



NATIONAL INSTITUTE FOR
OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service

OccuZone



The Optimal Work Environment

Designed to support wellbeing and enable productivity

Vol 8 | Issue 2 | September 2026

inside **THIS ISSUE**

Message from the Editor

3

Research focus

4

Publications

6

Features & News

13

Specialised Service Delivery

23

Teaching & Training

25

NIOH Services

26

The published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the National Health Laboratory Service or its Institutes be liable for damages arising from its use.

Editorial team: Ms Zinhle Mapumulo | Mr Vuyo Sabani | Prof. Nisha Naicker | Dr Kerry Wilson | Dr Monica Young | Ms Thato Malesa | Ms Bonolo Masoka | Mr Msingathi Magwaxaza

SUBSCRIBE

To subscribe please visit our website at <https://www.nioh.ac.za/>
or send us an email at niohnewsletter@nioh.ac.za



**Ms Zinhle
Mapumulo**

MESSAGE FROM THE EDITOR

Welcome to the September edition of the OccuZone, which focuses on a topic that is central to occupational health and safety: the optimal work environment.

An optimal work environment is about far more than how our workplaces look or function. This concept talks to conditions that enable employees to thrive, remain healthy, feel valued, and perform at their best – something all organisations should strive towards.

In this issue, we discuss the many factors that contribute to creating workplaces designed to protect health, support wellbeing, and enable productivity. Dr Monica Young examines the often overlooked impact of noise annoyance in the workplace settings, highlighting how environmental noise can affect employee wellbeing, concentration, morale, and overall productivity.

Professor Nisha Naicker discusses the critical role of research in developing optimal working conditions in South Africa, demonstrating how scientific evidence informs workplace policies, health interventions, labour standards, and safer working environments.

We also feature an article on ergonomics and designing workplaces for workers, reminding

us that workplace systems, equipment, and environments should be designed around human capabilities and needs. Through thoughtful workplace design, organisations can reduce workplace risks while improving comfort, efficiency, and performance.

This issue also features our regular National Institute for Occupational health (NIOH) research publications, which showcase our research outputs from occupational exposure and workplace injury prevention to advances in environmental health, toxicology, and cancer research. These studies continue to strengthen the evidence base that supports healthier workplaces and communities throughout South Africa.

In our Service Delivery feature, we profile the Safety, Health and Environment (SHE) Department, which plays a vital role in supporting the National Health Laboratory Service (NHLS) by implementing, monitoring, and improving occupational health and safety systems across NHLS.

We hope this edition provides valuable insights and practical considerations for advancing our shared goal of promoting healthy and safe workplaces.

Happy reading.



RESEARCH FOCUS

Prof. Nisha Naicker

Optimal working conditions in South Africa require a balance between legal compliance, employee wellbeing, productivity, health and safety, and flexible work practices. Achieving this depends on the availability of peer-reviewed research that can inform workplace policies, interventions and labour standards. The NIOH has expanded its scope beyond mining to address chemical, biological, physical, and ergonomic risks across diverse industries. This expansion has established it as a reliable collaborator for international organisations and research bodies addressing occupational health issues in low- and middle-income countries.

The International Labour Organization (ILO) defines decent work as work that “encapsulates the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income; security in the workplace and social protection for all; better prospects for personal development and social integration; freedom for people to express their concerns, organise and participate in the decisions that affect their lives; as well as equality of opportunity and treatment for all women and men.”¹

Research contributes significantly to the development of optimal working conditions by providing evidence-based insights that assist organisations to design workplaces that are safe, productive, healthy and compliant with labour standards.

Since its establishment, the NIOH has conducted research across formal and informal sectors to generate evidence that supports healthier workplaces, prevents occupational disease and injury, and promotes employee wellbeing and productivity.

Research can be useful in the following ways:

- Identifying factors that improve employee wellbeing: Research helps employers understand which workplace factors have the greatest impact on employee health and job satisfaction. Studies consistently show that reasonable working hours, adequate rest periods, safe environments, and supportive management improve employee wellbeing and performance. South African labour regulations incorporated many of these evidence-based principles into the Basic Conditions of Employment Act.
- Supporting evidence-based workplace policies: Industry can use research findings to develop policies related to flexible work arrangements, overtime management, occupational health and safety, employee wellness programmes and professional development initiatives.
- Employers can implement interventions proven to improve productivity and employee engagement. The ILO's Productivity Ecosystems for Decent Work programme emphasises using data and evidence to guide workplace reforms and productivity improvement efforts.²

▶ Everyone should have the opportunity for decent work



- Enhancing productivity and organisational performance: Research enables employers to determine the relationship between working conditions and productivity. It has been shown that workplaces with better skills development, employee participation, and efficient work practices tend to achieve stronger productivity outcomes.
- Improving occupational health and safety: Research identifies workplace hazards and evaluates strategies to reduce accidents, injuries, and occupational illnesses. Findings guide the development of safety standards, risk management practices, and health promotion programmes. Occupational safety and health are recognised internationally as essential components of decent work.
- Informing labour legislation and standards: Many labour laws are evidence-based. In South Africa, research has informed labour policies related to working hours, employee protections, occupational health surveillance, and workplace wellness programmes, helping employers align with legislative requirements while supporting workforce productivity.

- Identifying skills and workforce development needs: Research helps employers understand skill gaps and training requirements. According to ILO analyses, labour quality, education, skills, and workforce capabilities are critical drivers of productivity and economic growth. Research findings therefore support targeted employee development strategies.²

The NIOH continues to contribute to the evidence base that supports healthier and more productive workplaces in South Africa. The latest research publications and resources are available on the NIOH [website](#) or can be obtained through the Institute's Information Services.

References

1. International Labour Organization. Decent work and the 2023 Agenda for sustainable Development. <https://www.ilo.org/topics-and-sectors/decent-work-and-2030-agenda-sustainable-development> [Accessed 13 August 2026]
2. International Labour Organization. 2025. [Productivity insights to strengthen and advance Decent Work in South Africa](https://www.ilo.org/resource/article/productivity-insights-strengthen-and-advance-decent-work-south-africa). <https://www.ilo.org/resource/article/productivity-insights-strengthen-and-advance-decent-work-south-africa>

Decent work = Dignity
Decent work = Equality
Decent work = Fair income
Decent work = Social protection
Decent work = Safety and health
Decent work = Rights
Decent work = Social justice

RESEARCH PUBLICATIONS



Ms Mashele Thembi

Evaluation of the possibility of workplace environmental asbestos contamination and personnel exposure resulting from laboratory processing of asbestos-containing samples

Author(s): Mhlongo, L. N., Ngcobo, Z. B., Mashele, T.

Source: : Discover Public Health 23, 592 (2026). <https://doi.org/10.1186/s12982-026-01675-x>

Summary: Occupational exposure to asbestos remains a major cause of morbidity and mortality from asbestos-related diseases (ARDs). Laboratory environments that routinely process asbestos-containing materials (ACMs) are considered low-risk; however, there is limited data on potential airborne exposure during laboratory routine specimen handling and processing. This study aimed to determine asbestos exposure in the laboratory environment during routine analysis of specimens suspected to contain asbestos.

