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South African Society
of Occupational Medicine
FOUNDED IN 1944

South African Society of
Occupational Medicine (SASOM)



SAIOH

Southern African Institute for
Occupational Hygiene (SAIOH)



Mine Medical Professionals
Association (MMPA)

An accredited peer-reviewed journal of the Department of Higher Education and Training (DHET)

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SOUTHERN AFRICA

Volume 30, Issue 1, 2024

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Tuberculosis (TB)

INDUSTRY PERFORMANCE AGAINST TARGETS (2020-2022)

ACTIVITY	MILESTONE	2020	2021	2022
TB Screening	Annual TB screening (100%)	68%	75%	84%
TB Incidence	Below the National TB incidence rate 5%year-on-year reduction for the TB incidence rate	195/100 000 population	221/100 000 population	241/100 000 population

TB CONTACT TRACING

TB contact tracing was implemented to stop the spread of TB in the mining industry and in the community. It involves finding the people that an infected person has been in contact with, so, they can get counselling, testing and, if needed, be put on treatment.

The Health and Wellness Task Team (previously known as TB Contact Tracing Task Team) helps identify TB index cases from member companies and trace identified contacts in households and communities.

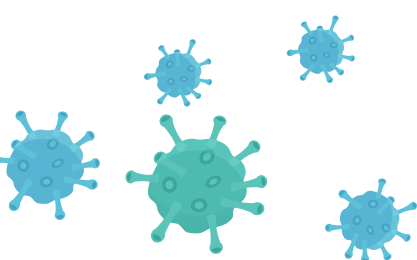
World Tuberculosis (TB) Day, 24 March 2024, continues with the theme “Yes! We can end TB”. TB is still one of the world’s deadliest diseases and recent years have seen a worrying increase in drug-resistant TB.



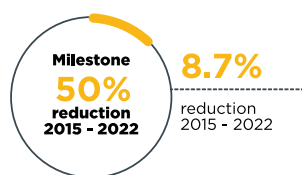
ACCORDING TO WORLD HEALTH ORGANIZATION (WHO)

In 2023, 192 countries and areas with more than 99% of the world’s population and TB cases reported data

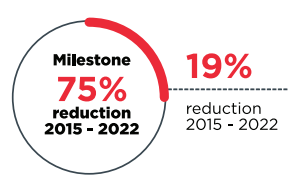
WHO END TB STRATEGY: 2025 MILESTONES.



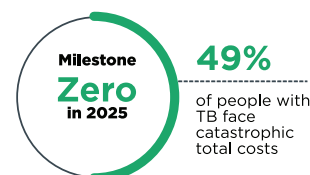
TB INCIDENCE RATE



NUMBER OF TB DEATHS



PERCENTAGE OF PEOPLE WITH TB FACING CATASTROPHIC TOTAL COSTS*



A total of 1.3 million people died from TB in 2022 (including 167 000 people with HIV). Worldwide, TB is the second leading infectious killer after COVID-19 (above HIV and AIDS).

Multidrug-resistant TB (MDR-TB) remains a public health crisis and a health security threat. Only about 2 in 5 people with drug resistant TB accessed treatment in 2022.

TB is present in all countries and age groups.
TB is curable and preventable.

US\$ 13 billion is needed annually for TB prevention, diagnosis, treatment and care to achieve the global target agreed at the 2018 UN high level-meeting on TB.

Ending the TB epidemic by 2030 is among the health targets of the United Nations Sustainable Development Goals (SDGs).

WHO published a Global tuberculosis report 2023 with more insights



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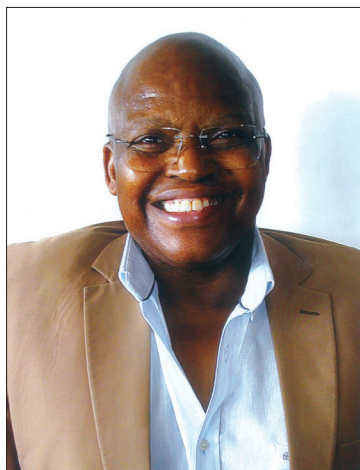
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From the Guest Editor . . .



Dr Vusumuzi Nhlapho, Guest Editor

The nation is gearing up for national and provincial elections scheduled for 29 May, and campaign efforts have intensified for what will be an election with a more uncertain outcome than any since the establishment of our democracy in 1994. It is imperative for South Africans to fulfil their responsibility by participating in the process to choose a political party and leaders who will steer South Africa towards economic improvement.

While the economy is at the forefront of the minds of many, we need to keep health high on the agenda. One of the diseases that persists in South Africa and other countries is tuberculosis (TB), the second leading cause of death from a single infectious agent after SARS-CoV-2. In 2022, 1.3 million people died from TB globally, as reported by the World Health Organization (WHO);¹ 424 000 of whom were from the African region.² Currently, TB is mentioned in the manifestos of only three political parties – the Economic Freedom Fighters (EFF), African Transformation Movement (ATM), and African National Congress (ANC).³ We can only hope that other parties will also see the importance of adding TB to their agendas before the upcoming elections.

The South African mining industry continues to address the high prevalence of TB. In partnership with the International Labour Organization (ILO) and the Mine Health and Safety Council (MHSC), the Minerals Council South Africa hosted a session on 'Sustainable responses to HIV, AIDS and TB in the world of work' at the 11th South African AIDS Conference in Durban in June 2023. In August last year, the Health Policy Committee established the Gold TB Working Group, which comprises all gold-mining companies. The Masoyise Health Programme⁴ has led in coordinating activities of the mining sector over the last decade, and continues to work on issues related to HIV, TB, and non-communicable diseases. Efforts to prevent and treat TB in the African region continue, under the auspices of the African Union Development Agency (AUDA-NEPAD) and funded by the Global Fund,⁵ as reported by Norman Khoza and colleagues over the last few years in this and previous issues of *Occupational Health Southern Africa*.

World TB Day is held on 24 March every year and this year WHO Regional Director for Africa, Dr Matshidiso Moeti, while highlighting the plight of paediatric TB, called it an 'ancient disease'.² It is relevant that one of the papers in this issue of *Occupational Health Southern Africa*, from the 7th International Conference on the History of Occupational and Environmental Health (organised by the International Commission on Occupational Health (ICOH) Scientific Committee on the History of Prevention of Occupational

and Environmental Diseases) that was held in Durban in November last year, is about silicotuberculosis – the combination of silicosis and tuberculosis – which still occurs in the mining industry. Rodney Ehrlich takes us on the historical journey of the two diseases in the gold mines – from the belief that they were linked, to the denial of the association, and back to the current evidence-based knowledge about the strong relationship between them.

David Rees and Gill Nelson take up the historical silicosis thread in their description of the belief that aluminium oxide powder could prevent pneumoconiosis in gold miners; another paper presented at the ICOH conference in Durban. Interestingly, South Africa never bought into the idea, saving many miners from aluminium-induced neurological injury. Arthur McIvor draws our attention to important similarities in the fight against TB and silicosis in South Africa and Britain, looking at the contributions to the occupational health narrative that trade unions made over a period of more than 100 years.

While significant progress has been made in the management of both TB and silicosis in the mining industry, concerted efforts and programmes are required to ensure that they soon become part of South Africa's (and the world's) history.

The 34th triennial ICOH congress (ICOH2024) will take place from 28 April to 3 May this year in Marrakesh, Morocco. Africa is well represented in the scientific programme of the congress, with presentations by participants from South African and other African countries in both the oral and poster sessions. We have been looking forward to meeting up with occupational health colleagues from around the world after the hiatus caused by the COVID-19 pandemic, which prevented many of us from travelling to Melbourne, Australia in 2021 to attend the 33rd ICOH congress, which was ultimately postponed to February 2022 in a fully virtual format. Look out for the report on the ICOH2024 Congress in our next issue.

As the heat wave appears to be retreating and winter steadily approaches, on behalf of the Editorial Board, I wish you a productive and research-full year.

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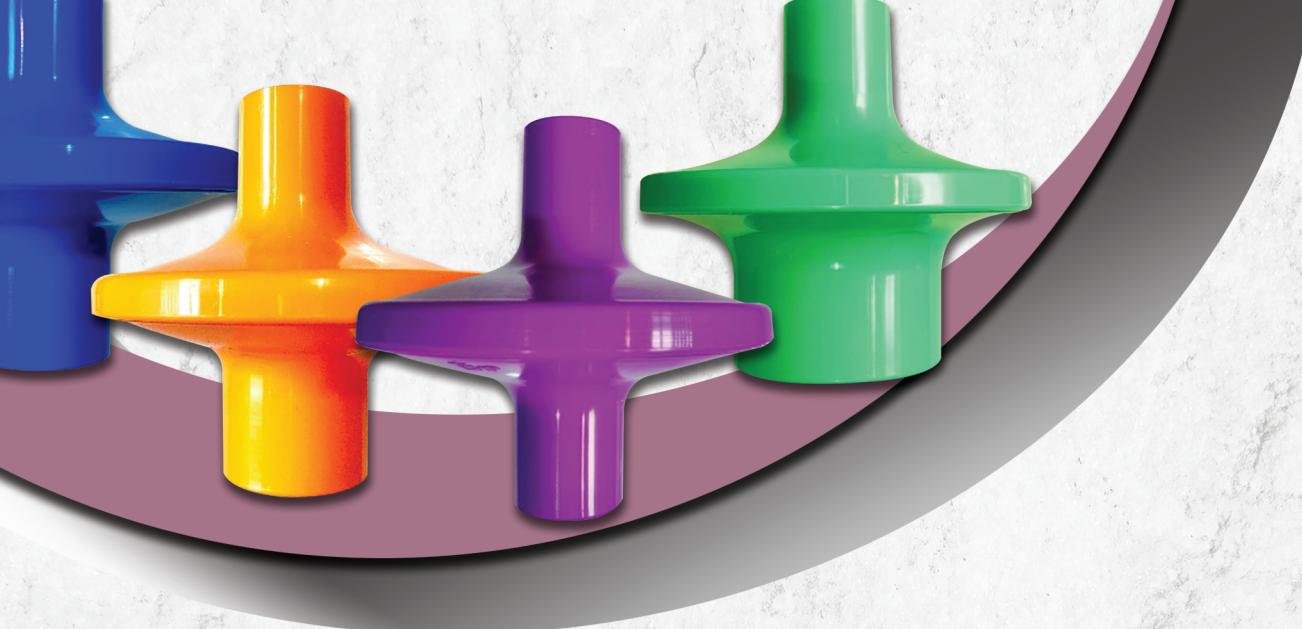
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*Specifications are filter dependant. For detailed specifications please contact us.



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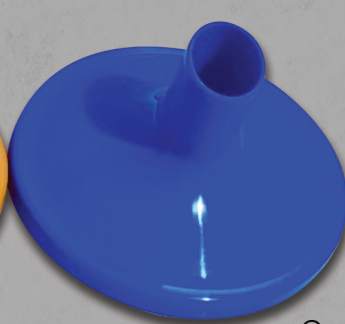
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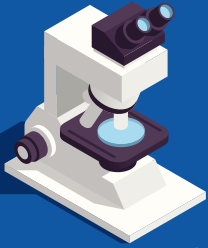
Reviewers of manuscripts in 2023

We are grateful to all our reviewers for their guidance and evaluation of manuscripts submitted to *Occupational Health Southern Africa*.

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STI Awareness

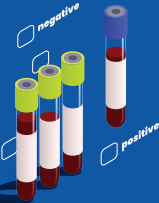


Key facts

- According to WIONEWS, SOUTH AFRICA HAS THE HIGHEST STD RATE (AUGUST 2023) – 37 272.5 PER 100K PEOPLE
- According to the World Health Organisation (WHO)- July 2023:
 - Human papillomavirus (HPV) infection is associated with over 311 000 cervical cancer deaths each year (2).
 - STIs have a direct impact on sexual and reproductive health through stigmatization, infertility, cancers and pregnancy complications and can increase the risk of HIV.
 - Drug resistance is a major threat to reducing the burden of STIs worldwide.

There are more than 20 types of STIs, including:

Chlamydia	HPV
Genital herpes	Pubic lice
Gonorrhea	Syphilis
HIV	Trichomoniasis



What causes sexually transmitted infections (STIs)?

STIs can be caused by bacteria, viruses, and parasites.

Who is affected by sexually transmitted infections (STIs)?

Most STIs affect both men and women, but in many cases the health problems they cause can be more severe for women. If an STI is passed to a baby, it can cause serious health problems.



Do you as a parent discuss this with your children?



Prof. Tony (JCA) Davies: 28 August 1931–3 March 2024

Worker advocate, mentor, and an inspiration to many

Gill Nelson: University of the Witwatersrand, South Africa; MMPA honorary life member

It is with sadness that we share the news of the passing of Professor Emeritus Tony Davies after a short illness. Born in Scotland, schooled at St John's College in Johannesburg, and trained in medicine at Guy's Hospital in London, he moved to Zimbabwe (then Rhodesia) in 1958. There, he worked at Mpilo Hospital in Bulawayo, and later was stationed at Shangani from where he ran the public hospital and satellite rural clinics. In 1962, he moved to Gweru where he was appointed as the Provincial Medical Officer of Health (MOH) for Midlands Province. During this time, he developed a nationwide TB register, which enabled the discharge of inpatients back into their communities (he emptied the sanatoriums), and follow up and supply of treatment at local clinics. He was the first TB officer in Zimbabwe, and his interest in TB – both preventive and curative – continued throughout and beyond his career in occupational medicine. In 1974, he moved to Harare to take up the MOH position for Harare City.

Nine years later, in 1983, Tony moved to Johannesburg and was appointed as the Professor of Occupational Health at Wits (in a joint post with the Department of Health), and as the Director of the



Professor Emeritus Tony Davies

National Centre for Occupational Health (NCOH), now the National Institute for Occupational Health (NIOH) – a position he held until 1996, although he continued in an honorary position for a further 19 years until his retirement to Kenton-on-Sea in the Eastern Cape, with his wife, Deirdre, in 2015.

Tony's experience in mine occupational health led him to being selected as one of four members of the Commission of Inquiry into Safety and Health in the Mining Industry, headed by Judge Leon in the 1990s. Throughout his career, he supported many researchers to undertake research of neglected but pressing occupational health issues. He was an active player in investigations into several cases of

worker exposure to hazardous substances, including the mercury contamination at Thor Chemicals in the 1990s. His work with asbestos miners contributed to the establishment of two trusts to compensate asbestos workers with disease and their dependants. Several of his many papers were published in the *Adler Museum Bulletin*, where he was the co-editor from 2005 to 2014.

Tony is survived by his wife, Deirdre, and their six children. 

