suitable occupational hygiene training programmes that meet SAIOH and international requirements.

The future of tuberculosis in South Africa

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The Mine Medical Professionals Association (MMPA) was founded in 1921.¹ Its membership comprises doctors and other healthcare workers who work or have interest in the mining industry. The principal objective of the MMPA is to provide professional medical education to healthcare workers, by creating awareness and assisting members to keep abreast of new developments related to both occupational and non-occupational diseases. The MMPA hosts information-sharing events like seminars and congresses.

The COVID-19 pandemic caused a loss of focus on the challenges of HIV/AIDS and tuberculosis (TB) in South Africa. Consequently, we failed to achieve the World Health Organization (WHO) target to reduce the incidence of TB by 20% from 2015 to 2020, globally, only achieving an 11% reduction (Figure 1).² Throughout the four waves of the Pandemic, medical resources were channelled towards the screening, diagnosis, and contact tracing of cases with COVID-19. The diagnosis and contact tracing of people with TB took a back seat, resulting in increased loss to follow-up of TB cases. During this period, and for the first time since 2005, an increase in TB deaths was recorded. There was also a failure to achieve the WHO target to reduce TB mortality by 35% from 2015 to 2020; only a 9.2% reduction was achieved.²

TB SEMINAR PROCEEDINGS

With the challenges of meeting the TB targets in mind, the MMPA hosted a TB seminar in collaboration with the Minerals Council South Africa's (MCSA's) Masoyise Health Programme. The seminar, with the theme *The future of TB: What is the latest?* was a hybrid event that was held on 9 July 2022 at Emperors Palace in Johannesburg. The President of the MMPA, Dr Dipalesa Mokoboto, welcomed the delegates. She highlighted that TB has always been an issue of concern in the mining industry, due to mine workers being exposed to silica dust, especially in the gold-mining sector. She reiterated the aim of the seminar: to provide information on the future and latest developments of TB, and anticipated that, through information sharing at the workshop, health professionals would be empowered and equipped with sufficient knowledge to manage TB adequately, post the COVID-19 pandemic.

Dr Tumi Legobye, the MMPA Vice-president, chaired the proceedings of the day. Several presenters, both onsite and virtually, kept

the audience captured. They included university professors, doctors, representatives from the WHO, the National Department of Health, and the Department of Mineral Resources and Energy (DMRE), and health practitioners from the mining industry.

The first speaker, Dr Nazir Ismail, from Team Lead Diagnostics, represented the WHO. His presentation was titled 'WHO guidelines on TB diagnostics'. He highlighted the WHO recommendation for initial TB diagnosis using Xpert MTB/RIF and Xpert MTB/RIF ULTRA assays for adults and children, based on sputum testing. He emphasised that additional testing should be done for extra-pulmonary TB (EPTB), using cerebrospinal fluid (CSF), lymph node aspirates, lymph node biopsies, and testing of pleural, pericardial, and peritoneal fluids, synovial joint fluids, and/or urine and blood. Dr Ismail advocated symptom screening, using the standardised TB cough questionnaire and chest X-ray.

The new nucleic acid amplification test (NAAT) for the detection of TB and rifampicin and isoniazid resistance (INH), have a pooled sensitivity of 93.0% and a specificity of 97.7%. The pooled sensitivities and specificities for rifampicin and INH resistance detection are 96.7% and 98.9%, and 86.4% and 99.8%, respectively. This is a marked difference from similar measures for culture and phenotypic drug-sensitivity testing (DST).³

There is a low-complexity automated NAAT for the detection of resistance to INH and second-line anti-TB agents such as the fluoroquinolones, ethionamide, and amikacin. The NAAT has provided us with a new and innovative method to detect the sensitivity of TB drugs before six weeks, unlike TB culture and sensitivity results that are issued after six weeks. This has reduced the time to make decisions about the appropriate drug regimen to treat drug-sensitive (DS) or drug-resistant (DR) TB patients.

Dr Lindiwe Ndelu, Chief Director of Occupational Health at the DMRE, spoke about TB and HIV performance in the South African mining industry (SAMI). She reported that, in 2021, the SAMI screened 91.1% of miners for TB; a reduction from 97.0% in 2020. Of those co-infected with HIV, 51.5% were screened in 2021; an increase from 40.5% in 2020. While 60.5% of the SAMI companies have integrated HIV and TB programmes, only 46.1% have budgets for HIV and TB programmes. She reported a 19% drop in the percentage of TB contacts traced and