Materials and methods: The prospective observational cross-sectional study was conducted between January 2023 and November 2024 at the NIOH, South Africa. Static and personal air monitoring samples (20 personal, 20 static and 10 control air filters) were collected during routine processing of lung and bulk samples suspected to contain asbestos. All Samples were processed under the biosafety cabinets. Air filters were analysed using scanning electron microscopy with energy-dispersive spectroscopy (SEM-EDS) by analysts at the NIOH, and data were analysed using STATA v16.

Asbestos fibres were identified in bulk and lung specimens on all the sampling days; however, no asbestos fibres were detected on any of the air monitoring filters. The current study findings indicate airborne fibre concentrations below the analytical detection limit of SEM-EDS under the controlled laboratory conditions.

No detectable airborne asbestos fibres were detected during routine laboratory processing of probable ACMs. While this may suggest a low potential for occupational exposure, low-level exposure below the detection limit cannot be excluded. The usage of approved protocols and continued exposure monitoring and surveillance remains necessary.



Dr Kerry Wilson

Asbestos in materials submitted for analysis to the National Institute for Occupational Health, South Africa, 2018–2022

Author(s): Ngcobo, Z.; Mashele, T.; Mhlongo, L.; Lakhoo, D. G; Wilson, K.

Source: Occupational Health Southern Afr. 2026; 32(1):26-31. [doi: 10.62380/ohsa.2026.32.1.3](https://doi.org/10.62380/ohsa.2026.32.1.3)

Summary: Asbestos is a harmful material that can cause serious lung diseases when people breathe in its tiny fibres. Though the laboratory environment is considered low-risk, evidence of airborne exposure in laboratory settings is limited. In this study, researchers looked at whether laboratory workers might be exposed to asbestos fibres while handling and testing samples (like lung tissue or other materials) that may potentially contain asbestos.

The finding suggests that, under proper laboratory conditions, the risk of breathing in asbestos fibres during routine work is very low. However, the study cannot completely rule out very tiny amounts of asbestos that current tests might not detect. Because of this, and asbestos being carcinogenic and there is no safe level of exposure, it is still important for laboratories to follow strict safety procedures and continue monitoring for any possible exposure.

Air monitoring samples (20 static, 20 personal and 10 controls) were collected whilst the samples suspected to contain asbestos were being processed, under controlled conditions. Although asbestos fibres were found in the materials being tested, none were found in the air monitoring samples.



Mr Hlologelo Ramatsoma

Self-reported workplace injuries among informal waste pickers in landfill sites in Johannesburg, South Africa

Author(s): Ramatsoma, H.; Manganyi, J.; Ditema, K.; and Naicker, N.

Source: International Journal of Environmental Research and Public Health, 23, p.509. <https://doi.org/10.3390/ijerph23040509>

Summary: South Africa's recycling sector relies heavily on informal labour, yet non-fatal workplace injuries among landfill-based waste pickers are poorly understood. This cross-sectional study assessed the prevalence of self-reported injuries and associated factors among 354 waste pickers at two landfill sites in Johannesburg. Participants (median age 34 years; 73.2% male) completed structured questionnaires that captured demographic information and injuries sustained in the previous six months.

A high prevalence of injury was reported, with 86.2% of participants experiencing at least one injury. Lacerations from contact with waste materials were the most common (82.7%), followed by incidents of violence

(20.5%) and needle-stick injuries (19.9%). Despite 94.1% of participants reporting the use of personal protective equipment (PPE), injury rates remained elevated. In multivariable analysis, each additional year of landfill work experience was associated with a slight increase in injury prevalence. In contrast, workers aged 51 years and older had a significantly lower injury prevalence compared to those aged 18–28 years.

These findings highlight the need for improved occupational health interventions, including mandatory safety training, provision of durable PPE, and formal integration of waste pickers into occupational health systems.



Dr Charlene Andraos

Berry-derived gold nanoparticles induce integrated ROS-mediated apoptosis, immune modulation, and transcriptomic remodeling in 4T1 triple-negative cancer cells

Author(s): Andraos, C.; Wepener, V.; and Gulumian, M.

Source: Cell Death Discovery (2026) 12:225. <https://www.nature.com/articles/s41420-026-03023-z>

Summary: This study looks at a highly aggressive form of disease called triple-negative breast cancer, which is notoriously difficult to treat. To find better solutions, this study mapped out the complete genetic blueprint of these cancer cells, discovering over 5.7 million mutations, particularly in vital bodyguard genes like TP53 and BRCA2 that normally prevent tumours from growing. It also used technologies to prove these mutations closely match human cancer traits, confirming it as an excellent model for finding a cure.

To target these cells, the researchers tested an innovative treatment using natural, health-boosting polyphenolic compounds found in berries, which are excellent at fighting cancer but normally break down too quickly in the body to be clinically useful. To fix this stability issue, scientists leveraged nanotechnology to pack the berry extracts into microscopic gold nanoparticles that act as tiny shields, delivering the medicine directly to the enemy cells.

The results were highly successful, as the berry-gold nanoparticles completely rewired the cancer cells' programming by shutting down the internal communication lines, specifically the PI3K/AKT/mTOR pathways, that cancer uses to grow and hide from the immune system. Furthermore, this targeted delivery locked the cells in place to prevent them from spreading to other organs (metastasis) and triggered a burst of cellular stress that forced the cancer cells to commit suicide through a process called apoptosis.

Ultimately, this research provides a vital, high-resolution upgrade to our database of breast cancer genetics while proving that combining natural dietary shields with modern nanotechnology is a powerful, effective strategy to stop aggressive tumours and force them to destroy themselves.



Dr Charlene Andraos

Toxicornon-toxic: a critical assessment of the contradictory results for selected graphene family materials

Author(s): Andraos, C.; Wepener, V.; and Gulumian, M.

Source: Frontiers in Toxicology <https://doi.org/10.3389/ftox.2026.1818582>

Summary: This research investigates why studies on the toxicity of graphene family materials (GFMs), particularly graphene, graphene oxide, and reduced graphene oxide, show such conflicting results.

Current literature reveals that reported cytotoxic (cell-damaging), genotoxic (DNA-damaging), and antimicrobial effects vary widely, ranging from severe toxicity to negligible responses. Researchers discovered that these contradictions are rarely caused by true biological inconsistency. Instead, a major driver is that GFMs cause severe assay interference. They disrupt standard colorimetric, fluorometric, and luminometric tests through mechanisms like adsorption, fluorescence quenching, and optical masking, leading to false data.

Furthermore, variations in physicochemical characteristics drastically alter both biological behaviour and test artefacts. Subtle differences in oxidation state, defect density, surface chemistry, and lateral size change how the materials behave. Sonication-induced structural modifications, endotoxin contamination, and residual impurities also heavily corrupt test results.

To resolve these discrepancies, the authors conclude that scientists must implement rigorous material characterisation. Researchers need to adopt interference-free or label-free testing strategies to ensure reliable, reproducible data.