Johann Beukes: 6 October 1941–11 March 2022

Deon Jansen van Vuuren: SAIOH General Manager

Almost two years have passed since Johann's death. In acknowledging the huge contribution that he made to the occupational hygiene profession in southern Africa, I was not sure if I should call this a tribute or an obituary. The words, 'gratitude' and 'admiration' came to mind, as did 'announcement of his death' and 'a short biography'. But let me not waste any more time on this – it is a mix of a tribute and an obituary.

Johann (JDR) Beukes was a giant of a man, not just in physical size, but also in his work and family – a true gentleman. In 2022, we notified you of his death by e-mail notification and in our newsletters. But I feel the need to acknowledge him and share something of this gentle giant or, rather, gentleman. His family summed it up accurately as a "life celebration".

Johann Beukes was our much-loved and admired friend and colleague, who sadly passed away on 11 March 2022. His knowledge of the industry and his many roles within the Southern African Institute for Occupational Hygiene (SAIOH) and its Professional Certification Committee (PCC) are well known. His positive attitude and desire to be of service to others, even during his darkest hours, touched



Johann Beukes

Photograph: courtesy of Juanita Meyer (Johann's daughter)

us all. On a personal level, we enjoyed his sense of humour, love of life and, above all, his deep love for his family and God.

I am not going to bore you with details of Johann's life, e.g. date and place of birth, where he grew up, schooling, etc. Let us rather celebrate the time we had with him.

Johann was not always the retired, elderly person we knew. He was extremely proud of being an occupational hygienist, and championed the profession in the mining industry and wherever else he worked.

Johann started his career in the old South African Railways and Harbours, after which he moved to the coal mines, specialising in ventilation. He was an active and proud member of the mines' proto rescue teams for almost 20 years, which entailed working in dangerous environments, and being exposed to serious life-threatening situations. Names like Grootvlei, Springfield, and Arnot came up in our conversations. At Arnot, he was the Mine Manager until he joined the Department of Mineral Resources and Energy (DMRE), and then Multimesh. Eventually, he started his own occupational hygiene consultancy: Health and Occupational Hygiene Laboratories (HOHL).



Johann Beukes receiving the SAIOH Fellow award and medallion from Celia Keet (SAIOH President 2020/2021)

Photograph: courtesy of Deon Jansen van Vuuren

I met Johann before 1994, when he was the Deputy Director: Dept. of Minerals and Energy (Directorate: Mine Environmental Control). From the first day, I knew him to be a fair, honest, and extremely knowledgeable person. When I did the BEBOH (now BOHS) Certificate of Practical Competence in Occupational Hygiene, he also attended the theory classes and sat the exams (two three-hour written assessments and an oral assessment). He did not pass them the first time, but said, *"I will read and upskill my occupational hygiene competency"*. He was, by then, the owner and managing director of HOHL, which was also a Department of Employment and Labour Approved Inspection Authority (DoEL AIA).

Johann was one of the main motivators and a passionate spokesman for occupational hygiene in the mining industry. At all times, he carried the occupational hygiene flag, and served on several objective-setting DMRE committees. His contributions included actively participating in the setting of qualification standards in the mining industry, acting as an office bearer for the Mine Ventilation Society of South Africa (MVSSA) (where he was also a Fellow), and giving presentations at mining conferences.

Johann's company, HOHL, was an Approved Training Provider (ATP) for the internationally recognised Occupational Hygiene Training Association (OHTA). Johann was also a certified technical occupational hygiene auditor for the South African National Accreditation System (SANAS).

Johann joined SAIOH in 1994, where he was an extremely active member. In 1999, he became a SAIOH Fellow – the 6th person to receive this honour at the time. He was a member of the PCC from 2004 to 2022, and PCC Chair from 2008 to 2010. He was elected to the SAIOH Council in 2003, served as the SAIOH Vice President from August 2009 to July 2011, and was the SAIOH President from August 2011 to August 2013. He was on the Council for many years, until

2018, either as an elected or a co-opted member, representing the Institute at mining industry events.

I had the honour and privilege to sit with Johann on many PCC oral assessments. His quiet authority and knowledge amazed me. I visited him at his home frequently, and had many conversations about occupational hygiene, SAIOH, and life. He enjoyed *"braaivleis, and boerewors en pap"*.

Hundreds of messages of condolence were sent after Johann passed away – a testament of how much he was loved and admired. Some are shared below.

"I am saddened to hear of the great loss!"

"Please convey my deepest condolences to Johan's family, we often met at the SANAS STC meeting in Pretoria and his wisdom and knowledge and experience in occupational hygiene, will be greatly missed."

"Such an epic loss. My heart goes out to his family."

"This is truly devastating news. Johann was a giant of a man who had my deepest respect as a professional and human being. May his soul rest in peace. My sincerest condolences to his family, they have suffered a huge loss."

"Please extend my deepest condolences to the family who have lost a giant of a human being."

"That's really a great loss."

"I received the sad news of the departure of Johann with a heavy heart and sadness. I have known Johann for many years, and I have always been touched by his humility, experience and great knowledge of the occupational health and hygiene industry. Indeed, Johann has contributed immensely and in numerous ways to the field. When I was doing my doctoral studies, I turned to Johann for insights and contribution. He selflessly shared his leadership and entrepreneurial knowledge and experience without any reservation. His insights contributed immensely to the development of my research and achievement of my doctoral qualification. I pray that his family find comfort in the knowledge that Johann has run his race and is now resting. May his family be consoled in the good memories and times that they shared with Johann. May his soul rest in peace and rise in glory."

"Very sad and a huge loss for occupational hygiene."

"Johann was such a kind, gentle soul and I will always remember him as a true gentleman whose love for his wife Clara, and his family was a true inspiration. I cannot imagine how much we will miss Johann, who always saw the best in everyone because of his generous heart." 🇿🇦



Trade unions and occupational health and safety in comparative historical perspective: a comment on South Africa and Britain

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ABSTRACT

In this paper, prepared for a keynote lecture to the International Commission on Occupational Health (ICOH) conference held in November 2023 in Durban, I explore the historical relationship between trade unions and occupational health and safety, comparing developments in South Africa and the United Kingdom (UK). The focus is on mining and I address the following questions: What impact did trade unions have, what was their relationship to occupational health and safety, and how did this change over time? I first argue the case for the central importance of trade unions and the progressive role they played, historically, in occupational health in the UK as 'guardians' of workers' bodies, critically examining the so-called 'trade union effect'. I then discuss the distinctive racialised nature of trade unionism in mining in South Africa and the role of the unions in occupational health. The powerful role that the whites-only Transvaal Miners' Union and the Mine Workers' Union played in occupational health is examined, and how the labour movement colluded in the tragedy of the silicosis and tuberculosis disaster amongst black miners in the twentieth century. I end the paper with a comment on how the emerging black trade union movement contributed to addressing the occupational health experience of black miners in the 1980s and 1990s.

INTRODUCTION

"There was money but there was also a bad culture. In Stoke-on-Trent [England], the men were not, they were not union conscious. I remember I ... went out on strike one day – other men doing the job for us (laughs) ... That wouldn't happen in Scotland, but it happened in Stoke-on-Trent and elsewhere in England. Different approach to trade unionism. ... They're very clever in Scotland and I think also in South Wales to some extent, from what I know of it, union conscious, safety conscious, dust conscious – really, really conscious. So that difference applied."^a

This was how Scottish coal miner, George Bolton, recalled his experience in an interview in 2005, referring to a spell as a migrant worker in England in the Midlands coalfield in the 1960s. It speaks volumes about the migrant worker experience, the differences in trade union influence and penetration *within* the mining industry of one country (the United Kingdom (UK)). It also speaks to the meaning of trade unionism to George – the protective role it provided for his body at the point of production. The repetition of the phrase 'conscious' is a telling one. In this paper, I briefly explore this historical relationship between trade unions and occupational health and safety, comparing developments in South Africa and the UK. I predominantly discuss mining and I address the following questions: What impact did trade unions have, what was their relationship to occupational health and safety, and how did this change over time?

TRADE UNIONS AND THE BODY AT WORK

We should first define what we mean by 'trade unions'. Trade unions are collective organisations of wage-earners and workers who officially banded together for their own protection, emerging primarily through the process of industrialisation and the capital/labour tensions and rising class consciousness brought about by industrialisation. They operated at several levels: in the workplace, sometimes referred to as 'the rank and file'; across an industry, and in wider federated bodies representing, or purporting to represent, the 'voice' of labour. The shop steward, national union official, and the Trades Union Congress (TUC) represent these different levels. Trade unions exist to represent and promote members' interests – which historically could be quite sectional and exclusive. However, the trade union *movement* also aims to represent and promote the broader interests of workers or labour, generally – for example, in pursuing legislation that applies to all workers, irrespective of whether they are union members or not. Sometimes, the different levels worked in harmony and sometimes in tension.

What Sellers and Melling have called 'industrial hazard regimes' differ markedly across different countries, and are the product of a complex mix of factors, at the centre of which is a power struggle between the forces of capital/business and labour, medicine, and the state.¹ Some research in the field is critical of trade unions' role, perceiving a failure to prioritise occupational health.

^a George Bolton and David Carruthers, both born 1934, interviewed by Neil Rafeek and Hilary Young, 12 January 2005. Scottish Oral History Centre (SOHC). SOHC Archive 017/C23, University of Strathclyde



However, the dominant interpretation rightly credits workers' trade unions with varying degrees of responsibility for pushing back against corporate interests and providing a protective buffer or 'shield' for the workers.² They were the 'sentinels' or 'guardians' of workers bodies. However, trade unions are multifaceted social movement organisations and the influence of trade unions, and their capacities and power to intervene, varied significantly over time and space, as did their operational choices (tactics and strategies), seeped as they were in the dominant ideologies of the time, not least regarding gender and race. Sometimes, unions did regard wages and jobs as more important than occupational or environmental health (and understandably so given the context and the importance of employment and income to health), so that tension existed, most evidently during much of the twentieth century.

That said, trade unions have been rightly identified as key players in occupational health and safety (OHS), globally, whilst it has been recognised that, in most countries across the world, the power, authority and effectiveness of trade unions have been limited. In many places, these social movements were powerful positive interlocutors in OHS, which succeeded over time in influencing the OHS discourse, protecting workers, and saving many from disabling injuries, chronic disease, and premature death. The key role that they played, perhaps, was in shifting the OHS discourse to define and locate disease in the workplace, against dominant ideas that placed the role of disease upon the individual, or the wider environment. This was crucial in placing the cost burden upon industry as, for example, Markowitz and Rosner have argued in relation to trade union activity on silicosis, lead poisoning, and chemical exposures in the USA.³

The role of trade unions in OHS historically extended along a spectrum of activities, the most important of which were the following:

1. **Negotiation, bargaining or strikes** to reduce, minimise, or remove OHS risks
2. **Legislation:** campaigning for preventive health and safety laws, worker rights, and their enforcement
3. **Compensation:** campaigning for laws and providing legal advice and support to workers in compensation and common law cases for damages
4. **Medical knowledge:** challenging; co-opting; generating and weaponising lay knowledge and medical discovery to workers' advantage
5. **Information/education:** providing information to members and running education and training programmes
6. **Workplace surveillance and protection:** via 'Workmen's Inspectors', and health and safety representatives on the shopfloor
7. **Rehabilitation and support:** for diseased and disabled workers
8. **Victimisation:** protecting shop stewards, health and safety representatives, and others from job loss and subsequent victimisation to exclude activists from employment⁴

Trade unions and OHS in the UK

The UK provides an example of a country where trade unionism was embedded relatively early, a by-product of the country being the first nation in the world to industrialise. Around a quarter of all employed workers were members of trade unions on the eve of the First World War, and this had rocketed to almost 50% by 1920.⁵ In Sidney and Beatrice Webb's pioneering 1910 study, *Industrial*

Democracy, it was argued: "In the trade union world of today, there is no subject on which workmen of all shades of opinion, and all varieties of occupation, are so unanimous, and so ready to take combined action, as the prevention of accidents and the provision of healthy workplaces."⁶

Trade union campaigns included the shorter hours movement, which, over a century, more than halved the working time of British workers, generating OHS benefits from reduced fatigue, more recuperative leisure, and reduced worker exposure time to toxins. The trade unions also played a key role in extending protective legislation (e.g. the Factory Acts and the Mines Acts) and campaigning for Workmen's Compensation legislation (1897/1906 in the UK).

However, it was the powerful coal mining trade unions in the UK – which had achieved nearly 80% of potential membership by the 1910s – that were in the vanguard of campaigning on OHS.⁷ These are some of the milestones:

- Three of the seven founding objectives of the Miners' Federation of Great Britain (MFGB) (formed in 1888), laid down in 1889, concerned health and safety.
- The 1911 Mines Act introduced 'Workmen's Inspectors' (early safety representatives), who came to play a key monitoring role, especially in relation to accidents underground and disasters, ensuring that the site could not be tampered with before a proper investigation.
- The long campaigns on silicosis, then coal workers' pneumoconiosis (1942), then bronchitis (1993), were led by the miners' unions – the South Wales Miners' Federation (SWMF) and the MFGB. The unions engaged their own geologists and used the media effectively, feeding information about uncompensated miners' deaths to the press. Their pressure, in the 1930s, led to the establishment of the Industrial Pulmonary Committee (IPC) in 1937, which eventually supported the case for coal workers' pneumoconiosis (CWP) to become compensatable. Important in this breakthrough was the suggestion of the SWMF Compensation Secretary (Harold Finch) to the IPC that they investigate respiratory disability and mortality amongst coal trimmers.
- Union campaigns involved generating lay epidemiology and challenging medical orthodoxies, including the 'silica fixation' – the prevailing idea that only silica dust was injurious – and developing strategic collaborations and alliances with science, including the union directly engaging geologists to examine silica content levels of rock formations. A good example is the collaboration of the National Union of Mineworkers (NUM) (formed in 1946) with the scientific expertise of the Socialist Medical Association in the 1950s (including a jointly organised pneumoconiosis conference, 'Dust and Dust Diseases in Industry' in November 1954, held in Scotland.
- There was parallel campaigning in the 1930s/1940s by the unions for more effective dust control, contributing to the 1943 statutory enforcement of dust control measures on coal owners. Nationalisation of the industry in 1947 – a longstanding trade union aspiration – brought vastly improved OHS, including the creation of a comprehensive global-leading Mines Medical Service. The NUM continued to prioritise OHS from the 1940s, when its impressive membership base of 700 000 members (around 90% of all coal miners) gave it the bargaining power to exert considerable influence.