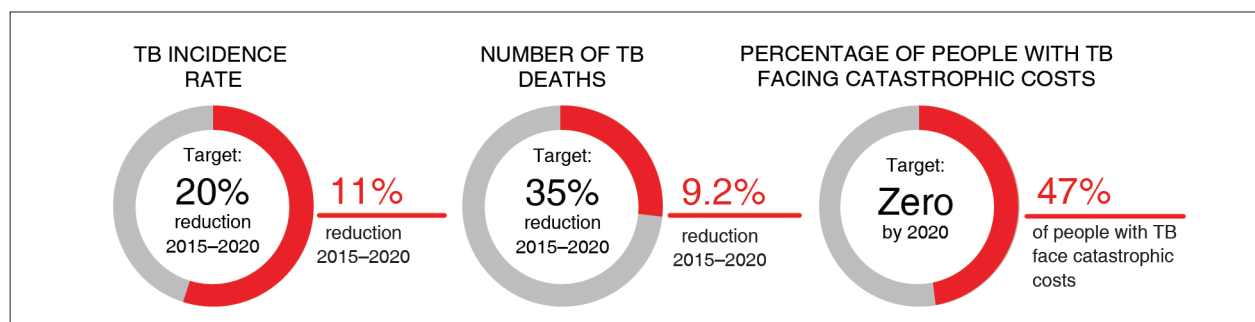
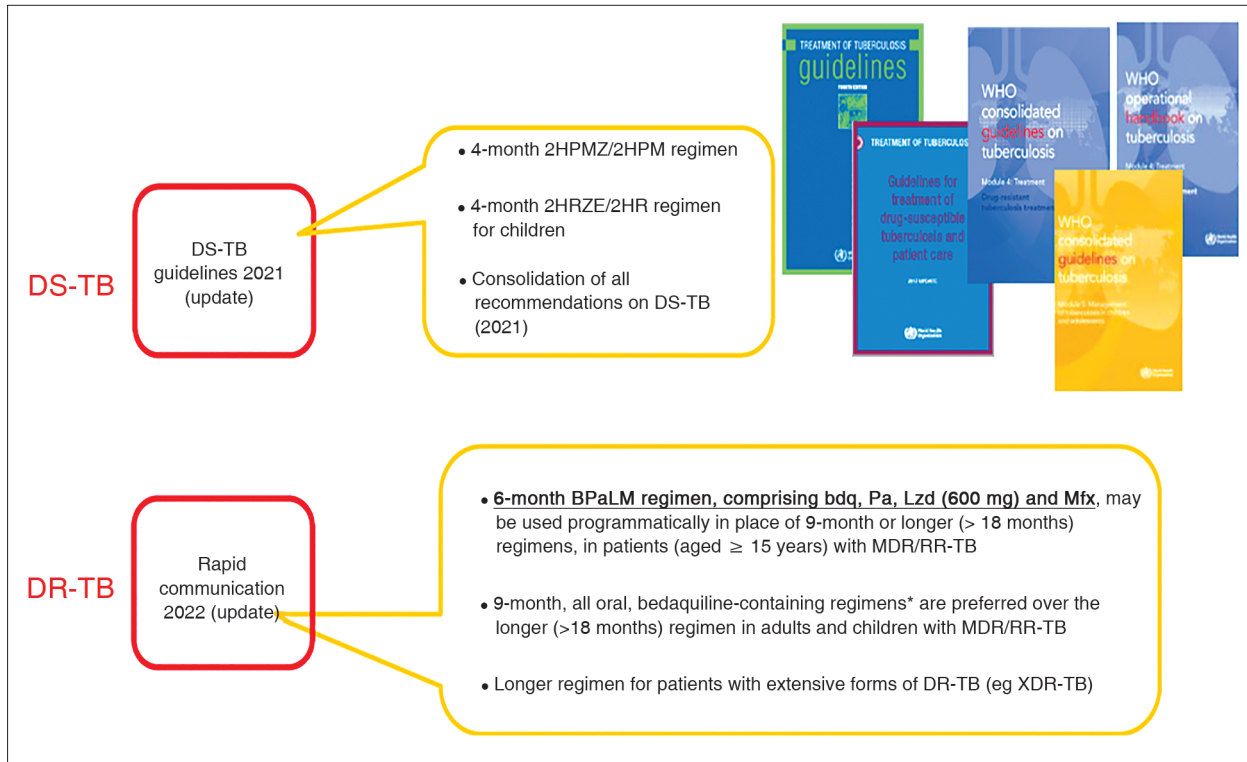


Figure 1. Progress towards the WHO End TB Strategy milestones, 2020²

screened in 2021, compared to 2020. During the COVID-19 pandemic, the mines continued to monitor TB under the guidance of both the Mine Health and Safety Council (MHSC) and the Masoyise Health Programme. She concluded that there is still room for better adoption of TB screening practices and contact tracing skills that were implemented during the COVID-19 pandemic.

Dr Medea Gegia of the TB treatment team (Global TB Programme, WHO) pointed out that several new treatment guidelines and handbooks have been made available in 2022 (Figure 2). These include new, shorter-duration TB treatment regimens. The treatment for patients with cardio-respiratory TB can be reduced from six to four months. However, there are exceptions that need to be taken into consideration (Table 1).