Dr Charlene Andraos

xCELLigence™ RTCA system in cancer biology:
innovations in real-time functional

Author(s): Andraos, C.; Joseph, J. S.; Utembe, W.; Magogotya, M.; Oriyomi, O.; and Fagbohun, O.

Source: Cytotechnology (2026) 78:128. <https://doi.org/10.1007/s10616-026-01000-z>

Summary: This paper highlights the xCELLigence™ Real-Time Cell Analysis (RTCA) system, an impedance-based technology that allows for the non-invasive, label-free, and continuous monitoring of cellular behaviour.

This platform tracks high-resolution kinetic data on critical cancer processes, including cytotoxicity, proliferation, adhesion, and cell invasion. Since 2020, RTCA has been increasingly relied upon across diverse oncology fields, including immunotherapy, kinase inhibition, and nanomedicine. By evaluating impedance-derived kinetic signatures, scientists gain a deeper mechanistic understanding of tumour cell behaviour.

The authors emphasise the translational relevance of the xCELLigence system for precision oncology and drug development. Ultimately, the review discusses current limitations and emerging directions to establish this real-time platform as a predictive, integrative tool in preclinical cancer research.



Prof. Nisha Naicker

Applications of digital technologies in environmental health information systems

Author(s): Masimula, S. S.; Senekane, M. F; and Naicker N.

Source: Health Informatics Journal. 2025; 32(2):1-25. <https://doi.org/10.1177/14604582251389857>

Summary: The world is facing complex environmental health challenges, which require a data science approach for holistic solutions. This indicates a greater need for environmental health information systems (EHISs) to be digitally transformed to facilitate rapid data flow for agile public health interventions.

To consolidate and characterise the body of literature on the application of EHISs in the digital era to inform decision-making and action.

This review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines. Literature was searched from PubMed, Scopus and Google Scholar between January and March 2025.

The study analysed 74 articles, with 26% focusing on existing EHISs, 24% on environmental health indicators, 14% on geographic information system tools, and 36% on digital technologies in environmental health data management. Researchers and practitioners, mainly in high-income countries, continue to explore predictive analytics, modelling and machine learning, the Internet of Things, smart devices, and infographics in environmental health.

Digital technologies are revolutionising environmental health by providing actionable insights, enhancing decision-making, and promoting proactiveness. This integration is crucial for improving public health outcomes and must be embraced by low- and middle-income countries as well, even amid resource-related and interoperability challenges.



FEATURES AND NEWS

The sound of an optimal work environment

By Dr Monica Young

An optimal work environment requires conditions where employees are comfortable and focused, allowing them to deliver on their responsibilities. When these conditions are disturbed, it may reduce employee productivity and morale. Noise annoyance is one of the factors that may interfere with an optimal working environment.

In occupational health, annoyance noise is distinct from occupational noise: the latter is assessed to determine the risk of noise-induced hearing loss, while the former is evaluated in terms of annoyance and the quality of speech communication.¹ Annoyance noise refers specifically to noise disturbing employees in office environments from sources such as diesel generators, traffic or nearby industrial equipment.

The body's reaction to constant unwanted sound is the release of stress hormones that trigger the fight or flight response, raising blood pressure.² In addition, remaining in a prolonged state of fight or flight can negatively affect mood and heighten anxiety.³ Noise annoyance consequently affects employee mental health and wellbeing while decreasing work productivity.⁴ Such effects can cause low morale in one employee and ripple outward, influencing the attitudes of colleagues through shared interactions.

In South Africa, noise annoyance is evaluated using the SANS 10103:2008.¹ These assessments should be conducted by competent persons with adequate knowledge and experience in noise assessments. If the measured noise levels are above the guideline levels stipulated in SANS 10103:2008, the assessor makes recommendations and ensures they are practical. These may vary depending on the cause of the noise but can include investing in green energy solutions such as solar panels to eliminate the noise from diesel generators or erecting brick and mortar walls to block sound from a busy road or a nearby factory with industrial equipment.

To control noise, it is necessary to understand how sound waves propagate (how sound travels). In general, sound propagation is influenced by distance, the material through which it travels, temperature, and humidity. For example, certain materials may reflect, amplify, or absorb sound depending on their properties and the frequency of the sound.⁵ This is why sound insulation is made of sound absorbing materials such as rubber or foam, and why brick and mortar walls are more effective barriers against sound than corrugated metal walls. These are some of the factors that are considered when interventions are recommended.



Sound propagation is a complex field and requires expertise in acoustical engineering when these interventions are implemented.

Many employers have begun implementing strategies to design optimal work environments that improve employee wellness and boost productivity. Noise annoyance should be included in employee feedback and morale surveys, as it may be a hidden factor affecting wellness and overall morale. Incorporating this measure will enable employers to make informed decisions when implementing workplace strategies and help determine whether there is a need to engage a service provider to conduct a noise annoyance survey.

Addressing noise annoyance not only supports employee wellness but also fosters a culture of attentiveness and respect in the workplace. By proactively managing this factor, employers demonstrate a commitment to creating an optimal work environment where productivity and morale can thrive.

References

1. SANS 10103: 2008 The measurement and rating of environmental noise with respect to annoyance and to speech communication. South African National Standards (SANS). 2008:35.
2. Ising H, Braun C. Acute and chronic endocrine effects of noise: Review of the research conducted at the Institute for water, soil and air hygiene. *Noise and Health*. 2000;2(7):7-24.
3. Zheng J, Yue N, Tian Z, Yu J, Li B. Beyond the HPA axis: Synaptic circuits of PVNCRH neurons in stress-related psychiatric disorders. *Pharmacological Research*. 2026;227:108179.
4. Di Blasio S, Shtrepi L, Puglisi GE, Astolfi A. A Cross-Sectional Survey on the Impact of Irrelevant Speech Noise on Annoyance, Mental Health and Well-being, Performance and Occupants' Behavior in Shared and Open-Plan Offices. *International journal of environmental research and public health*. 2019;16(2):280.
5. Berg RE. Sound. *Encyclopedia Britannica* 2026. Updated 16 July 2026. Available from: <https://www.britannica.com/science/sound-physics>. Accessed 13 August 2026.



Designing workplaces for workers

By Ms Thato Malesa and Ms Bonolo Masoka

October is Global Ergonomics Month, providing an opportunity for ergonomists and industry practitioners to raise awareness on ergonomic principles. The Ergonomics Unit at the NIOH joins industry stakeholders and partners in promoting Human Factors and Ergonomics (HFE) awareness, fostering knowledge sharing, and capacity building as part of its commitment to advancing HFE across South Africa's diverse workplaces. This year's theme focuses on "Designing Workplaces for Workers," emphasising the importance of placing people at the centre of workplace design. The theme highlights the need to consider workers' physical, cognitive and psychosocial characteristics, capabilities and limitations when designing work environments, equipment, systems and processes.