The mining trade unions, from a very early period in the UK, thus ticked pretty much all of the eight criteria that Quinlan et al. (2010) proposed as ways to measure the influence of trade unions in relation to OHS.⁴



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In other industries, the activities of the trade unions were more uneven. With asbestos, for example, there is a somewhat more ambiguous and patchy story regarding trade union intervention and influence in the UK. This difference can be partly explained by a more fragmented union presence, for example, in shipbuilding and construction. Alan Dalton and Geoff Tweedale's research indicates that there was no significant involvement by the trade unions in the regulation of asbestos in the UK up to the 1960s.^{8,9} Thereafter, OHS strikes (at the local 'rank and file' level, such as the London dockers and Glasgow asbestos ladders) and agitation resulted in widening the statutory Asbestos Regulations to 'user' workers, as in shipbuilding (the initial 1931 Regulations covered only factory processes such as spinning and weaving asbestos), such as the 1969 Asbestos Regulations. By the 1970s, the trade unions were much more proactive, although there were still divisions. There co-existed pro-asbestos and an anti-asbestos lobbying within the trade unions right up to the 1970s, with the former arguing the virtues of the product as a life-saving fire retardant and opposing any ban as this would adversely affect jobs.¹⁰ This 'jobs versus health' conundrum persisted and such divisions were paralleled in other countries, such as Canada, where pro-asbestos campaigners succeeded in prolonging the life of chrysotile asbestos mining in Quebec.¹¹

Union activity could also cross the blurred boundary between occupational and public health. I have argued elsewhere for very significant involvement of the trade unions in the UK in the long campaign to get tuberculosis (TB) recognised as an occupational disease.¹² This was taken up by the TUC between the World Wars, and was a particular project for the first TUC medical advisers (Thomas Legge and Hyacinth Morgan) in the 1930s and 1940s. This culminated in the 1951 Act, which recognised TB as an occupational disease for National Health Service (NHS) and other health workers – though not, in contrast to South Africa, in relation to miners, which happened in 1916 in South Africa. In the UK, silicosis was recognised for miners from 1928 under the Workmen's Compensation Act (although in a very restricted way), whilst silico-tuberculosis was effectively recognised in this way for miners in 1931.¹³ This recognised that lungs damaged by silica inhalation predisposed workers to contracting TB. Later research identified this link even with low levels of silicosis.¹⁴ Unions were significant agents in these campaigns around silicosis and TB in the UK. Other work has largely supported this positive interpretation of the role of trade unions, as key interlocutors, in the OHS discourse and policy regimes of the UK, including the important work of Vicky Long, researching the TUC struggle for 'the healthy factory' from the First World War to the 1960s.¹⁵

Historians interested in OHS stories elsewhere around the world have sometimes reflected on the high degree of trade union organisation and engagement with OHS in Europe (and especially Britain and Scandinavia), and on the resulting 'protective' regulatory framework that compared favourably to their research case studies, for example, in relation to silicosis and black lung in the USA.^{16,17} Referring to Britain, Rosner and Markowitz commented: *"There the tradition of an organized and class-conscious labouring population helped shape the views of physicians familiar with the traditions of social medicine."*¹⁷ Steven High's work on the deindustrialisation

of the USA/Canada 'rust belt' also shows how the Canadian trade unions were much more effective in navigating a managed deindustrialisation process – and hence minimising adverse health impacts – than in the USA.¹⁸ As Levenstein et al. (2002) have argued, trade unionism was relatively weak in the USA, and *"seldom able to mount serious attacks on owner and managerial prerogatives, and this is especially true, with some exceptions, in the area of workplace health and safety."*¹⁹ Amongst the exceptions, Levenstein and colleagues identified unionised Massachusetts, and the successful campaigning of the unions and community activism in the 1960s, which led to the scheduling of CWP (1969) and the Occupational Health and Safety Act (OHSA) (1970).¹⁹ There remained, then, a wide variation in practice and experience across a multifaceted trade union and labour movement across space and time, both within and across Britain, as well as internationally.

As alluded to earlier, the worker testimony of George Bolton (provided at the beginning of this paper) represents a rich seam of evidence that speaks to the meaning of trade unionism. In their oral testimonies, workers provided a range of views, but the dominant motif that emerges from reading these is awareness of the role of the trade union as being to fundamentally protect workers' bodies. One vulnerable black immigrant foundry worker (from Coventry), when asked in 1980 why he had joined a union, said, *"What the management would like to do to the workers is prevented by the unions, so we are protected."*²⁰

Glasgow asbestos ladder, Hugh Cairney, reflected on the 1960s struggles:

"Well, if you're talking about the unions. ... This branch done a lot. We happened to belong to a trade union. We fought ... I mean, we walked the streets for twenty-six weeks to get conditions. ... We always nearly had to hit the gates to get any health and safety ... when we took action it was every ladder."^b

Shipyard worker, John Keggie, recalled the 1960s and 1970s:

"By and large most o' the disputes in Robb's [shipyard] were about health and safety issues. They were not really about arguments about money or wages, terms and conditions. They were about health and safety issues, where management under pressure to complete orders would try and put people into environments that were unsafe. And the workers would refuse and the management would then suspend an individual."^c

By the 1960s and 1970s, the trade unions in the UK were increasingly deploying the strike weapon to defend workers' bodies. In one survey of 225 trade union health and safety officers in Glasgow in 1978, it was found that 20% of all industrial action involved health and safety issues, some resulting in 'wildcat strikes'.²¹ Much of this kind of plant-level localised trade union activism to protect workers' bodies has been forgotten, and merits more analysis.

It is important to recognise that the relationship between trade unions and protecting workers' bodies was complex and could be compromised by prevailing power relations, as well as by embedded attitudes and wider cultural influences. There remained an ongoing tension between the tactics of maintaining wages and jobs (both fundamentally important for the maintenance of the

^b Hugh Cairney, interviewed by Neil Rafeek, 26 March 2005. SOHC Archive 016/A35, University of Strathclyde

^c John Keggie, interviewed by Ian MacDougall, 6 May 1997. Scottish Working People's Trust Collection, SOHC Archive, University of Strathclyde



health of individuals and families) and occupational health and safety standards. Some unions prioritised the former over the latter, for understandable reasons. Feminist researchers have also pointed to the ways that trade unions neglected the fundamental OHS interests of women and how, with policies supporting gender differences (with protection and exclusion in the labour market), this sustained wage inequality.^{22,23} Sectarianism and racism also undermined the capabilities of some trade unions to protect the bodies of all workers.²⁴ The ill-health of women at work has been grossly under-reported and the OHS experience of women has been neglected in the literature, as Karen Messing has persuasively argued in the Canadian context.²³ Trade unions, for a long time, neglected OHS issues that impacted on women, such as reproductive hazards, childcare, job stress, gender ergonomics, violence, and sexual harassment. In the USA, research showed that, in the 1980s, of all traumatic occupational fatalities amongst men, 11% were homicides whilst, amongst women, the figure was 42%.²⁵

These issues and fractures within and across working-class communities acted as a drag anchor on OHS standards, as did a productionist, profit-maximising managerial culture and a macho work culture in some heavy industry workplaces. The trade unions sometimes embraced these prevailing work cultures, sometimes did put wages and jobs first, and sometimes did tactically negotiate a 'wage premium', or 'danger money', to compensate for risk to their health. For example, in 1961, the NUM negotiated a 'dust money' scheme, which the South Wales Area of the NUM pilloried as 'organised murder'.²⁶ But wages and jobs were fundamental to the health and wellbeing of workers, and it is understandable and a perfectly rational trade union tactic to prioritise these issues. The work of Bufton and Melling, and Vicky Long, demonstrated how compensation was not simply prioritised by the unions; rather, prevention and compensation went hand-in-hand, in parallel, and compensation could have a positive deterrent effect on employers.^{15,27} It hit them in the pocket.

To varying degrees and increasingly over time, trade unions fought against managerial exploitation and the unhealthy high-risk work cultures to which workers had become acculturated and, over time, came to deploy a wider and more sophisticated range of weapons as their capacities to push back evolved. Safety and health consciousness became embedded within trade union activities, as George Bolton acutely observed.^d 'Danger money' deals, for example, had become rare by the late 1970s in the UK. In a very real sense, the trade unions operated as guardians or sentinels, protecting workers' bodies, and developed interests in wider public health (such as TB), morphing from strictly occupational issues to embrace wider environmental concerns.

Another noteworthy point is that, in the UK context, ethnically and racially divergent migrant workers tended to experience significantly worse OHS standards than did white workers. Whilst on a different scale, this mirrors experience in South Africa, and UK trade unions could collude in this, as well as challenge it. We see this discrimination with Irish Catholic migrants. An example is the prevalence of Irish Catholics in navvying (railways), tunnelling, and the asbestos insulation trade.^e Black and minority ethnic migrants also

experienced quite extreme job discrimination in the post-Second World War (SWW) decades (c1945–1980s) in the UK, ghettoised for a generation into some of the most hazardous jobs – such as in the chemical factories in Glasgow, Scotland and the foundries in the Midlands (England). Initially, there was reluctance to recruit such workers by the unions, due to sectarianism and racism, as with the waterfront unions, where there was an active condoning of racial discrimination to ensure whites retained the top, best-paying jobs. Some unions were more progressive than others and the position of the trade unions was uneven, at best, in the 1950s and 1960s, evidenced by a series of local strikes to retain the 'colour bar' (as on the buses). There were also trade union refusals to allow black, minority and ethnic (BME) workers into apprenticeships (and, hence, skilled, higher-paid work), and TUC opposition to the Race Relations Acts (1965; 1968) being operative in the workplace. In a study published in 1987, Wrench commented: *"Black workers in this country have served the unions far better than the unions have served black workers."*²⁸

Invariably, however, where there were demanding and dangerous working conditions, this led to migrant workers forming unions, or joining and becoming active in strong and militant trade unions. This is evidenced in the early involvement of Irish migrants in the British labour movement – and in 'dangerous trades'. An example is the militant Glasgow ladders branch of the Transport and General Workers' Union (TGWU) in the 1950s and 1960s. What is clear is that an important stimulus to the creation of trade unions, historically, was dangerous and unhealthy workplaces, and that the trade union movement – from the rank and file, through industry-level unions, and to the federations (the TUC (1868) and Scottish TUC (1897)) – played a vital progressive role in protecting bodies at work. This goes a long way to explaining why the miners developed the most powerful and militant of trade unions and why mining operated in the 'vanguard' in campaigning on OHS issues in the UK.

Campaigning was one thing, however, but effectiveness or tangible policy or behavioural change was quite another. The effectiveness of trade unions on OHS (in discourse and regulatory regimes) in the UK and elsewhere depended upon the wider economic, political, and cultural contexts that prevailed, the tactical priorities or strategic choices of unions, and the willingness of trade unions to engage in tactical alliances with progressive medicine and sympathetic supporters. A number of variables affected trade union capabilities and capacities, including the attitudes and roles of big business and the state – the relative power of capital and labour. The range of experience might be summarised thus:

- High trade union membership density/trade union 'closed shop' (pre-entry; post-entry); liberal labour laws
- Single unified industrial unions
- Employer recognition/collective bargaining rights
 - for full workforce
 - partial/limited (e.g. by craft/race)
- Multiple fragmented trade unions/competition/divisions
- Low union density/'open shops'
- Non-unionism/employer ban/coercive control/legal and state collusion in the suppression of trade unions

^d George Bolton and David Carruthers, both born in 1934, interviewed by Neil Rafeek and Hilary Young, 12 January 2005. Scottish Oral History Centre, SOHC Archive 017/C23, University of Strathclyde

^e Hugh Cairney, interviewed by Neil Rafeek, 26 March 2005. SOHC Archive 016/A35, University of Strathclyde



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The top of this range of experience may well have roughly equated to the UK in the mid-twentieth century, whereas the bottom equated more closely to the prevailing situation in twentieth century South Africa.

The unions' role in, and effectiveness on, OHS was not a unilinear upward curve, but subject to challenge. It ebbed and flowed with economic and political circumstances. The trade union voice was relatively muted during the interwar Depression and was most powerful during the SWW and the so-called 'Golden Age' when unions were most empowered in the UK, from c1945 to 1979. Subsequently, there has been some deterioration in the protective matrix of the trade union movement in Britain and elsewhere. Trade union membership declined sharply in the context of deindustrialisation, retrenchment, and mass unemployment. This challenge to trade union power and influence was exacerbated by the turn to privatisation and the free market, and a right wing, neo-liberal political assault on the unions since the 1980s, led in the UK by Conservative Prime Minister, Margaret Thatcher.

TRADE UNIONS AND OHS IN THE MINING SECTOR IN SOUTH AFRICA

How did the historical experience of mining and OHS in South Africa compare with the UK, and what role did the trade unions play? South Africa's industrialisation was heavily dependent upon mining, and mining in South Africa, from the discovery of gold in 1886, was heavily reliant upon recruitment of skilled and experienced foreign migrant labour (mostly white), combined with largely migrant African black workers undertaking most of the manual labour. These black workers were initially recruited by the mining companies, largely from surrounding countries, notably Mozambique, Lesotho, Malawi, and Eswatini.²⁹

What was the impact of labour migration from Britain and Europe to South Africa, and from nearby African nations to South Africa? To what extent were the workers' trade unions in mining in South Africa successful – as in the UK – in mediating the occupational health risks associated with mining, especially relating to respiratory disease – silicosis and TB – in the twentieth century?