DS-TB: drug-sensitive TB, DR-TB: drug-resistant TB, MDR/RR-TB: multidrug-resistant/rifampicin-resistant TB, XDR-TB: extensively drug-resistant TB

Figure 2. New developments in TB treatment guidelines in 2022

Table 1. A new treatment regimen for drug-susceptible pulmonary TB

Drug regimen	Treatment and dose	Exclusions
Age ≥ 12 years Weight ≥ 40 kg	2HPMZ/2HPM regimen	Weight < 40 kg
4-month regimen: INH RIFAP MOX PZA	Duration: 8 weeks, daily INH, RIFAP, MOX, PZA, followed by 9 weeks, daily INH, RIFAP, MOX	Severe extrapulmonary TB: TB meningitis, disseminated TB, osteoarticular TB, and abdominal TB
	Dose: RIFAP 1200 mg MOX 400 mg	PLHIV with CD4 count < 100 cells/mm ³
	DOTS: Presence of DOTS supporter	Age < 12yrs
	Not recommended: replacement of MOX with another fluoroquinolone	Pregnant, breast-feeding and postpartum women
DO NOT PROLONG TREATMENT BEYOND 4 MONTHS		↓
		New pulmonary TB: 2HRZE/4HR
		TB meningitis: Use adjuvant corticosteroids; dexamethasone or prednisone tapered 6–8 weeks (strong recommendation) TB pericarditis – use dexamethasone initially

INH: isoniazid, RIFAP: rifapentine, MOX: moxifloxacin, PZA: pyrazinamide, PLHIV: people living with HIV, DOTS: directly-observed therapy shortcourse

With regard to DS-TB treatment, the WHO has made the following recommendations:

- National TB control programmes should provide supervision and support for all TB patients to ensure completion of the full course of therapy.
- Drug-resistance surveillance should be implemented to monitor the impact of TB treatment programmes, as well as for designing standard regimens.
- TB patients who are living with HIV should receive at least the same duration of daily TB treatment as HIV-negative TB patients.
- For people living with HIV (PLHIV), anti-retroviral treatment (ART) should be started as soon as possible within two weeks of initiating TB treatment, regardless of CD4 cell count.
- Steroids must be prescribed for patients diagnosed with TB meningitis.

Prof. Norbet Ndjeka (Chief Director: TB Control and Management, National Department of Health) delivered an insightful presentation and made recommendations on innovative ways of enhancing TB recovery plans. His recommendations, together with those made by other presenters, were emphasised at the end of the seminar. These recommendations will be carried forward to aid our quest to END TB. The recommendations were:

1. To improve governance and management of TB
2. To improve TB surveillance, i.e. TB case finding and reduction of diagnosed TB cases that are lost to follow-up
3. To strengthen systems for retention in care

4. To develop guidelines in line with the WHO recommendations for TB diagnostics, detection, and reduction of TB resistance
5. To adopt quality improvement approaches to improve TB outcomes
6. To develop innovative ways to monitor and manage TB case finding, diagnosis, treatment, and follow-up using IT systems to link surveillance systems in the private and public health sectors

Dr Thuthula Balfour, Head of Health for MCSA, re-iterated the importance of keeping our focus on TB management. Having succeeded in reducing TB incidence in the SAMI, it is important that we consider the recommendations made by different presenters if we are to stay on top of our game. She then thanked all those who had contributed to making the seminar a success.

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SOUTHERN AFRICA

Vol. 28 No. 5 September/October 2022

Contents

Editorial	178
<i>News</i>	
Institution of Occupational Safety and Health call for research proposals	179
WHWB surveys healthcare providers who wish to participate in its work	179
Eureka: delving into artisanal diamond mining	180
NIOH Research Committee: Saluting female research scientists advancing occupational health in South Africa	182
<i>Original Research</i>	
Evaluation of grip strength and finger forces while performing activities of daily living MM Keller, R Barnes, C Brandt	187
<i>Short Report</i>	
Knowledge and practices of private practitioners regarding healthcare waste management in KwaZulu-Natal, South Africa L Boodhram, S Ghuman, D Singh	192
<i>Opinion</i>	
Working towards better health in Africa: Where should we concentrate research efforts? G Nelson	196
<i>Report</i>	
Regional technical support for the establishment of occupational hygiene analysis laboratories in Malawi and Zambia AUDA-NEPAD	198
Global Exposure Manager	
IOHA	202
<i>Occupational Health Legislation</i>	
Harassment Prevention Pack – helping employers to prevent and eliminate harassment in the workplace in South Africa Bowmans	204
Hazardous Biological Agents Regulations, 2022, promulgated under the Occupational Health and Safety Act No. 85 of 1993, as amended	205
<i>Society Reports</i>	
SASOM	207
SASOHN	210
SAIOH	211
MMPA	215