While the principles of human factors and ergonomics are widely recognised, applying them successfully requires a deep understanding of how people interact with the tools, technologies, and environments around them. To unpack these concepts and their practical relevance in modern workplaces, the Ergonomics Unit invited leading ergonomist Ms Jessica Parry, Senior Human Factors Consultant and Manager at ClariMed, Inc. to share her insights on designing systems that truly meet user needs.

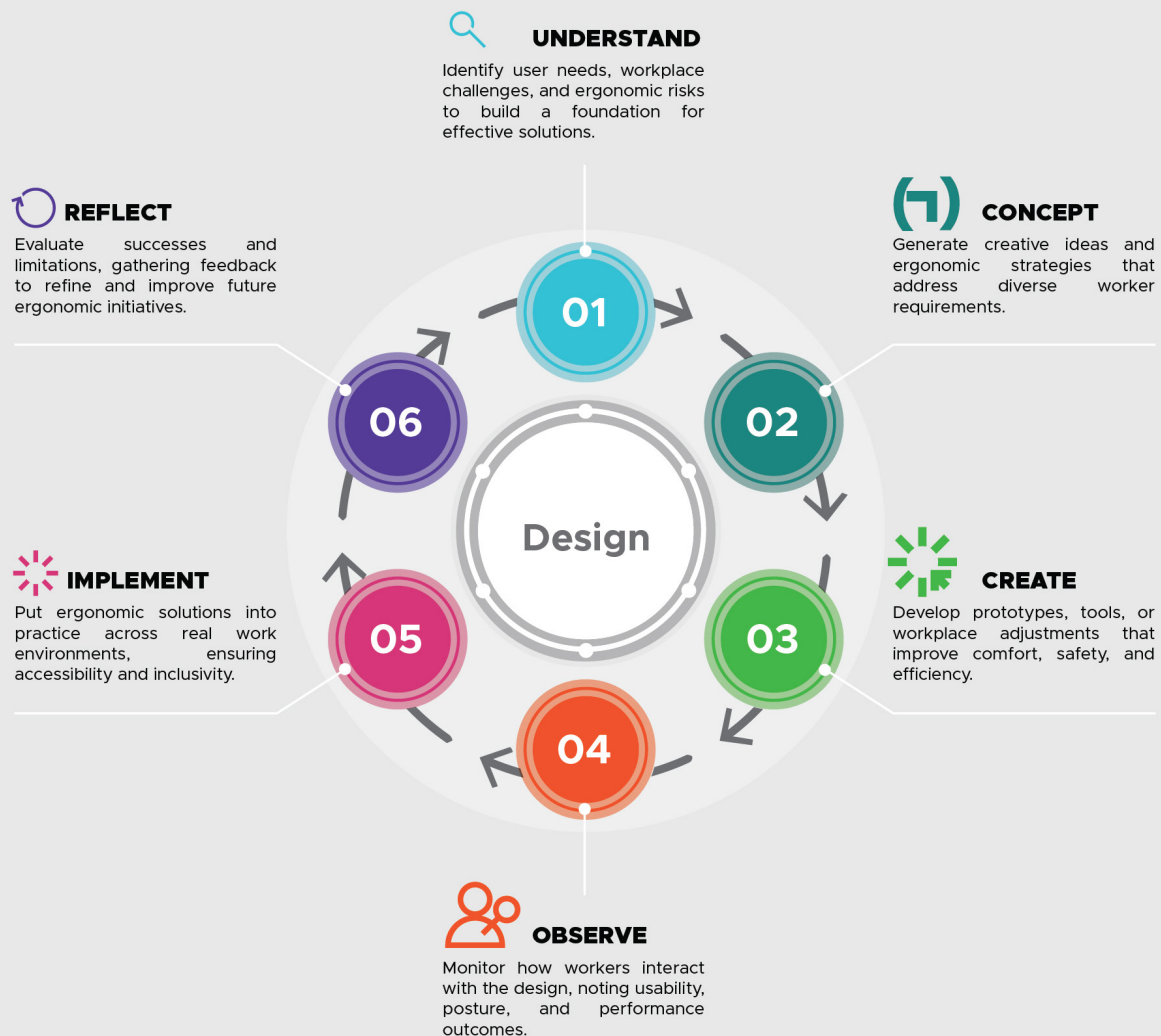
Jessica Parry

Designing for the people who actually use them

Most injuries and near-misses aren't caused by carelessness. They're caused by a mismatch between what a task demands and what a person can reasonably do, given their physical and cognitive abilities, their attention, and the environment they're working in. That mismatch is exactly what HFE exists to close. Rather than expecting people to adapt to poor design.

The physical side is the more familiar one. It's about how far someone has to reach, how much force a task requires, how long someone holds an awkward posture, and how a tool sits in the hand. A control panel mounted too high, a lever that needs both hands and a strong back, a screen positioned so a user has to twist to read it. None of these are the worker's fault. They're a product of a workstation making the wrong assumptions about the range of bodies and physical capabilities of the people using it. When physical ergonomics is well considered, organisations can reduce fatigue, strain injuries, and the kind of slow-motion harm that develop over time..

The cognitive side is less visible, but just as important. It's about attention, memory, and decision-making under real conditions.



Not the calm, focused conditions of a training room, but a noisy floor, a night shift, an interruption mid-task. A confusing interface, an alarm that sounds identical to five other alarms, a procedure that relies on someone remembering 17 steps in the right order. These create what we call user-related risk: the chance that a well-trained, well-intentioned user still gets it wrong because the system set them up to. When that happens, it's not “user error.” It's a design that didn't account for how people actually think and process information under pressure.

The two are always intertwined. A user reaching awkwardly for a control (physical) while also trying to read a poorly labelled display and remember what step comes next (cognitive) is dealing with one integrated problem, not two separate ones. Good HFE looks at the whole user scenario: the task, the tool, the environment, and the person together, holistically.

This is also why simulated use and formative evaluation matter so much in good design practice.

Watching real intended users attempt real tasks, in conditions that resemble their actual use environment, surfaces problems no amount of desk-based review will catch. It's far cheaper to find a bad handle grip or a confusing sequence of steps during design than after a product or process is already out in the field, especially for critical tasks, the ones where a failure could cause serious harm.

Ergonomics Awareness Month is a good moment to make a simple point: good design isn't a “nice to have” bolted on at the end. It's a core part of protecting the intended users who engage with the tool, product or system, and it pays off in fewer injuries, fewer errors, and users who aren't fighting a frustrating experience with the product or system. The most effective way to get there is straightforward, if not always easy: design with users, not just for them.

The importance of anthropometric data in designing for diverse population groups such as women



By Sarah Bannatyne
Certified Professional Ergonomist at
Incomar Aerospace and Defence Systems

Designing products, workplaces, equipment, clothing, furniture, and built environments requires an understanding of the physical characteristics of the people who will use them. One of the most important sources of information to ensure designs are comfortable, functional, and safe for their intended users, is anthropometric data—the scientific measurement of human body dimensions and proportions.