The white miners in South Africa have been associated, historically, with a wider 'radical diaspora'.³⁰ This is a rather romanticised notion of the transmission of mutualist, trade union, and socialist ideals by these economic migrants from Britain, other parts of Europe, and beyond, where trade unions had stronger and deeper roots.³¹ There were many examples of trade union cultures being imported from Europe from the late nineteenth century, and the leadership of the South African Communist Party, formed in 1921, comprised mostly white European migrants, including the enigmatic William H (Bill) Andrews (its first General Secretary). James Bain, William Mather, Thomas Matthews, and the Glaswegian, Archibald Crawford, were other prominent British-born South African labour movement leaders in the 1900s and 1910s. However, this 'radical diaspora' idea has rather obscured the diverse set of cultures that miners brought with them from their European homelands. In reality, this was a mix of conservative, jingoist, aspirational entrepreneurialism and varying degrees of knowledge and experience of trade unionism and, in some cases, of socialism. When gold mining began in South Africa in the 1880s (in the Transvaal), the skilled,

experienced white miners came mostly from Europe and Australia. Britain (including the tin mining area of Cornwall) was a major source of this labour in the 1890s. Whilst the pre-First World War coal-mining communities (and ironstone miners and north Wales quarrymen) in the UK were invariably well-unionised, with degrees of socialist and even syndicalist-inspired leadership (as in south Wales), the non-ferrous metal mining communities, including Cornwall, were not. Cornish miners were generally much more individualistic and conservative, with a strong tradition of Freemasonry.³² Many would have been influenced by colonialist ideas and would have brought with them ideas of white racial superiority. These white migrant workers usually became supervisors and 'elite workers' in the South African gold mines, earning high wages – around 20 times more than the majority of black miners. Roughly, black African miners outnumbered white miners by a ratio of around 10:1. In these early years, however, white miners were exposed to high levels of dust inhalation at work – identified clearly when Cornishmen returned from South Africa to Cornwall during the Anglo-Boer War of 1899–1902. By 1902, 600 such returning Cornish migrants had died of phthisis (respiratory disease, including TB and/or pneumoconiosis).^f

Historically, trade union organisation in the South African mining industry followed racialised lines. Militant white craft unions emerged in gold mining on the Rand with the Transvaal Miners' Association (TMA), formed in 1902, and evolved into a powerful industrial union for white miners in 1913, with the formation of the Mine Workers' Union (MWU). This shaped the provision of occupational health services across the sector. These early white miners' unions were powerful, health-conscious, and militant in campaigning and using the strike weapon to achieve OHS reforms.³³ Major strikes punctuated the mining sector in South Africa in 1907, 1913, 1914, and 1922. Amongst the leading activists was a handful who were migrants from the UK. One was Mary Fitzgerald, who moved from Ireland to South Africa in 1902, worked at the TMA as a typist, and became a trade union organiser and agitator, including during the 1913 miners' strike. She was nicknamed 'Pickhandle Mary' for leading crowds brandishing pick handles. Influenced by the doctrines of the Industrial Workers of the World, Mary was one of the few people who supported non-racialised trade unions. She was the only woman at the founding conference of the South African Labour Party and, in 1915, was elected to the Johannesburg City Council, where she became the first woman deputy mayor in South Africa. Mary Fitzgerald was awarded the Order of Luthuli (the civil rights medal) in 2018, and features in the 'We Salute You' list of women activists celebrated in the 1860 Heritage Centre in Durban.

Clearly, there were tensions between the largely racist white mineworkers' membership and some elements of the leadership, including committed socialists, who were opposed to the exclusion of black mineworkers. The latter never succeeded, however, in changing policy, and the TMA and the MWU remained exclusively whites-only organisations. The powerful and militant white miners' unions succeeded in achieving levels of OHS regulation, dust control, and workmen's compensation for white miners that matched and even surpassed their counterparts in Britain and elsewhere. With silicosis recognised in 1910 and TB recognised as an occupational disease in 1916, South Africa led the world with the most generous compensation scheme for white miners. This might be

^f Report of the Secretary of State for the Home Department of the Health of the Cornish Miners, British Parliamentary Papers; 1904. Cd. 2091. p. 8

interpreted as a corporate strategy to ensure the continued flow of essential skilled and supervisory labour into the gold, silver, coal, and asbestos mines that were expanding rapidly in South Africa at this time; however, the agency of workers influenced by European trade union traditions in mining where occupational health was a priority, played a part. As Keith Breckenridge has argued: *"The white workers on the Witwatersrand before 1922 were militant in large part because they were preoccupied with the physiological (and emotional) costs of working underground."*³⁴

This racialised system classically co-opted the elite white workers and obscured, as many researchers have identified, the silicosis, pneumonia, and TB epidemics that ravaged the black migrant mining population for most of the twentieth century. The mining companies' recruitment and labour control policies were mainly responsible for this. Migrant black miners had short-term contracts (typically six months), after which they were repatriated to their villages in surrounding countries and the South African 'homelands' and, later, the townships. This spread TB, something which was hidden from the public gaze by a failure to test and monitor the black mining population, in contrast to what was done for white miners who had regular medical testing and, later, X-ray surveillance, and generous compensation schemes (including paid repatriation).

The much-lauded international Silicosis Conference in Johannesburg in 1930 had no direct trade union representation, and the discourse was dominated by medical experts such as Dr Orenstein, effectively hiding the real experience of high levels of respiratory disease and premature mortality of black miners.^{35,36} One estimate (Leger, 1998) calculated that around 66 000 miners were killed in mine disasters and accidents from 1900 to 1990.³⁷ The vast majority were black miners.

The white mining unions continued to act as a powerful pressure group on OHS matters, protecting the bodies of their white trade union membership for decades, although, as Yudelman (1983) has shown, they became less militant, 'co-opted', and 'depoliticised' in the process.³³ Their powerful bargaining position was cemented in 1937 when the mining companies conceded a formal closed-shop agreement with the MWU.³³ McCulloch has shown how, during the period 1910–1954, there were 15 committees of enquiry/commissions, driven by pressure from the MWU and their concerns over levels of compensation and the risk that white miners faced from high TB rates amongst black miners.²⁹ The MWU also purchased an expensive X-ray machine to corroborate cases, and supported development of mass mobile radiography in the early 1950s, pressing this on the Bureau of Mines. The union clearly had powerful supporters within the South African Parliament and benefitted from what Naidoo has described as *"a conservative alliance between the white workers and the state [which] continued until 1994 and shaped all development of occupational health and safety"*.³⁸ This occurred whilst ignoring the blatant decimation of fellow black miners' bodies. The embedded institutionalised racism appears to have been rarely challenged. However, some did oppose this stance, such as UK trade union leaders, Keir Hardie and Tom Mann, when they visited South Africa on speaking tours, before and just after the First World War. Hardie was heckled and manhandled at speaking events for his principled stance against the whites-only trade union policy of the MWU.^{39,40}

Meanwhile, black workers were denied the right to form and join trade unions, with legislation strengthened to this end during the post-SWW apartheid era. Trade unionism of any kind, beyond

the gold mines, was discouraged and aggressively opposed by employers in South Africa. The lack of trade unions in the asbestos, platinum, and diamond mines were important elements of a coercive, authoritarian regime of controlling labour by the mining corporations, which contributed to monumental OHS issues in those sectors, not least of which were asbestos-related diseases (ARDs), including a mesothelioma epidemic.⁴¹ The leading historian of asbestos in South Africa, Jock McCulloch, paid the ultimate price for his exposé of such health crises, dying of mesothelioma himself in 2019 (through exposure during research trips to asbestos mining and manufacturing areas).

There were occasional episodes of black miners organising and pushing back against such exploitative and deadly working conditions in the South African mines. The immediate post-SWW period was one such time, when extraordinary high demand provided workers with a favourable environment to organise and initiate collective action. The 1946 black mineworkers' strike, however, was quickly quashed by the mine owners and manufacturing employers, with strong support from the South African Government.

Black trade unionism only managed to gain a firm foothold, and then rapidly spread in the 1980s, with the formation of the National Union of Mineworkers (NUM) in 1982, under the leadership, initially, of Cyril Ramaphosa. From its formation, the NUM was centrally concerned with extending protection over black workers' bodies, focusing on accident disasters, as at Holbane (1983: 68 miners killed) and Kinross (1986: 177 miners killed), fighting for preventive OHS measures, and extending provision for compensation for black miners for silicosis, TB, and other respiratory ailments. On the NUM in the 1980s, Wilmot James has argued that *"The union gave health and safety issues a high profile."*⁴² The NUM also campaigned for nationalisation of the South African mines, which, in the UK, had been a major factor in improving OHS from 1947. The mine owners' umbrella employers' organisation, the Chamber of Mines, was divided in response, although it quickly recognised the need to concede union recognition and hence shift its labour management strategy to controlling the nascent black workers' union movement, within the constraints of a formalised collective bargaining system. The 1983 trade union recognition agreement in South African mining created mine shaft and shop stewards' agreements, extending the union's protective matrix significantly in the workplace. The actions of the NUM in the Holbane and Kinross disasters in representing miners and their families, recruiting international experts to support the black workers (for the first time) at the enquiry, and organising the post-Kinross Day of Action to mourn (involving around 250 000 workers) brought it much credibility and support. NUM membership rocketed by 1988, to 360 000, representing around 60% of all miners in South Africa. In the 1980s, the NUM pressed for improvements in protection against occupational diseases, for better compensation, and to extend the rights of disabled workers (including the right to re-employment).⁴²

In turn, mine owners resisted what they perceived as fundamental concessions that would affect their profitability, re-asserting their prerogative to manage, and a period of intense struggle and conflict ensued, characterised by mass dismissals and victimisation of workers. The Anglo American Co. dismissed 14 000 workers from the Vaal Reefs mine, whilst Gencor sacked 20 000 from the Impala platinum mine. As James (1992) noted, *"In defending workers' rights to job security, as in protecting their health and well-being, the NUM*



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faced an uphill battle".⁴² The employers' counter-attack against the nascent organisation of black workers meant that the improvements in occupational health for miners and across the economy in the 1980s were limited.⁴³

It was in this context of intense industrial conflict that the dismantling of apartheid in South Africa led to profound change. This was evident in the passage of the Occupational Health and Safety Act (OHSA) of 1993. As with the Health and Safety at Work Act (HSWA) in the UK two decades before (1974), it was the trade unions that were the dominant driving force in this extension of the legal rights of workers on OHS. La Dou (2003) commented in a piece reflecting on international developments in occupational health in 2003: *"The improved mining occupational health and safety legislation in South Africa is a direct result of a strong National Union of Mineworkers."*⁴⁴ Fundamental change only came with the dismantling of apartheid. The passage of the South African OHSA in 1993 marked something of a watershed as non-racialised legislation designed to protect *all* workers, irrespective of race and skin colour, from the risks and hazards of their employment. The NUM continued to prioritise OHS in its activities into the twenty-first century, including the calling of the first-ever full mining industry strike, bringing out 240 000 workers on 4 December 2007 to protest against work conditions and the continuing poor OHS record of the industry.

In the global context, the experience of South Africa and the UK stood at opposite ends. South Africa shares the experience of countries where independent trade unions were severely curtailed by state regulation, including Russia/Soviet Union and China. Few countries across the globe experienced as deep and sustained penetration of trade unionism as did Britain – although the British experience was broadly shared with several other nations, including Germany, Scandinavian countries, Australia, New Zealand and Canada. Industrialisation was a key precondition and partly explains uneven trade union development around the world. Even in industrialised nations, however, trade union penetration differed widely, depending upon prevailing cultures and state and capital attitudes towards what was viewed as a restraint on economic accumulation possibilities. Indeed, trade unionism struggled to flourish across much of the globe, facing varying degrees of suppression and legal impediment, and corporate opposition.

Historically, the power of major corporations and organised capital to contain trade unionism should not be underestimated. Employers deployed a range of coercive, authoritarian methods, often backed by the state, to suppress trade unions, and labour management strategies morphed over time into co-opting unions, or modes of incorporation or 'procedural control'. Yudelman has discussed the latter in the South African context.³³

This transition in corporate strategies was the theme of my first book, *Organised Capital* (1996), and reading and reflecting on the experience of South Africa for the ICOH conference presentation, I was reminded of how powerful a constraint on trade unionism employers organised together could be.⁴⁵ In South Africa, the stand-out example is the omnipotent Transvaal Chamber of Mines, representing the big multinational corporations or 'mining houses'. Markowitz and Rosner have also commented on the pivotal role played by the employers' trade associations in the USA, and their culpability in the lead and chemical pollution disasters.³

POWER, WORKERS' BODIES AND THE 'TRADE UNION EFFECT'

Historically, trade unions acted as the guardians or protectors of workers' bodies and were key players in OHS discourse and policy-making, although to differing degrees across space and time. Union responses and effectiveness ranged across a spectrum and could be cyclical, depending on the prevailing power balance between capital and labour. In the UK, for example, the 1920s/1930s Depression brought retrenchment and stagnation in OHS standards, notably across the so-called traditionally dominant 'heavy' industries, whilst the 1940s–1970s 'Golden Age' represented a period of trade union/worker empowerment and sharply improving OHS standards, within a favourable political context of interventionist social democracy and the nationalisation of the mines. The return to retrenchment and accelerated deindustrialisation, with mine closures and community dislocation in the 1980s and 1990s, reversed this, disempowering labour, deepening work precarity and work-related stress levels, challenging OHS standards, and leading to an epidemic of anxiety and poor mental health associated with the ruination of communities that accompanied job losses.

The story is a complex one, though, with evidence that some unions were making strategic choices; for example, supporting policies that prioritised wages and jobs over the reduction of risk, and the preservation and improvement of health. We see this, for example, in relation to the asbestos issue in the UK in the twentieth century. A range of positions existed across different UK unions. Variations existed at different levels within individual unions, and capacities to affect OHS discourse and mobilise on OHS shifted over time and space. Fractures around race and gender were amongst the issues that undermined collective action on OHS. Still, the evidence strongly supports the idea of a positive 'trade union effect' on OHS standards, and of the trade unions as pivotal guardians of workers' health, albeit with differing degrees of effectiveness. Unions made a big difference in OHS – and continue to do so where they are empowered, as across much of Europe. A 2013 study of industrialised countries concluded that *"union density is the most important external determinant of workplace psychosocial safety climate, health and GDP"*.⁴⁶ Other data also support this conclusion, with the International Labour Organization (ILO) (2002) arguing that *"progress ... including a clear decrease in work-related accidents in the industrialized world, the improvement of work methods and recognition of the human factor in industries over the last century, owes a lot to efforts by organized labour"*.⁴⁷ Globally, where there are strong independent trade unions, fatality rates on the job tend to be considerably lower than where union densities are low or no independent trade union exists. The USA, for example, with only 10% of its workers in trade unions, had an occupational accident fatality rate (per 100 000 workers) in January 2024 that was five times higher than that of the Scandinavian countries, where unionisation rates average above 60%.^{48,49} There is also a strong correlation between unionisation rates and countries ratifying ILO conventions on health and safety.⁴⁷

The decline in trade union membership and power, with deindustrialisation and globalisation since the 1980s, provides a profound threat to the ability of trade unions to protect workers' bodies from harm and ill-health due to their work. Widening the lens to the global level, it is clear that trade unions found it difficult to gain a foothold in many nations and, hence, were unable to influence the



OHS discourse effectively. Industry proved to be infinitely adaptable, shifting production from well-unionised places to areas without trade unions, such as the shift of the textile industry from New England in the USA to the South, and of multinationals in developed countries like Britain and the USA shifting manufacturing to the developing world. Outsourcing to sub-contractor 'supplier' companies in Asia (including China) continued this process of shifting OHS risk, enabling the ongoing asbestos and pneumoconiosis disasters.

South Africa provides an example of a very different experience. Here, a racialised form of powerful and militant white trade unionism served the interests of the minority of 'elite' white workers, substantially improving their OHS to the detriment of the majority workforce of black workers in the mines. This fracturing of the trade unions and ban on black workers joining unions before and during the apartheid era, contributed to the underreporting and concealment of the epidemics of pneumoconiosis (including silicosis) and TB, which blighted migrant black mineworkers in South Africa and their host communities in nearby countries throughout the twentieth century. White authoritarian corporal punishment and violence in the pits, explored by Breckenridge, only exacerbated the poor health of black workers. The white trade union movement was complicit in this, with no fundamental change until mass trade unionism of black miners and other industrial workers came in the 1980s, and apartheid was dismantled in the 1990s.