Anthropometric data are essential because people vary in body shape and size. It plays a particularly important role when designing for diverse population groups such as women. Historically, many products and environments have been designed using limited datasets, often based predominantly on data from male or relatively homogeneous populations. When these datasets are applied to designs intended for women or other diverse groups, it can result in discomfort,

reduced performance, exclusion, and, in some cases, safety risks.

Using appropriate and representative anthropometric data allows designers to accommodate human diversity rather than assuming one size fits all.

Why women and other diverse population groups require specific consideration?

While there are similarities in body dimensions between men and women, body proportions and dimensions can differ, including the relationship between height, hip width, shoulder dimensions, limb lengths and other measurements. There is also considerable variation among women themselves, influenced by factors such as age, ethnicity, geographic location and occupation. Good design should therefore not only focus on creating something that fits an “average” woman, but on accommodating a realistic range of users.

Designs based primarily on male measurements may result in workplaces or products that are not only frustrating, uncomfortable or difficult for many women to use, but in some cases, are also genuine safety risks. Anthropometric differences are particularly important to consider when designing seats, tools, machinery, protective equipment, clothing, vehicle interiors, and workspaces. For example, if a work chair is designed around a larger male body, a shorter person may struggle to sit comfortably while keeping their feet on the floor and maintaining proper support. Similarly, tools, controls, protective equipment, vehicles, clothing and workstations may become less comfortable or less effective when the people using them are not adequately represented in the design.

The benefits of using representative anthropometric data extend beyond comfort.

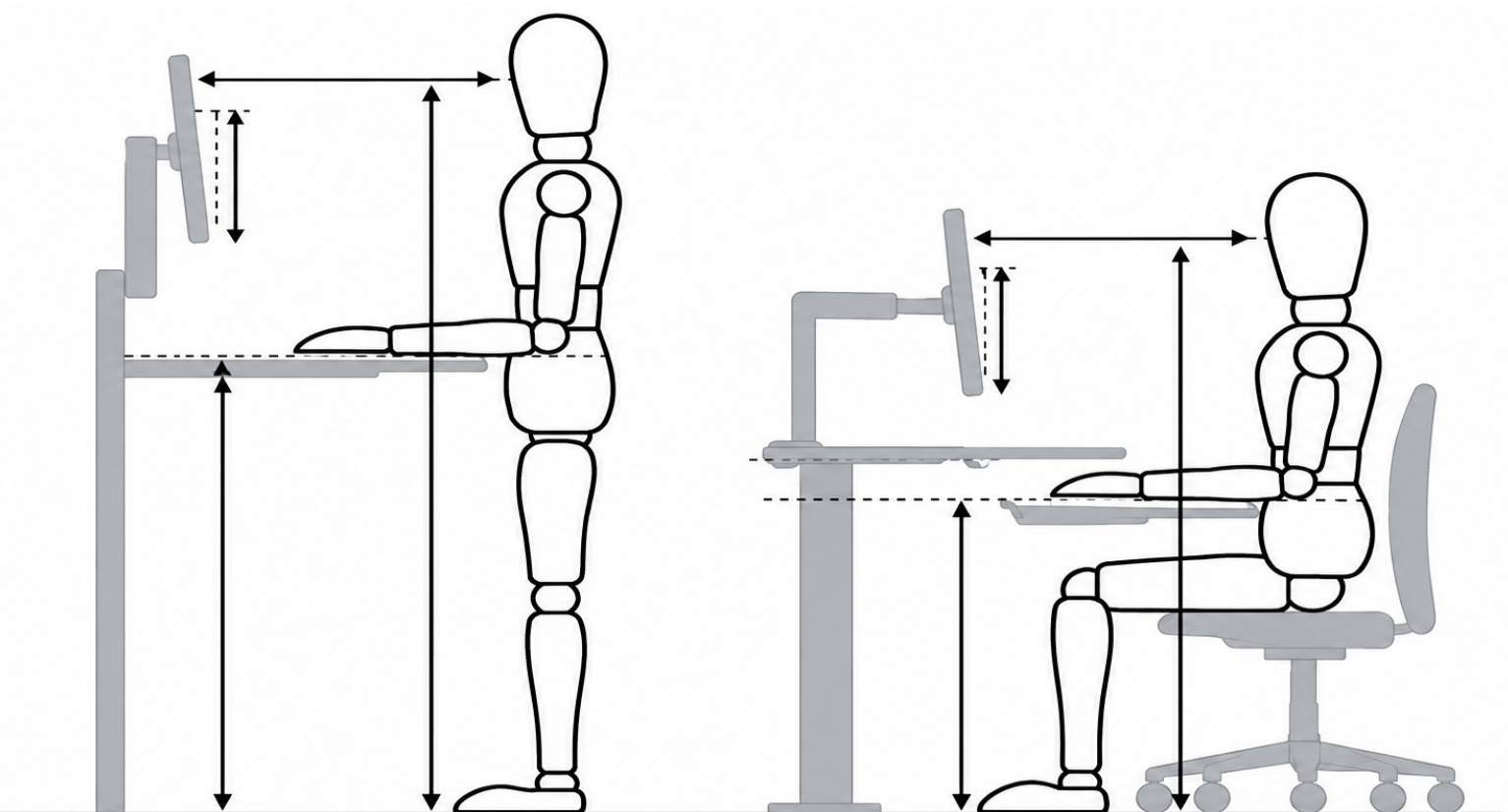
Poorly fitting products can contribute to injury, fatigue, reduced performance and exclusion. In the workplaces, equipment that is too large or poorly positioned may increase physical strain.

Personal protective equipment that does not account for women's body shapes may provide inadequate protection or restrict movement. Similarly, poorly designed seating, workstations or vehicle interiors can negatively affect posture, comfort and usability over time.

Importantly, inclusive design should extend beyond collecting anthropometric measurements. Women and other diverse groups should be considered throughout the design process, including research, testing and evaluation.

Combining representative anthropometric data with feedback from real users can further help to identify practical issues that measurements alone may not reveal.

Anthropometric data provides an essential foundation for human-centred and ergonomic design. The use of representative data is particularly important when designing for diverse populations, such as women, whose body dimensions and proportions may differ from those represented in traditional design datasets. Incorporating representative anthropometric data enables designers to create products, workplaces and environments that are safer, more effective and inclusive of the people who use them. Ultimately, anthropometric data are about more than just measurements; it's about inclusion, comfort, usability, safety, recognising human diversity and designing accordingly.