That said, it is important not to lose sight of the fact that primary responsibility for South Africa's relatively poor OHS record in the mines lay with the mine owners and their repressive, autocratic, and racialised anti-union regime in the mines (gold, diamond, and asbestos) and their migrant labour recruitment and callous repatriation policies. This was enabled through the inordinate power of the South African Chamber of Mines and the 'big six' international mining corporations (which included Anglo American and Gencor), with consistent state collusion influenced by the massive importance of gold to the South African economy. The health crisis of black miners was, thus, rendered virtually invisible. This perpetuated the utter fallacy of 'safe' and healthy African mines from the 1920s onwards, conspiring to obscure the respiratory disease epidemic amongst mostly migratory black miners in the twentieth century, with estimated deaths running at something like 100 times higher than official recorded data.^{50,51} The racist white mining unions were not the root cause of this, but they certainly colluded in it and contributed to its survival, turning a blind eye to the unfolding occupational health disaster in South African mining throughout the twentieth century.

CONCLUDING COMMENTS

It strikes me, from this brief comparative survey and the conversations and comments made by colleagues at the ICOH conference in Durban in November 2023, that there is still much scope for further research to fully understand the role played by workers and their collective organisations in OHS in South Africa. How did the black trade union movement – led by the mineworkers – shift the prevailing discourse on occupational health from the 1980s? Who were the voices calling for black workers' bodies to be, at long last, effectively protected and prioritised? How did the labour movement deploy lay epidemiology and engage with the science? How did the emerging labour movement deal with the tension between jobs and bodies, given the economic dislocation, job precarity, and violence

that has characterised the recent past in South Africa? And how and to what extent has occupational health activism fed into the wider environmentalist movement – are there the kinds of connections that Chris Sellers found in his study of the environmental movement in the USA?⁵² Karen Bell, in a wonderful recent book (2020), makes the point that we still know very little about working-class environmentalism.⁵³ This needs to be addressed in subsequent scholarship.

One fruitful area would be the extension of oral history interview-based studies into occupational disease and what we might refer to as the diseased workers' movement. My work has focused on bringing this methodology to the study of occupational health. In medical and health history, I believe this is now accepted as a pivotal approach to studying the recent past.⁵⁴ However, inevitably perhaps, the lived experience of apartheid and the struggle for civil rights has dominated the oral history of South Africa. The example of Sean Field's wonderful work springs to mind.⁵⁵ There is the potential here, though interviewing workers, shop stewards, workmen's inspectors, health and safety committee members, and other occupational health activists and supportive professionals, to reconstruct the story of workers' lived experience with diseased bodies – their pain and suffering as a result of their work – and their agency, advocacy, and push-back on OHS. In the process, we might get nearer to understanding what occupational disease *felt* like; the range of emotions, the impact on families, the destroyed lives, the trauma, and the identity transitions from independence to dependency as a result of crippling and deadly work-related diseases, such as asbestosis, mesothelioma, pneumoconiosis, and TB.

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Silicotuberculosis in South Africa: forgotten in history, neglected in science

A brief overview

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INTRODUCTION

Silicosis and pulmonary tuberculosis (TB) are distinct diseases but frequently co-occur in settings in which workers inhale silica dust. There have been different conceptions of combined disease, associated with differences in terminology, as explained below. However, silicotuberculosis is defined here as the combination of silicosis and tuberculosis, whether the tuberculous component is active disease requiring treatment, or post-TB lung disease ('old TB'). Relative to silicosis alone, silicotuberculosis is associated with increased lung function impairment, poorer outcomes in treatment, and increased mortality.¹⁻³

In this overview, I argue that silicotuberculosis has received insufficient scientific and medical attention over the past half century or so. The context is the South African gold-mining industry, but the argument extends to the English-language literature, globally. My perspective is influenced by Rosental's analysis of the International Labour Office (ILO) Silicosis Conference held in Johannesburg in 1930.⁴ In Rosental's view, the international medical definition of silicosis was shaped by the needs of the South African mining industry, particularly in developing a manageable system for medical exclusion and compensation. One consequence for science and practice was a narrowing of the field of vision and scope of research on the effects of silica dust.

Lethal miners' phthisis – dust or TB?

By 1900, there was a lethal epidemic of miners' phthisis in the new South African gold-mining industry.⁵ There had already been a century of medical argument about the causes of lung disease in such dusty industries. After Koch's discovery of the tubercle bacillus in 1882, the view took hold that TB was a necessary factor in miners' phthisis.⁶ It was believed that dust played a role, but that TB was responsible for the serious effects, including premature mortality.⁶ This view presumably underlies the listing of both silicosis (in 1912) and TB (in 1917) as compensatable diseases in miners under South African law. However, only at the 1930 Silicosis Conference was a consensus expressed that silica dust on its own could cause serious disease.^{4,6}

Silicosis and silica as contributing causes of TB

The literature up to the 1960s is striking in the almost unanimously expressed belief that silica dust and silicosis predisposed to TB. However, from at least the 1930s, Orenstein, medical advisor to Rand Mines Ltd., denied the aetiological association between silica, silicosis, and TB.⁷ Almost 50 years later in 1978, Martiny, the medical advisor to the industry recruiting agency, the Witwatersrand Native Labour Association (WNLA), stated that "*TB is not a mining disease*" in an unpublished memorandum to the South African Parliament to have TB removed from statute as a compensatable disease in miners ("*Comments on Revision of the Plural Affairs code – pneumoconiosis and tuberculosis; 1978*"). At about the same time, Cowie, a specialist physician at Anglo American's Ernest Oppenheimer Hospital in Welkom, expressed the opinion that given the replacement of accelerated silicosis by the slowly progressive chronic form of silicosis, and the availability of short-course TB treatment, the aetiological association between silicosis and TB had lost much of its practical importance.^{8,9}

However, within the next decade Cowie published evidence of an almost trebling of the TB risk in miners with silicosis.¹⁰ There is little in the public domain on how this finding was managed internally within the gold-mining industry but, from my observation at the time, it appears that the association was accepted and the question shifted to that of whether TB could be attributed to silica exposure in the absence of silicosis. This was a more difficult question to answer, as it required studies able to measure dust exposure and in which silicosis could be controlled for in the analysis. To further complicate the question, "*absence of silicosis*" should have been "*absence of radiological silicosis*". This follows from a study by Hnzido and Sluis-Cremer, based in the Epidemiology Research Unit attached to the Medical Bureau for Occupational Diseases, which showed that two thirds of the silicosis cases identified at autopsy were not visible as such on the chest X-ray (CXR).¹¹ This finding seems to have had little influence on conceptions of the influence of silica and silicosis on TB and other diseases, both in South Africa and in the global literature more generally.¹²

The 2000s brought a surge in publications on human immunodeficiency virus (HIV) and TB in gold miners. The singular association between silicosis and TB was replicated in a number of studies.¹³⁻¹⁵

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Silicosis was shown also greatly to aggravate the association between HIV and TB. In HIV-infected miners, the unadjusted relative risk of TB was reported in 2000 to be 4.5.¹⁵ In miners with both HIV infection and silicosis, the relative risk for TB was more than three times higher, at 14.6.

In 2018, six large gold-mining companies settled a class action suit for silicosis and TB contracted by their employees.¹⁶ Each disease is assessed separately under the Trust Deed of the Tshiamiso Trust, the civil trust formed in the wake of the settlement, and respiratory impairment and compensation grade are determined from the results of spirometric testing.^{16,17} This formulation is in contrast to that in the Occupational Diseases in Mines and Works Act (ODMWA) under which TB combined with any other disease (commonly silicotuberculosis) is automatically classified as second degree (equivalent to “> 40% impairment”). This certification carries a substantially greater payout than does first degree.¹⁸

Occupational health management of miners with silicosis and tuberculosis

By the 1970s and 1980s, resistance had developed within the gold-mining industry to the longstanding statutory requirement that miners diagnosed with silicosis or TB (active or with evidence of old TB) be excluded from risk work. This resistance arose from a change in labour regimen towards retention of skilled and returning migrant workers,^{19,20} and was influenced by medical research within the industry, which showed that short-course TB treatment was curative and not impaired by co-existing silicosis.²¹ Changes in mining company practice,⁹ followed by statute,¹⁸ resulted in the dropping of automatic exclusion of individuals with silicosis or TB from risk work. This did not apply to combined disease, which continues to require exclusion from risk work. Follow-up studies were few. An exception was Cowie's demonstration that miners with silicosis had a 50% greater TB treatment relapse rate than those without silicosis.²²

Linkage of silicosis to TB programmes

By the 2010s, international interest had turned to combatting TB in southern Africa²³ – by the World Health Organization, the World Bank, and the Global Fund to Fight AIDS, Tuberculosis and Malaria. One outcome of this international interest was the Global Fund-financed programme, Tuberculosis in the Mining Industry in Southern Africa (TIMS), from 2017 to 2018.²⁴ This programme provided the resources for an eight-country programme, excluding South Africa, to screen and treat TB in miners, ex-miners, and community members in countries neighbouring South Africa. Included was a protocol for submission of the claims of migrant workers from the South African mining industry for compensation under the ODMWA. Based on quarterly reports, more than 200 000 people were examined from July 2016 to September 2018 (of which the majority can be assumed to have been miners or

ex-miners).²⁴ However, the opportunity to expand our knowledge of the epidemiology and clinical characteristics of the two diseases in this large ex-miner population was taken up by only one centre, based in Lesotho.^{25,26}

Looking back

In returning to the literature on combined disease in the first two thirds of the 20th century, prolific publication on all aspects of combined disease is evident from South Africa, the United Kingdom, and the United States (from English-language sources). The multidisciplinary coverage included pathology, physiology, radiology, and clinical science.²⁷⁻³² By the 1970s, this literature appears to have been largely forgotten and seldom referred to. Tony Davies, at the National Centre for Occupational Health,³³ and Cowie⁹ were exceptions, and it took professional historians to bring this work to wider attention. This included the work of Rosental mentioned above, McCulloch²⁰ and, more recently, McCulloch and Miller.³⁴

An interesting mid-century example is the 1964 paper by Gerrit Schepers.³⁵ The 18-page article lacks references, but is an unusually comprehensive source of experimental and clinical observation and accompanying theory of interaction. Schepers had worked at the Miners' Phthisis Medical Bureau in Johannesburg from 1944 to 1954, before emigrating to the United States, where he spent the first three years at Saranac Laboratory, a centre of research into TB and mineral dust disease.²⁰ His paper provides a systemic classification of the pathogenesis and clinical presentation of different disease phenotypes due to silica exposure and TB infection, depending on the temporal sequence. These are briefly summarised in Table 1.

While the body of work referred to above predates the era of modern short-course treatment of TB and reflects higher silica dust exposures, the late 20th century/early 21st century epidemic of silicotuberculosis in South Africa calls for a reconsideration of everything learned about combined disease.

Somewhat later, in the 1980s, Solomon published two papers based on his long experience as an occupational radiologist, which reflected close observation of the radiological appearances of silicosis and TB in miners.^{36,37} In these articles, he identified a nodular presentation of TB (other than that of miliary TB) that may complicate silicosis, including an 'indolent' form in which the sputum was frequently negative for TB.

Looking ahead

There is a need for an active research programme in the pathophysiology, pathology, radiology, and clinical science of silico-tuberculosis (as defined in the Introduction) as a specific phenotype resulting from exposure to silica and *Mycobacterium tuberculosis*. Table 2 suggests a number of lines of research for revival or initiation.

Table 1. Schepers' classification of phenotypes of combined silica exposure and TB infection³⁵

Phenotype	Temporal pattern	Clinical outcome
Tuberculosilicosis	Silica exposure follows TB infection ('reactivation')	Reactivation of TB disease, with tendency to indolent chronic disease
Silicotuberculosis	TB infection contemporaneous with silica exposure ('simultaneous phase')	Rapidly developing tissue destruction and fibrotic disease, with fatalities
Silicosis with tuberculosis	Active TB superimposed on silicosis ('predisposition phase')	Rapidly disabling disease with high fatality rate, irrespective of whether TB occurs during or after silica exposure

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Table 2. Needed lines of inquiry into silicotuberculosis

Topic	Line of inquiry
Pathogenesis	How silica particles and <i>Mycobacterium tuberculosis</i> , and the disease processes of silicosis and TB, modify each other. This should include consideration of the influence of the temporal sequence of exposure, infection, and disease, in addition to dose and duration
Epidemiology	Long-term cohort study of miners to determine the natural history of silicotuberculosis, including mortality. In southern Africa, these include living cohorts who worked on the South African mines and new cohorts, such as informal and small-scale miners in South Africa and other countries such as Zimbabwe ³⁸
Radiological differential diagnosis	Role of computed tomography in distinguishing between silicosis, TB, and silicotuberculosis
Impairment	Role of diffusing capacity for carbon monoxide (DLco) in silicotuberculosis, thus expanding the measurement of pathophysiology beyond spirometric lung volumes
Diagnosis of active TB	Influence of silicosis on the performance of CXR and of microbiological tests in detection of active TB
Treatment of TB	Effectiveness of different drug regimens for TB, including short-course regimens, in individuals with silicosis
TB preventive treatment	• Effectiveness of TB preventive treatment, including that of short regimens, in silica-exposed individuals • Operational studies on how to improve uptake and adherence
Silica exposure cessation for preventive purposes	• Determination of silica exposure threshold that prevents excess risk of TB or recurrent TB • Risk of TB (or recurrent TB) associated with continuing silica exposure relative to ceasing exposure

CONCLUSION

The combined disease of silicotuberculosis has historically been subject to shifting interest and understanding – driven by burden of disease, concerns about compensation, medical exclusion, and loss of livelihood, and assignment of responsibility for treatment and prevention. The argument in this article is that one of the effects of the separation of silicosis and TB as individual diseases, to be considered and managed apart, has been the neglect of scientific exploration of their relationship and interaction in the late 20th and early 21st centuries.

Interest in phenotypes of combined disease waned in high-income countries with the decline in silicosis severity and incidence, and the introduction of effective treatment for TB – a stage prematurely believed to have been reached in South Africa. Failure to recognise subradiological silicosis in the classification of silicosis at the 1930 TB conference further contributed to the invisibility of combined disease, as did the South African migrant labour system, with the experience of miners leaving employment with silica-laden lungs or radiological silicosis lost to observation.

This overview has focused on the South African gold-mining industry, which is exceptional in some respects – such as a century-long management of a migrant labour system, the great depth of mining operations, and the size of local TB and HIV epidemics. However, the questions raised about silicotuberculosis apply also to other countries with large silica-exposed populations and high TB burdens, notably China and India, and to growing informal and small-scale mining in Africa.³⁸ A programme of research is needed in the relevant disciplines to pursue the unanswered questions, with funding sufficient to sustain research groups able to build the body of knowledge required for policy, clinical practice, and social justice.

DECLARATION

The author has prepared expert reports for plaintiff attorneys in silicosis legislation, including the relationship of silicosis to tuberculosis.

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The non-use of aluminum oxide for silicosis prophylaxis in South African mines

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INTRODUCTION

Aluminum powder, known also as McIntyre Powder, was packed into cylindrical canisters measuring about 5 cm high and 3 cm in diameter (Figure 1). The canisters contained a fine respirable powder of approximately 85% aluminium oxide and 15% aluminium. It was produced, patented, marketed, and sold by the McIntyre Research Foundation in Toronto, Canada.¹ First used in 1943,¹⁻³ it was widely adopted, mostly by silica-generating mines – predominantly gold mines – but also by factories where workers were exposed to silica.³

The powder was marketed as a silicosis prophylaxis; prevention of the pneumoconiosis was purportedly achieved by inhalation of the powder by silica-exposed workers.³ The powder was claimed to prevent silicosis forming, to arrest the progression of immature lesions, and to prevent complications such as progressive massive fibrosis (PMF),⁴ the fibrotic masses that are > 1 cm in their largest dimension. It was less vigorously promoted as a therapeutic agent for those who already had established disease.⁵ The powder was administered by dispersing it into closed congregate gathering places such as mine change rooms (equated with shut windows and other openings to enable the powder to reach the desired concentration in the room). Less commonly, individual workers were administered the powder through inhalation devices.⁴

After 1943, use of aluminium powder became widespread, although exact numbers of 'dosed' workers is undocumented. In Canada alone, companies administered aluminum powder, daily, to 16 000 workers in 1949.⁵ It is estimated that 27 500 miners in Ontario were treated from 1943 to 1979.² In Mexico in 1956, approximately 1.25 million doses were delivered.⁵ In Australia, 2 337 miners or 72% of Western Australia's total underground workforce took McIntyre Powder by 1958.⁵ Martell and Guidotti (2022) wrote that tens of thousands of workers in at least 200 workplaces worldwide (Canada, United States, Western Australia, Mexico, England, Belgian Congo, Chile) received aluminium powder.³

The evidence for the prophylactic ability of aluminium powder in humans was scant, and centred on extrapolation from in vitro and animal experiments, and small methodologically flawed human

trials. The theory underpinning aluminum's preventive mechanism was that, by reducing the solubility and inhibiting the toxic surface properties of silica particles, the aluminum dust would prevent fibrosis of the lung.³ An example of an animal experiment is that of Denny et al., published in 1939.⁶ They exposed rabbits to quartz and aluminium powder, or only quartz (controls) in various ways, most pertinently through inhalation by dusting. One conclusion was: "No animals whose lungs on analysis contained 1 per cent or more of metallic aluminum have shown any evidence of silicosis up to periods of seventeen and a half months, in contrast to well-developed silicosis in the quartz control rabbits in seven months." These findings supported the prophylactic efficacy of aluminum powder, but animal experiments were inconsistent in demonstrating this. For example, South Africa's Pneumoconiosis Research Unit (PRU) found their early guinea pig studies to be inconclusive.⁴ Small human studies of workers with silicosis were initiated in the early 1940s.⁷ Although called trials, they were not controlled randomised trials, but rather studies of volunteer miners with silicosis.⁷ The trials and investigations of aluminium-exposed factory workers were claimed to "have shown 'conclusively' that aluminium powder was 'entirely harmless' and 'proved definitely beneficial' in some cases."⁷ Critics questioned the studies, noting their small sample sizes, flawed methodology, such as being uncontrolled, and the frequent lack of convincing objective evidence of improvement.⁷

Despite the questionable evidence of efficacy, McIntyre Powder was widely used because it was cheaper than dust suppression technology: licensees paid about one dollar per year per dosed worker.^{4,7} Additionally, should it prevent disease, the negative publicity associated with high disease rates would be managed, workers' compensation expenses would be reduced – a growing financial burden at the time⁷ – along with costs associated with occupational diseases, such as hiring and training replacement staff.

South Africa, notwithstanding its very large gold-mining industry (hundreds of thousands employed for many decades),⁸ high rates of silica-associated disease,⁹ and costs associated with dust



Figure 1. Cylindrical canisters of aluminium oxide powder (McIntyre Powder) showing the wording on the bases

Photograph: David Rees

controls and workers' compensation, never adopted McIntyre Powder. One reason, among several possibilities, was the influential role of the PRU and its staff, notably Prof. Ian Webster, and is discussed in this paper.

Prof. Ian Webster, the Pneumoconiosis Research Unit, and aluminium powder

In early 1963, Prof. Ian Webster, then Head of the Pathology Division of the PRU, undertook a fact-finding mission on silicosis prophylaxis by aluminium powder to Canada, England, and Wales. He published a report on the mission, and his findings and recommendations, in the 1963 PRU Reports No 1–10.⁴

The PRU was an entity of the statutory Council for Scientific and Industrial Research (CSIR), a large research and development organisation with an important role in stimulating the development of research in industry. The role of the CSIR in the 1960s was to work closely with industry and the public sector,¹⁰ as it still does today (see: https://en.wikipedia.org/wiki/Council_for_Scientific_and_Industrial_Research#).

Webster's trip coincided intentionally with that of the South African Department of Mines (Government) and the Transvaal and Orange Free State Chamber of Mines (Industry), showing a collaborative relationship between Government, industry and the PRU.

In the PRU report, Webster explained the reason for his trip. He had read a 1961 report by Angus D Campbell that was positive about aluminium powder. Campbell had presented the report to the Chairman and Directors of the McIntyre Research Foundation. Webster writes that "A careful study of this report revealed a number of statements and claims which needed clarification or

explanation. I was of the opinion that such clarification could only be obtained in Canada."⁴ More specifically, Webster listed three reasons:

- a) To determine whether aluminium powder is harmful or not
- b) To determine whether the McIntyre Powder could:
 - prevent the development of silicotic lesions
 - prevent progression of silicotic lesions
 - cause improvement of the symptomatology associated with pneumoconiosis
- c) To find out how aluminium powder was administered in gold mines

The question of harm arose from reports of 'aluminium lung', a lung fibrosis linked to aluminium powder or fume inhaled at work, and of reports of aluminium-induced neurological injury, an issue that is still topical.³

On the trip, Webster visited 21 institutions and persons,⁴ plus three other persons, incidentally. Among them, Webster encountered enthusiasts, agnostics, and sceptics of aluminium powder. Unsurprisingly, the most enthusiastic were those associated with the McIntyre Research Foundation, or its clients. Academics in Canada, England, and Wales were mostly agnostics or sceptics.⁴ An allegory told to Webster by Dr Paterson, Toronto, Canada, as reported in the 1963 PRU Report, expresses Dr Paterson's sceptical opinion of the prophylactic value of aluminium powder: "There were two people going out fishing in a rowing boat. In the rowing boat was an anchor, and when they came to the part where they wanted to stop the one person in the boat said to the other, throw out the anchor. The other person picked up the anchor and said, no rope. The first person said throw out the anchor anyway."⁴

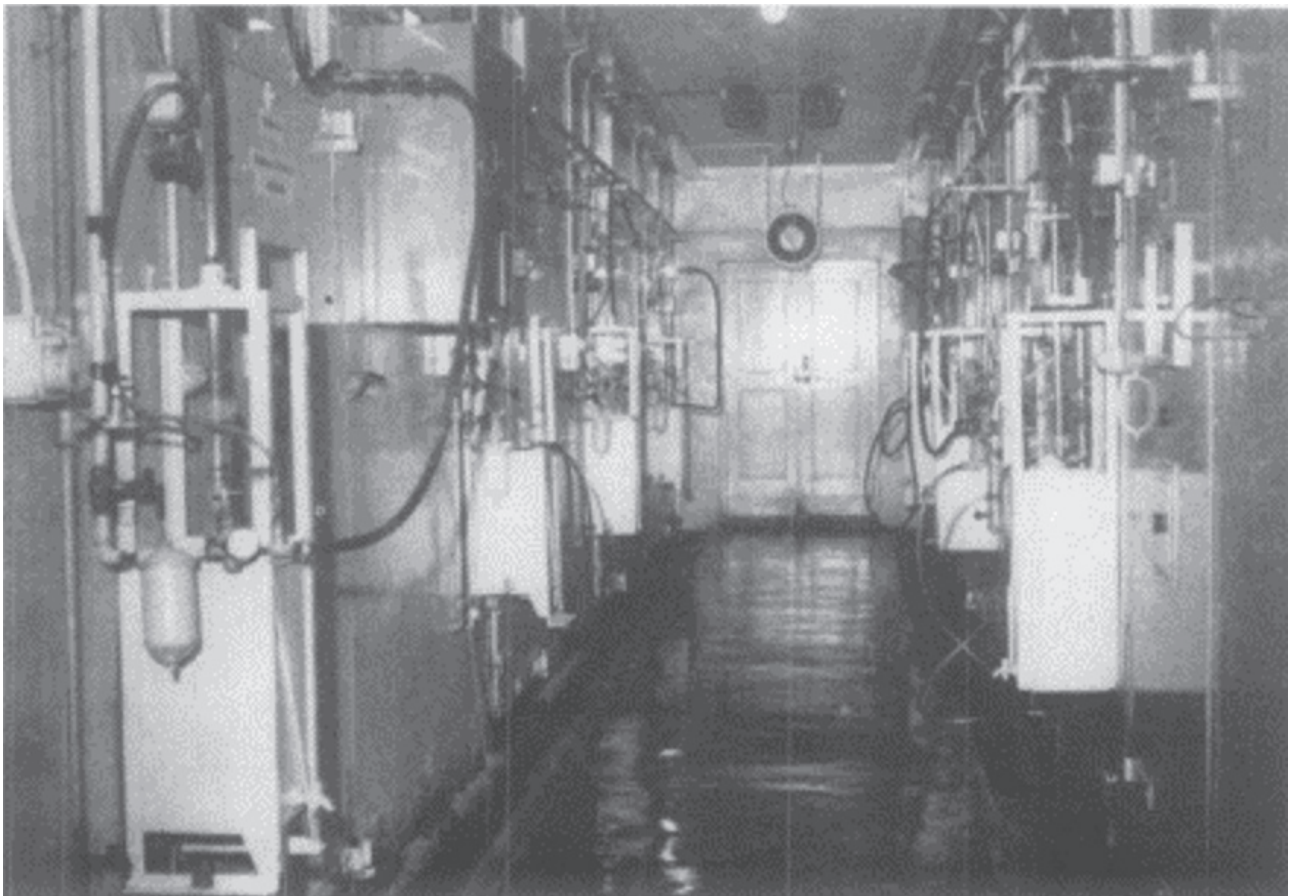


Figure 2. The corridor of the animal exposure chambers of the Pneumoconiosis Research Unit, Johannesburg. The mechanism for feeding dust into each chamber is shown

Reproduced from Goldstein et al.¹⁰ with permission

This captured Paterson's view that aluminium powder was being used despite the lack of evidence for its efficacy.

Webster summarised his conclusions arising from his consultations thus:⁴

- "1. After 20 years of the use of aluminium prophylaxis there is no evidence that the inhalation of the McIntyre Research Foundation powder causes harm.
2. There is no proof that aluminium prophylaxis has prevented the development of silicosis.
3. Aluminium prophylaxis does not stop the progression of silicosis."

He concluded by saying that he could not recommend the use of aluminium prophylaxis in South Africa, and that animal experimentation should continue. Also, somewhat surprisingly, he added, "Should the State or an industry wish to use aluminium prophylaxis, the Pneumoconiosis Research Unit should assist."⁴

THE NON-USE OF ALUMINIUM POWDER IN SOUTH AFRICA

Aluminium powder was not introduced into South African mines in the 1960s and 1970s. We could not find reasons for the non-use of the material in the formal literature using PubMed and Google Scholar searches. DR also read the PRU annual reports of the 1960s and no mention is made in them of why McIntyre Powder was not introduced. Less formal literature may reveal the rationale for the decision; records of meetings and discussions of the Chamber of Mines, the Department of Mines, and professional bodies for example, but we did not explore these. There may be two reasons for non-use related to the PRU, however.

The influence of the PRU

The PRU and the CSIR were influential at the time of the evaluation of aluminium powder's silicosis prevention efficacy and had relationships with Government and business. A convincing illustration of this is the 1959 Pneumoconiosis Conference held at the University of the Witwatersrand, Johannesburg. This international conference was convened by the CSIR at the request of the South African Government and opened by the Governor-General of South Africa. It drew pneumoconiosis experts from many countries and international organisations, including the World Health Organization.¹¹ Both the Chamber of Mines and the Department of Mines participated.¹¹ The PRU staff were prominent contributors and its Director, AJ Orenstein, edited the Proceedings of the conference, which were published in 1960.¹¹ The PRU's opinion on aluminium powder, as advanced by Webster in his 1963 report, would likely have carried considerable weight in this collaborative context.

The PRU's experimental research capacity

A second plausible explanation is that the PRU would have been justified in believing that it could convincingly answer questions about the efficacy of McIntyre Powder's silicosis prophylaxis through its own research. Webster and the PRU could give effect to the continuation of animal experimentation that Webster had recommended, because the Unit had sophisticated exposure facilities (Figure 2) and experienced staff to operate them, as described in a 1974 publication written by PRU researchers.¹² Small laboratory



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animal experiments were underway at the time of Webster's trip⁴ but a more elaborate study using non-human primates – vervet monkeys – was also being conducted.¹² The study findings, completed in 1966, added support for the PRU's non-use stance: *"The experiment showed that the aluminium powder delayed the onset of the experimental silicosis, but when the surviving animals were kept out of the dusty atmosphere and without aluminium prophylaxis, they subsequently developed lesions of a severity equal to that of the controls. The use of this powder could therefore not be recommended for human use."*¹²

The non-use of aluminium powder in South Africa was vindicated by the global cessation of its use in 1979, by when it had become abundantly evident that it did not prevent silicosis and that exposed workers were potentially being harmed.³

CONCLUSION

Aluminum powder was used in many parts of the world as a silicosis prophylactic from 1943 to 1979. Despite claims that it reduced disease and its attendant costs, it was never adopted in South Africa; a sound decision, given the evidence of ineffectiveness and possible harm that accumulated after its introduction. There are several, sometimes interrelated, reasons for the non-use of aluminium powder in South Africa. We postulate that the influential role of the PRU and its staff, notably Prof. Ian Webster, who publicly stated their reservations about its efficacy as a silicosis preventive treatment, was material in the decision. This demonstrates the potential positive role of national institutes for occupational health in developing evidence-based policy and practices.