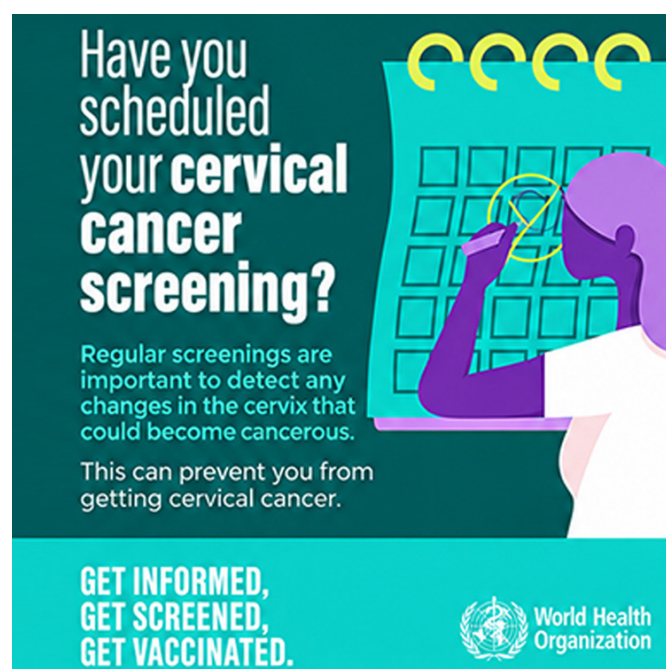


Cervical cancer and the workplace

By Dr Melitah Mothlale

Cancers associated with occupational hazards account for about 20% of all cancers, with 1.3 million deaths worldwide.¹ Occupational exposures include chemicals such as benzene, silica, pesticides, and ionizing radiation. According to the International Agency for Research on Cancer (IARC) monographs, established occupational cancers include lung, bladder, skin, nasal cavity, peritoneal, laryngeal, liver, leukemia, pancreatic, myeloma, brain, pharyngeal, oesophageal, and breast. Cervical cancer is rarely mentioned as an occupational cancer.

Cervical cancer is a cancerous tumor primarily affecting the cervix within the female reproductive tract.² Women living with HIV are three to five times more likely to develop cervical cancer than women without HIV. Cervical cancer is strongly associated with the human papillomavirus (HPV), which, while sexually transmitted, might also be related to occupational risk factors.¹ It progresses slowly, often taking five to 20 years to advance from initial disease onset to late-stage disease.^{3,4} Sexual behaviour, early onset sexual activity, multiple sexual partners, tobacco smoking, and immune factors like HIV status influence the mechanisms that underlie carcinogenesis.¹ Thus, more prevalent among working-age women.⁵ Cervical cancer is rare among women aged 20 and below.⁴ It ranks among the top 5 common cancers and underlying cause of mortality among women worldwide.⁶



Sub-Saharan Africa is listed among other regions globally that bear a disproportionate burden of cervical cancer, with approximately 101,423 new cases and 76,44 deaths reported annually.^{7,8} This is mainly due to poor awareness, ineffective screening practices, and a huge burden of HIV in the region.^{6,8} In contrast, cervical cancer incidence and mortality are lower in developed nations due to effective cervical cancer screening.⁹ Beyond common risk factors for cervical cancer, occupational and social determinants also influence cervical cancer development. Occupational status contributes to the risk

of cancer through direct exposure to work-related carcinogens and indirectly based on differences in working conditions, workload, stress levels, health literacy, and access to screening.¹⁰ Precarious jobs are associated with limited participation in cancer screening.¹⁰

Tetrachloroethylene, also referred to as perchloroethylene (PERC), a metal degreasing solvent and dry-cleaning agent, is recognised as a potential risk factor for cervical cancer.¹ Additionally, tetrachloroethylene is recognised as a carcinogenic substance that can occur in multiple workplace settings, such as industrial, machinery production, personal service, domestic service, and metalworking environments.¹ Thus, a high rate of cervical cancer has been reported among dry cleaners and laundry workers with occupational exposure to tetrachloroethylene.⁴ Additionally, occupations involving trading and farming accounted for a considerable number of women with cervical cancer.⁸ Nonetheless, apart from other occupational groups, commercial sex workers have been identified as a population with a higher burden of cervical cancer.⁷ This results from prolonged working hours, sexual and physical violence, unsafe work conditions, challenges accessing health care, and limited consideration in occupational health policies.⁶

Recommendations

- Cervical cancer screening programs could have a high impact if made accessible in the workplace.¹⁰
- Health education interventions should be introduced in the occupational setting.⁹
- Increased awareness among high-risk occupations and encouraging regular screening alongside exposure controls could increase early diagnosis and avoid preventable deaths.

References

1. Brito-Marcelino A, Duarte-Tavares RJ, Marcelino KB, Silva-Neto JA. Cervical cancer related to occupational risk factors: review. *Rev Bras Med Trab*. 2020;18(1):103-8.
2. Zhao M, Gu RY, Ding SR, Luo L, Jia Y, Gao CX, et al. Risk factors of cervical cancer among ethnic minorities in Yunnan Province, China: A case-control study. *Eur J Cancer Prev*. 2022;31(3):287–92.
3. Visanuyothin S, Chompikul J, Mongkolchat A. Determinants of cervical cancer screening adherence in urban areas of Nakhon Ratchasima Province, Thailand. *J Infect Public Health* [Internet]. 2015;8(6):543–52. Available from: <http://dx.doi.org/10.1016/j.jiph.2015.04.018>
4. Slack R, Young C, Rushton L. Occupational cancer in Britain: Female cancers: Breast, cervix and ovary. *Br J Cancer* [Internet]. 2012;107(S1):S27–32. Available from: <http://dx.doi.org/10.1038/bjc.2012.115>
5. Sun YS, Chen WL, Wu WTe, Wang CC. The fact of return to work in cervical cancer survivors and the impact of survival rate: An 11-year follow-up study. *Int J Environ Res Public Health*. 2021;18(20).
6. Singini MG, Sitas F, Bradshaw D, Chen WC, Motlhale M, Kamiza AB, et al. Ranking lifestyle risk factors for cervical cancer among Black women: A case-control study from Johannesburg, South Africa. *PLoS One* [Internet]. 2021;16(12 December):1–15. Available from: <http://dx.doi.org/10.1371/journal.pone.0260319>
7. Luvían-Morales J, Gutiérrez-Enríquez SO, Granados-García V, Torres-Poveda K. Risk factors for the development of cervical cancer: analysis of the evidence. *Front Oncol*. 2024;14(May):1–10.
8. Woldetsadik AB, Amhare AF, Bitew ST, Pei L, Lei J, Han J. Socio-demographic characteristics and associated factors influencing cervical cancer screening among women attending in St. Paul's Teaching and Referral Hospital, Ethiopia. *BMC Womens Health*. 2020;20(1):1–9.
9. Nartey Y, Hill PC, Amo-Antwi K, Nyarko KM, Yarney J, Cox B. Cervical cancer in the Greater Accra and Ashanti Regions of Ghana. *J Glob Oncol*. 2017;3(6):782–90.
10. Collatuzzo G, Teglia F, Boffetta P. Role of Occupation in Shaping Cancer Disparities. *Cancers (Basel)*. 2022;14(17):1–15.

A portrait of Dr Monica Young, a woman with dark hair, wearing a grey sweater, set against a green circular background. The background of the entire header is a solid green color.