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.

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The Ergonomics Regulations: the role of the health professions

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INTRODUCTION

Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population. In December 2019, the Ergonomics Regulations¹ (the Regulations) were gazetted under the Occupational Health and Safety Act No. 85 of 1993² (OHS), with the purpose of protecting the health and safety of persons who may be exposed to ergonomic risks in the workplace. Under the Regulations, employers have a general duty to ensure that exposure to ergonomic hazards and risks is either prevented or adequately controlled. The Regulations compel employers to undertake ergonomic risk assessments, implement control measures, provide training, and conduct medical surveillance to protect employees from ergonomic-related disorders. The Regulations require that ergonomic risk assessments be performed by a 'competent person', yet stop short of defining explicit criteria for competence. Some confusion has subsequently arisen around the Regulations' definition of a competent person and questions have been raised about whether health professionals have a role to play in ergonomic risk assessment. We use a systems ergonomics approach³ to argue that ergonomic risk assessment should consider, in addition to the environmental and task-related risks, the unique human factor risks that each worker brings to the work situation. Examples of such risks include motor, sensory, psychosocial, cognitive, and behavioural characteristics, which frequently affect health status and functional fitness to work. This paper examines the role of registered health professionals in identifying and managing these risks.

ABSTRACT

Ergonomics is the scientific discipline concerned with customising workplace conditions and job demands to fit the capabilities, limitations, and needs of the workforce. It is a multidisciplinary field, synthesising principles from diverse areas such as human factors engineering, industrial engineering, physiology, psychology, industrial design, biomechanics, kinesiology, occupational safety, and occupational health. The Ergonomics Regulations compel employers to undertake ergonomic risk assessments, implement control measures, provide training, and conduct medical surveillance to protect employees from ergonomic-related disorders. The Regulations mandate that ergonomic risk assessments be performed by a 'competent person', yet stop short of defining explicit criteria for competence. This has led to some confusion regarding the involvement of health professionals in ergonomic risk assessment and raises the question, 'Do health professionals comply with the legal definition of competence for this task?' This paper uses a systems ergonomics approach to highlight the diverse and complex risk factors that human workers bring to the workplace. The authors argue that qualified health professionals are best positioned to identify and manage high-risk motor, sensory, psychosocial, cognitive, and behavioural human factors, and are therefore indispensable in the ergonomic risk assessment process.

The systems ergonomics approach

The systems ergonomics approach³ views work as an integrated system, where humans interact with technology, tools, environments, and organisational structures. Systems ergonomics emphasises the interconnections and interdependencies within the system and acknowledges that changes in one part of the system can impact other parts of the system. Ergonomic solutions must thus consider the whole system rather than isolated elements. Chapanis (1996) defines a system as *"an interacting combination, at any level of complexity, of people, materials, tools, machines, software, facilities and procedures designed to work together for some common purpose."*⁴ Due to the complexity of components in any work system, ergonomics is inherently multidisciplinary. It integrates knowledge from various disciplines such as human factors engineering, physiology, psychology, industrial design, biomechanics, kinesiology, industrial engineering, occupational safety, and occupational health.

Figure 1 illustrates a simple conceptual framework that explains systems ergonomics. The Person-Environment-Occupation (PEO) Model⁵ was developed by occupational therapists in 1996 and is used to analyse complex occupational performance issues. According to the PEO Model, safe, effective, and rewarding occupational performance is shaped by the interaction of three domains, namely:

- The person domain – the worker, with his/her distinctive physical, cognitive, psychosocial, and physiological characteristics, as well as his/her skills, experiences, and personality

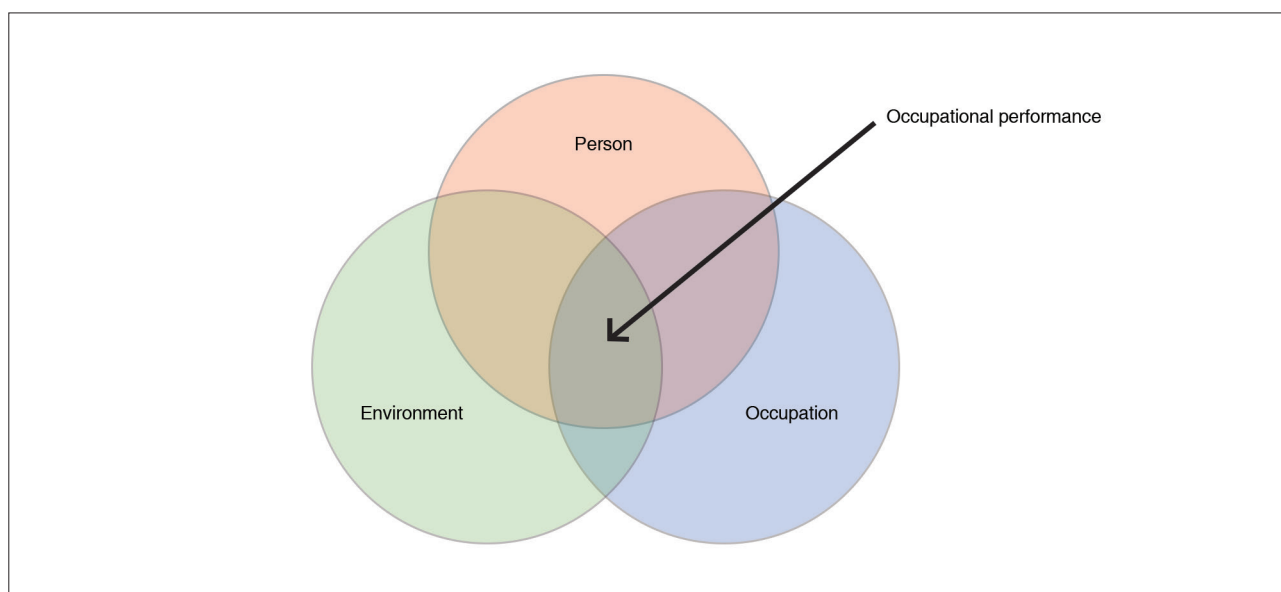


Figure 1. Person-Environment-Occupation Model⁵

- The environment domain – the physical layout of the workplace, social atmosphere, cultural context, and environmental characteristics such as temperature, noise and lighting
- The occupation domain – the work tasks, including tools, equipment, work postures, physical, and mental work demands

These three domains are dependent upon, and influenced by, one another. The higher the level of congruence or balance between the three domains, the better the quality of occupational performance, leading to increased productivity, efficiency, safety, and wellbeing for the worker. Ergonomic risk assessment within the PEO context entails identifying and addressing the ergonomic risks within each domain, and restoring the balance between the three domains.

Risks intrinsic to the human/person component of the system

The person domain of the work system is highly complex, encompassing physical, sensory, psychological, cognitive, and social dimensions. These dimensions vary enormously between individuals and can fluctuate significantly within a person. The PEO Model is particularly useful in understanding and analysing problematic areas that affect workers' occupational performance. Worker problems (or human factors) are highly complex and individual, typically demanding special expertise for effective identification and management. This expertise is provided by medical and other health professionals. Interventions provided by health professionals range from prevention to treatment, and from functional assessment to functional restoration.⁶ Preventive services typically include medical surveillance, ergonomic support to prevent strain and injury, worker fitness evaluations to assess worker risk in relation to inherent job demands, workplace wellness programmes, education and counselling regarding healthy lifestyle habits, stress management, and emotional regulation interventions. Restorative services typically include the treatment of medical conditions, rehabilitation, case management, and reasonable accommodation where appropriate.

Ergonomic risk assessment and the 'competent person'

Ergonomic risk assessment is defined in the Regulations as "a programme, process or investigation to identify, analyse, evaluate and prioritise any risk from exposure to ergonomic risks associated

with the workplace".¹ The Regulations require that the ergonomic risk assessment be performed by a 'competent person',⁷ defined as someone who "(a) has in respect of the work or task to be performed the required knowledge, training and experience in ergonomics and, where applicable, qualifications specific to ergonomics: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008, those qualifications and that training must be regarded as the required qualifications and training"; and "(b) is familiar with the Act and the applicable regulations made under the Act".¹ This definition identifies three main requirements for competence, but these are vague and ambiguous:

- The first requirement states that the competent person "has, in respect of work or task to be performed the required knowledge, training and experience in ergonomics."¹ Exactly what the specific requirements are for knowledge, training, and experience in ergonomics is not defined. Considering the multidisciplinary nature of ergonomics, and the range of professionals whose qualifications include education and training in ergonomic principles pertinent to their scope of practice, it is reasonable to conclude that the knowledge, training, and experience of the competent person may differ according to the nature of the ergonomic hazard and the type of risk assessment required.
- The second requirement indicates that "where applicable, [the competent person should have] qualifications specific to ergonomics: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008, those qualifications and that training must be regarded as the required qualifications and training."¹ This requirement is particularly vague and confusing. While many professions practise ergonomics in South Africa, the only profession with qualifications *specific* to ergonomics is that of ergonomists. It seems unlikely that the intention of the Regulations is to limit a multidisciplinary field of practice to one profession. The circumstances under which a qualified ergonomist might specifically be required to perform the ergonomic risk assessment is also not identified, with the requirement only given as "where applicable". The second part of this requirement indicates that "where appropriate", the qualifications must be

registered in terms of the National Qualifications Framework Act (NQFA). Again, the specific qualifications required and the circumstances under which they need to be registered under the NQFA remain unclear.

- The final requirement mandates that the competent person should be well acquainted with the Act and the corresponding regulations under it. Therefore, the competent individual is expected to have a comprehensive understanding of the OHSA, the Ergonomics Regulations, and any other pertinent regulations under the OHSA that are relevant to the assessed risk. This underscores the importance of multidisciplinary competence, where professionals within a specific field are trained in, and knowledgeable about, the legal provisions that relate to their scopes of practice.

The authors propose that qualified health professionals are important members of the multidisciplinary ergonomics risk assessment team, especially when evaluating or addressing ergonomic risks associated with a worker's medical or health status.

Ergonomic risk assessment and the role of the health professional

The ergonomic risk assessment detailed in Regulation 6 is subject to the requirements of Section 8.2(d) of the OHSA, which requires employers to assess workplace hazards and to establish and implement appropriate control measures to protect the health and safety of persons. The person performing the ergonomic risk assessment should, thus, be proficient not only in identifying the risks, but also in recommending appropriate risk controls. Since work systems risks could be environmental, task-related, person-related, or a combination of these, various forms of expertise might be required to perform an effective risk assessment. Examples of individuals with such expertise include the safety practitioner, occupational hygienist, industrial engineer, ergonomist, or health professional. Input from health professionals is typically required when the identified risks arise in the worker domain of the PEO work system.

Medical surveillance under the Ergonomic Regulations

Regulation 8.1(a) contains a statutory obligation for employers to place high-risk employees identified in the ergonomic risk assessment under medical surveillance, which should be overseen by an occupational medicine practitioner (OMP). This provision directly calls for the involvement of the OMP and, where appropriate, other health professionals, in the risk assessment process. An OMP is required to develop an ergonomic medical surveillance programme as part of the normal occupational health services. Medical surveillance for ergonomic exposure needs to be determined by the OMP, according to identified causal factors (Regulations 8.1(a) and (b)). The term 'medical surveillance', as defined in the OHSA, is health surveillance for employees working in jobs where either the ergonomic risk assessment identifies a substantial risk, or an OMP recommends that certain employees must be under health surveillance. The aim is to optimise human wellbeing, promote adaptation to the work environment, and monitor the effectiveness of workplace control measures.² The implications of these legal requirements are that:

1. The OMP must be part of the ergonomic risk assessment team as the competent person to identify where raw- or residual-ergonomic risk exposures may trigger the health surveillance requirement, and

2. The OMP is the accountable person for health surveillance. The objectives are to:

- detect ill-health effects at an early stage
- provide data to help employers evaluate health risks and improve containment
- enable employees to raise concerns about how work affects their health
- highlight lapses in workplace control measures
- provide an opportunity to reinforce training, education, and health promotion of employees

Medical surveillance is the analysis of health information and data to look for problems in the workplace that require targeted prevention. Health information and data are gathered in a planned medical programme with periodic examinations that may include clinical examinations and testing, biological monitoring, and/or functional testing of employees. Collation and analysis of data and timely dissemination for an appropriate response are then undertaken.^{1,8} In line with the requirements of labour legislation^{9,10} and medical ethics, all health enquiries, medical testing, and functional testing of employees should be informed by the inherent job demands as identified in a functional job analysis.

The collection of employees' medical data or health information is part of the medical surveillance process¹¹ defined in the Regulations. Medical surveillance can also be defined as a screening process. Screening is the application of a specific medical procedure or test to people who have no symptoms or impairment related to a particular disease, for the purpose of determining their likelihood of having or developing the disease. The screening procedure itself does not diagnose the illness.¹² Where markers for potential pathology or impairment are found, the individual is referred for full investigation by an OMP. These data, or the information from medical screening or surveillance, must be recorded as personal or human health data or information. The appropriate management, sharing and storage of these data highlight the need for health professionals to be recognised as 'competent persons' in relation to the risk assessment process. Medical records of employees include confidential personal data that must be kept in accordance with professional ethical and practice guidelines. Health professionals must also comply with the Protection of Personal Information Act, 2013 (POPIA)¹³ and the Promotion of Access to Information Act, 2000 (PAIA).¹⁴

Evaluation of worker fitness

The work fitness evaluation is a health assessment typically conducted before an individual starts a new job. The purpose of the evaluation is to ensure that the prospective employee is medically, physically, and mentally capable of safely meeting the job's essential duties and demands. It commonly includes a review of the individual's medical history, a baseline medical examination, and, where appropriate, tests related to high-risk physical or mental job demands such as visual acuity, manual material handling, balance, cardiopulmonary endurance, manual dexterity, cognitive ability, and executive function. The goal is to ascertain if the person has any health issue(s) that might interfere with his/her job performance or pose a risk to himself/herself or others in the workplace. Determining and maintaining worker fitness is a risk control measure and is central to risk assessment and medical surveillance. It is an individualised process for each worker.