Optimal lighting for workplaces

By Dr Monica Young

Lighting in the workplace is important for employees to be able to do their tasks safely and efficiently. The faster and easier employees can identify a hazard, the more likely they are to avoid it. Lighting is not only important for safety, but it also affects employee productivity by improving visual performance, which refers to the speed and accuracy with which employees perform visual tasks.¹ In addition, light plays an important role in employee mood regulation by affecting circadian rhythm hormones (cortisol and melatonin) and serotonin activity.²

Cortisol and melatonin affect employee alertness during the day by ensuring an optimal sleep cycle is maintained, while serotonin is an important neurotransmitter involved in mood regulation and several other physiological and behavioural processes, including appetite, memory, and stress responses.³

Poor lighting may contribute to visual discomfort, reduced productivity, workplace accidents, and, in some cases, increased absenteeism.⁴ With these costs in mind, the health and safety of South African employees regarding lighting are regulated by the Physical Agent Regulations of the Occupational Health and Safety Act 85 of 1993.⁵

These regulations were promulgated by the Department of Employment and Labour in March 2025, stipulating the lighting requirements for workplaces, by requiring employers to eliminate glare, flicker, and

stroboscopic effects at the source, and ensuring that all work areas comply with the minimum illuminance values prescribed in the Regulations. The Regulations also provide for the maintenance of uniform illuminance in work areas, stipulating that the difference in illumination between a task area and adjacent areas may not exceed the ratio specified in the Regulations. These requirements are essential for ensuring the safety and well-being of employees and recognise glare, flicker, poor lighting, and stroboscopic effects as workplace health and safety risks.

The Regulations further acknowledge that different work areas and tasks require different levels of illumination. This is based on the principle that the visibility of an object and the visual performance required to complete a task vary according to the visual demands of that task. Factors that influence these demands include the size and detail of the object being viewed, the time available for observation, the degree of contrast between the object and its surroundings, the position of the object within the visual field, and the employee's experience and familiarity with the visual task.¹

Uniformity of illuminance is crucial for minimising visual fatigue, especially when employees are using electronic visual displays such as computer screens. Minimising the illumination contrast between visual displays and the surrounding area reduces the strain on the pupils, which would otherwise need to constantly adjust to varying light levels between these areas.⁶

Another aspect of lighting that has received considerable attention in recent years is blue light emitted by digital displays and its potential effects on visual comfort and circadian rhythm. Various studies have found an association between blue light exposure and disruption of the circadian rhythm.⁷ However, current scientific evidence has not demonstrated that blue light emitted by digital devices causes eye damage in humans at normal exposure levels, although research into potential long-term effects continues.⁸

Fortunately, most modern devices provide an easy way to reduce blue light exposure. By changing display settings to a warmer colour temperature, such as "Warm" or "Paper" mode, the screen emits less blue light. These settings may be useful for reducing evening circadian rhythm disruption, although their effectiveness in preventing eye damage has not been established.

Effective workplace lighting is about more than simply meeting regulatory requirements. Appropriate illuminance levels, good uniformity, reduced glare, and consideration of circadian health can contribute to a safer, more comfortable, and more productive work environment. By understanding how lighting affects both visual performance and employee well-being, employers can make informed decisions that support workplace health, safety, and operational efficiency.

References

1. SABS Standards Division. SANS 10114-1 Interior lighting Part 1: Artificial lighting of interiors. In: South African Bureau of S, editor. Pretoria, South Africa: SABS; 2023. p. 90.
2. Aryani SM, Kusumawanto A, Suryabrata JA, editors. Lighting in the workplace as the visual environment that affect the occupant's mood: A literature review. 3rd International Conference on Dwelling Form (IDWELL 2020); 2020: Atlantis Press.
3. Bamalan OA, Moore MJ, Al Khalili Y. Physiology, Serotonin. StatPearls [Internet]. Updated 2023-07-30 ed. Treasure Island (FL): StatPearls Publishing; 2026.
4. Health and Safety Executive, Lighting at work. 2nd ed. Surrey: Crown; 1997. 45 p.
5. Department of Employment and Labour. Occupational Health and Safety Act 85 of 1993, Physical Agents Regulations, (2024). South Africa.
6. Fan Q, Xie J, Dong Z, Wang Y. The Effect of Ambient Illumination and Text Color on Visual Fatigue under Negative Polarity. Sensors (Basel, Switzerland). 2024;24(11).
7. Zhao ZC, Zhou Y, Tan G, Li J. Research progress about the effect and prevention of blue light on eyes. International journal of ophthalmology. 2018;11(12):1999-2003.
8. Hipólito V, Coelho JMP. Blue Light and Eye Damage: A Review on the Impact of Digital Device Emissions. Photonics. 2023;10(5):560.





SERVICE DELIVERY

Profiling the National Safety, Health and Environment (SHE) Department

By Dr Monica Young

The National Safety, Health and Environment (SHE) Department functions as a support service for the NHLS, providing SHE services to all laboratories and workplaces of the National Health Laboratory Service (NHLS). The department is based at the National Institute for Occupational Health (NIOH) for convenience in accessing services and supporting departments such as Occupational Hygiene, Occupational Medicine, Epidemiology, Immunology, Microbiology, and Pathology. The National SHE Department is responsible for advising and guiding, implementing (where possible), maintaining, and evaluating OHS in all NHLS laboratories and workplaces. This is achieved through formal permanent SHE staff appointments, SHE policies and procedures and an established occupational health and safety management system (OHSMS) whose main elements include policy, organising, planning, implementation, evaluation, and action for improvement.

The National SHE Department comprises three sections overseen by a National SHE Manager. The Safety section consists of a Deputy Manager-National SHE and NHLS regional Safety Health and Environment Officers (SHEO); an Occupational Health section consisting of an Occupational Medicine Practitioner (OMP) and NHLS regional Occupational Health Nurse Managers (OHNM); and a Waste Assurance section consisting of a Waste Assurance Manager and NHLS regional Waste Assurance Officers (WAO).

1. Services Offered:

While each of the sections has a particular focus in service delivery as listed below, the department works as one, with cross-over occurring in certain service functionalities.

1.1. Safety Section

- Develop and review safety policies and procedures (Q-Pulse).
- Evaluate and provide safety guidance on SHE risk assessments from NHLS facilities
- Monitor and facilitate the process of Health and Safety Representative (HSR) Appointment and Training, Health and Safety Committee (HSC) Set-up and HSC Meetings, and SHE Legal Appointments (Section 16.2, HSR, FA, FW, WO, etc.)
- Provide OHS Training (NHLS Intranet SHE programme Training, HSR Online Training, ECHO National Training, SHE Induction Training and Face-to-Face Training)
- Provide OHS Technical support in an advisory capacity at all Quarterly HSC meetings the NHLS Regions

- Monitor occupational incident reporting and investigation by NHLS facilities in OHASIS (occupational health and safety information system) and provide guidance and support where required
- Conduct OHS compliance monitoring through annual SHE Audits of all NHLS Facilities

1.2. Occupational Health Section

- Provide guidance and medical support to specific cases and incidents involving:
 - ⊙ Possible exposures to Brucella
 - ⊙ Possible exposure to Congo Fever and other viral haemorrhagic fevers
 - ⊙ Employees diagnosed with Tuberculosis
 - ⊙ Employees with Hepatitis B
 - ⊙ Ergonomic incidents and issues
 - ⊙ Glove and other work-related allergies
 - ⊙ Exposure or possible exposure to other biological agents, chemicals, and physical and psychosocial hazards
 - ⊙ Medical fitness for work assessments.
- Medical surveillance
- Medical fitness for work assessments
- Medical and disability accommodation advisory and guidance
- Facilitation and advisory on COIDA claims submissions
- Medical and health OHS training
- Workplace vaccinations

1.3. Waste Assurance Section

- Manage the implementation of the waste management programme in the NHLS to ensure compliance with the national waste management policy.
- Advise and support NHLS facilities on waste management requirements
- Promote sound management of waste in the NHLS
- Develop and review NHLS waste management procedures

- Audit and monitor waste management procedures and practices
- Provide waste management training

Special investigations and NIOH support:

The National SHE Department ensures that NHLS employees' exposure levels to formaldehyde and xylene are continuously evaluated in accordance with the Occupational Health and Safety Act (OHS Act 85 of 1993) with the assistance from the Occupational Hygiene Section of NIOH. The SHE Department also utilises expertise from other sections in NIOH, including Occupational Medicine and Immunology, for guidance on ergonomic assessments and immunology testing and advice, respectively.

Occupational Health and Safety Information System (OHASIS)

The department utilises an in-house electronic developed and managed information system to provide monthly statistics for NHLS EXCO reporting and high-level decision-making.

OHASIS has been used to:

- Conduct health and safety audits
- Report and record all health and safety incidents
- Investigate all health and safety incidents
- TB and Hepatitis B medical surveillance
- Record hazardous and healthcare risk waste generated, treated, and disposed of.

OHASIS has been successfully implemented in Namibia and locally in the Western Cape Department of Health. It is also currently being rolled out to other departments of the Gauteng Provincial Government.

Contact Details

For more information about the NHLS National SHE Department, contact:

Occupational Safety Section	Occupational Health Section	Waste Assurance / Environmental Section
Ms Michelle Morgan Tel: +27(0)11 712 6447 Email: MichelleM@nioh.ac.za	Dr Graham Chin Tel: +27(0)11 712 6485 Email: GrahamC@nioh.ac.za	Ms Mmashela Kgole Tel: +27 (0)11 712 6484 Email: MmashelaK@nioh.ac.za

TEACHING AND TRAINING

Integrating Ergonomics in the workplace

Save The Date



NATIONAL INSTITUTE FOR
OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service

Date: 29 October 2026 | **Time:** 08H30 -16H30 | **Venue:** Online

Click [here](#) to register

Cost: R900

Accreditation: CPD Points confirmed

Enquiries: Ergonomicstraining@nioh.ac.za

NIOH SERVICES

Section	Services	Contact person
Analytical Services	Analytical Services provides a broad range of users with analytical services expertise in occupational hygiene, biological monitoring, and some clinical laboratory tests.	Head of Section Dr Puleng Matatiele Tel: 011 712 6477 Email: PulengM@nioh.ac.za
Immunology & Microbiology	The Immunology and Microbiology section consists of three units: Occupational Allergy, Waterborne Pathogens and Bioaerosol. The Occupational Allergy Unit provides diagnostic tests to identify workplace agents that cause respiratory and skin diseases. The Occupational Skin Disease Clinic also offers consultations with a dermatologist. Waterborne Pathogens Unit (WBPU) conducts monthly microbiological testing of potable water from workplaces to ensure compliance with the SANS 241 drinking water standard. It also analyses non-potable water samples to ensure they meet microbiological safety standards for their designated occupational use. The Bioaerosol Unit identifies bacteria and fungi in environmental air samples taken from the workplace and performs efficacy testing on air disinfection devices, such as ultraviolet germicidal irradiation (UVGI). In addition, the unit performs risk assessments for Hazardous Biological Agents (HBA) in different workplaces.	Head of Section Ms Edith Ratshikhopha Tel: 011 712 6475 Email: EdithR@nioh.ac.za
Information Services and Training	Archive Documenting and preserving the institutional memory and create access points to the rare and unique information resources showcasing how the institute has evolved over time. These records stretch as far as 1912, they include personal papers, conference papers, registers, obsolete instruments, photographs etc.	Mr Simphiwe Yako Tel: 011 712 6518 Email: simphiwey@nioh.ac.za
Pathology Division	Training laboratory technical staff: The laboratory performs practical training of technical laboratory staff enrolled as medical laboratory scientists, and laboratory technologists in the histopathology discipline.	Ms Busisiwe Mkhonza Tel: 011 712 6519 Email: BusisiweM@nioh.ac.za

Section	Services	Contact person
Toxicology and Biochemistry	United Nations Globally Harmonised System of Classification and Labelling of Chemicals (UNGHS) The Toxicology Department facilitates the UNGHS workshop to train individuals who handle hazardous chemicals in their workplaces in the identification and management of chemical hazards according to GHS classification criteria.	Dr Wells Utembe Tel 0117126741 Email: wellsu@nioh.ac.za
Occupational Medicine	Advisory services Advisory services on the prevention and management of occupational diseases and disorders offered to organizations within the SADC region.	Occupational Medicine Specialist referral clinic: Mr Jacob Senamolela Tel: 011 712 6462 Email: JacobSe@nioh.ac.za
Occupational Hygiene	Occupational Hygiene Training Association (OHTA) Modules The Occupational Hygiene Section is an approved OHTA trainer, and provide training on the following modules: Foundation level: • OHTA201 Basic principles in Occupational Hygiene Intermediate level – core modules: • OHTA501 Measurement of Hazardous Substances • OHTA503 Noise – Measurement and its effects • OHTA505 Control of Hazardous Substances • OHTA507 Health effects of Hazardous Substances Intermediate level – optional modules: • OHTA502 Thermal Environment. • OHTA504 Asbestos and other fibres. • OHTA506 Ergonomics Essentials.	Dr Jeanneth Manganyi Tel: 011 712 6406 Email: JeannethM@nioh.ac.za
Epidemiology & Surveillance	Training and services: Epidemiology and Biostatistics Training: • Basic and Advanced courses. • How to use routine surveillance data to improve the health of workers. • How to use REDCap Protocol development for research on Occupational exposures and Health outcomes. • Development of REDCap tools and other data collection tools. • Research on work exposures and health outcomes in the workplace.	Asanda Jekwa Email: AsandaJ@nioh.ac.za

Section	Services	Contact person
	Services: • Analyses of routine medical surveillance data. • Developing analysis plans for surveillance data. • Literature Reviews on occupational health topics. • Evaluation of Surveillance systems. • Advice and guidance around developing a surveillance system or advice for selecting a service provider for surveillance tools. • Designing or conducting occupational health screening surveys along with staff satisfaction and mental health surveys in your workplace. • Evaluation of training programs in occupational hazards, health and safety.	



**NATIONAL INSTITUTE FOR
OCCUPATIONAL HEALTH**

Division of the National Health Laboratory Service



Contact details

25 Hospital Street, Constitution Hill, Johannesburg,
South Africa

PO Box 4788, Johannesburg, South Africa, 2000

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