Serra et al. (2007) describe work fitness as a multidimensional and dynamic concept, incorporating: 1) the worker's physical and mental capacity, 2) the worker's risk in relation to the job

Table 1. Typical functional abilities included in the functional work assessment^{16-18,21}

Physical functional ability	Psycho-emotional and cognitive functional ability
• Gait • Balance, i.e. physical equilibrium, including static and dynamic balance • Range of movement, i.e. dynamic flexibility • Static posture, including stand, sit, stoop, crouch, and reach • Strength, including lift, carry, push, and pull • Coordination/reaction time • Manual strength using one or both hands • Physical endurance, including cardiovascular endurance and muscular endurance	• Sensory, i.e. sight/visual, hearing, smell, taste, and touch • Attention, i.e. the act or state of applying the mind to a particular topic • Memory, e.g. short-term memory, working memory, and delayed recall • Inhibitory control, i.e. the ability to inhibit or suppress automatic or impulsive responses or behaviours to perform a goal-directed action • Verbal comprehension, i.e. the ability to understand spoken language • Mood, i.e. a prevailing affective state, typically positive or negative • Emotions, i.e. strong subjective feelings that result in physical and psychological changes that influence thought and behaviour • Psychomotor abilities, i.e. motor or muscle action directly progressing from mental activity • Perceptual skills, i.e. the ability accurately to interpret and understand sensory information from the environment to recognise patterns, discriminate between different stimuli, and make meaningful interpretations based on sensory experiences • Abstract thinking, i.e. the ability to think about objects, principles, and ideas that are not physically present • Mental endurance • Motivation, including a person's perceived limitations that may affect his/her performance

demands and the work environment, and (3) ethical, economic, and legal considerations.¹⁵ It is, thus, essential that any work fitness evaluation be based on the inherent requirements of the job. Job-related testing is considered fairer, safer, more reliable, and more valid than arbitrary medical examinations.¹⁶⁻¹⁸ The work fitness evaluation is, thus, a complex, multifaceted enquiry conducted by one or more registered health professionals, which simultaneously addresses medical, psychosocial, environmental, task-related, and practical concerns.

Establishing worker fitness as a risk control measure

When considering the 'competent person' to assess employees' health-related fitness to work, it is important to note that:

1. The persons to whom the employer should assign this duty are not defined in the Regulations.
2. Medical and healthcare professionals in South Africa are regulated by the Health Professions Council of South Africa (HPCSA). The HPCSA is a statutory body established by the Health Professions Act No. 56 of 1974.¹⁹ The primary role of the HPCSA is to regulate and oversee the professional conduct and practice of the various health professions. The HPCSA ensures that medical and healthcare professionals meet specific standards of education, training, and ethical conduct. In addition to the oversight provided by the HPCSA, each profession has its own council or regulatory body that works in conjunction with the HPCSA to regulate and govern the profession.
3. Each health professional, when duly registered, is competent and legally entitled to work within the defined scope of their profession, and is the designated person to examine, test, or evaluate the worker and present an evidence-based work fitness recommendation to the employer.
4. Where the risk assessment identifies the requirement for medical work fitness assessment and certification, the employer must appoint an OMP in charge of the work fitness programme. The OMP is a registered medical practitioner with a postgraduate qualification in occupational medicine that is recognised by the HPCSA.
5. The OMP is the primary health professional in this process and will, as the case applies, be assisted by other HPCSA-registered practitioners, including but not limited to general practitioners, medical specialists (e.g. ophthalmologists, cardiologists, physicians, orthopaedic surgeons, neurologists, psychiatrists, etc.),

audiologists, occupational therapists, optometrists, physiotherapists, biokineticists, psychologists, and environmental health practitioners.

An interdisciplinary approach is frequently required when assessing work fitness.²⁰ The assessment should include:

- A functional job analysis to determine the inherent physical, mental, and psychosocial demands of the job and the ergonomic risks. This is typically performed by occupational therapists who have in-depth training in functional activity analysis
- A medical and functional assessment of the worker to determine whether he/she meets the functional job demands in a safe and productive manner (Table 1 contains a list of physical and mental functional abilities commonly assessed in the work fitness assessment)

Discrepancies between worker abilities and job demands are addressed through medical and rehabilitative interventions. Where a worker's impairment remains unresolved, options for reasonable accommodation should be explored in accordance with labour law provisions.^{9,10} It is important that health professionals participate in the reasonable accommodation process due to their understanding of the medical diagnosis, prognosis, limitations, and restrictions of the individual and the functional work-related effects thereof. Individuals with known medical conditions may require individualised risk assessments, as the baseline ergonomics risk assessment may not sufficiently consider the risks posed by the medical condition.^{17,21}

CONCLUSION

Within the multidisciplinary field of ergonomics, health professionals, as defined by the HPCSA, play a critical role in assessing and managing ergonomic risks in workers with high-risk health conditions or the potential to develop such conditions. In this regard, health professionals fulfil the requirement of 'competent person' in the ergonomic risk assessment process.

KEY MESSAGES

1. The Ergonomics Regulations require employers to assess and mitigate ergonomic risks to prevent work-related disorders through four main strategies, viz. risk assessment, implementation of controls, training, and medical monitoring.

2. Collaboration across multiple disciplines is key to effective ergonomic risk prevention, ensuring tailored controls for specific risks.
3. Healthcare professionals recognised by the HPCSA play a crucial role in assessing and managing ergonomic risks that affect the health status of workers.

Declaration of conflicts of interest and affiliation

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: DJK, LS, GT, JL, GV

Drafting of the paper: DJK, LS, GT, JL, GV

Critical revision of the paper: DJK, LS, GT, JL, GV

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Ergonomics Regulations 2019, promulgated under the Occupational Health and Safety Act No. 85 of 1993, as amended

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On 6 December 2019, the Ergonomics Regulations were published in the Government Gazette,¹ and are applicable to all workplaces as per the definition in the Occupational Health and Safety Act No. 85 of 1993, as amended.² The intention of the Regulations is an ergonomics programme approach, which should be integrated into existing occupational health and safety programmes. Ergonomics is not a stand-alone hazard, but rather part of the broader approach to ensure a workplace that is safe and without risk to the health of employees, as well as productive.² An ergonomics programme is a systematic process for anticipating, identifying, analysing and controlling ergonomic risks, and should include, at least, an ergonomics hazards identification and risk assessment, risk controls (through the implementation of the hierarchy of controls), information and training, monitoring and evaluation, and medical surveillance.

The aim of the Ergonomics Regulations is to balance worker wellbeing and productivity through interactions of the human and the work-system, focusing on a human-centred approach. The practical benefits of ergonomics include:

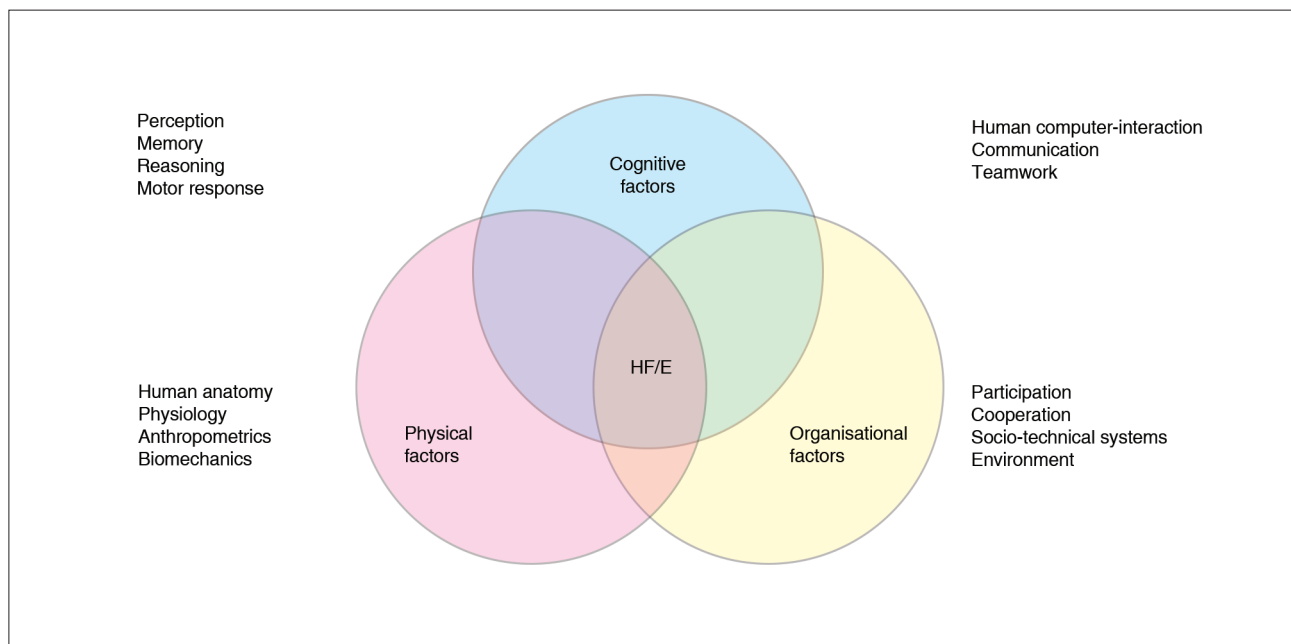
- For the employee – improved health, wellbeing and safety at the workplace
- For the employer – improved productivity, efficiency, and prevention of occupational incidents and adverse health effects
- For Government – a workplace that is safe and without risk to the health of employees²

The Regulations also incorporate the three factors of ergonomics, previously known as domains, viz. physical, cognitive, and organisational, which are interrelated¹ as illustrated in Figure 1.

Physical ergonomics focuses on physical activity, cognitive ergonomics on mental processing, and organisational ergonomics on optimising sociotechnical systems. Table 1 provides a few examples of each factor. It is important to keep in mind that employers and competent persons must take all three factors into account when conducting an ergonomics risk assessment, and work with other disciplines when addressing these issues.³

It is important that the Ergonomics Regulations are not read in isolation. As indicated in Table 1, some of the examples of cognitive and organisational ergonomics are governed in other laws administered by the Department of Employment and Labour. Therefore, when conducting an ergonomics risk assessment, employers and the competent person need to consider:

1. The Occupational Health and Safety Act No. 85 of 1993, as amended²
2. Relevant regulations promulgated under Section 43 of the Basic Conditions of Employment Act No. 75 of 1997, as amended⁴
3. The Codes of Practice associated with the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993, as amended⁵
4. The Employment Equity Act No. 55 of 1998, as amended⁶
5. The Code of Practice on the Prevention and Elimination of Harassment in the Workplace⁷



HF/E: human factors/ergonomics

Figure 1. Interaction between the three factors in ergonomics

Source: *International Ergonomics Association*³

Table 1. Examples of physical, cognitive, and organisational ergonomics factors

Ergonomics factor		
Physical	Cognitive	Organisational
• Working postures • Materials handling • Repetitive movements • Work-related musculoskeletal disorders • Workplace layout • Physical safety and health	• Mental workload • Decision making • Skilled performance • Human-computer interaction • Human reliability • Work stress • Training	• Communication • Employee resource management • Work design • Design of working times • Teamwork • Participatory design • Virtual organisations • Quality management

Since the promulgation of the Ergonomics Regulations in December 2019, there have been a number of challenges with their implementation. However, the Department of Employment and Labour (DEL) has addressed these and is working on further ways to promote ergonomics in the workplace. The first challenge was the COVID-19 pandemic and its implications for the workplace, with a move to hybrid and remote work. There were also a number of enquiries with regard to the risk assessment and the competent person described in the Regulations. As risk assessment is one of the fundamental regulatory prevention principles in the workplace, the Department gave a 12-month exemption for conducting risk assessments and related medical surveillance, in order for employers to upskill employees or to find skilled external individuals for this task. The Department also drafted and published a guideline on the competent person,⁸ which provides more details on how to select such a person. However, while the Regulations require the appointment of a competent person to perform the risk assessment, the Department has always promoted a team approach when conducting risk assessments, as it is beneficial to draw on knowledge and skills of others in the workplace.

The DEL will also conduct a small, national survey about the implementation of the Regulations, aimed at employers across the country, and using the inspections conducted by the occupational health and safety inspectors. The results of the survey will hopefully provide information about how the regulations are being implemented, the challenges being experienced by industry, and where best practices are being implemented.

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The genesis of ISO 23875 and its impact on heavy mining equipment operator enclosure air quality

Part 1

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ABSTRACT

Mining machines frequently operate in environments with high concentrations of respirable crystalline silica (RCS) dust. Overexposure to RCS poses a substantial health risk to mining machine operators, leading to lung diseases. The International Standards Organisation (ISO) 23875:2021 standard establishes a uniform method and defines the performance metrics necessary to ensure acceptable air quality for mining machine operators. This article series delves into the historical development and transformative influence of the ISO 23875 standard on the air quality within heavy mining equipment (HME) operator enclosures.

INTRODUCTION

Mining machines frequently operate in environments with high concentrations of respirable crystalline silica (RCS) dust. Overexposure to RCS poses a substantial health risk to mining machine operators, leading to lung diseases. Research indicates that existing technologies are highly effective in reducing silica exposures when appropriately applied to heavy equipment cabs.¹⁻⁴

To reduce the risk of overexposure to RCS, the International Standards Organisation (ISO) Technical Committee- (TC-) 82 Mining created ISO 23875:2021 to provide a uniform method, and define performance metrics, to ensure acceptable air quality for mining machine operators. This standard is crucial for implementing consistent and effective measures across the mining industry, to safeguard the health of operators exposed to RCS.

This article, the first in a three-part series, explores the historical development and transformative influence of the ISO 23875 standard on air quality within heavy mining equipment (HME) operator enclosures. We will delve into the roots of ISO 23875 and its inception, and acknowledge the individuals and institutions instrumental in laying the foundational research on which it is built.

Respiratory diseases are inherent in mining. Historically, mineworkers were left to fend for themselves. A recent landmark class action suit in South Africa resulted in a significant settlement for mineworkers with silicosis.⁵ Mining companies are now being held responsible for worker overexposures, which have resulted in lung disease and, in some cases, death.

Litigation pressure underscores the need for standardised best practices in the international mining industry to address operator enclosure air quality. Far more than local and national regulations, effective, industry-adopted international standards heavily influence machine specifications, machine manufacturing, and health and safety practices.

Creating effective international standards is only the first step. To comply with the standard, mining machines require retrofitting or re-engineering to shield operators from respirable dust exposure. Research performed over the past 25+ years, by the US-based Pittsburgh Mining Research Division (PMRD) of the National Institute for Occupational Health and Safety (NIOSH),^a revealed what engineering controls are necessary to control dust ingress into an operator

enclosure, including continuous positive cab pressurisation and high-efficiency filtration on intake, and recirculation airflows within the ventilation system.¹

While research identified the engineering path required, technologies were initially inadequate. However, in 2000, Sy-Klone International patented a powered particle separator, which removed particles larger than 5 µm from heating, ventilation, and air conditioning (HVAC) intake airflows without the use of a mechanical filter, at greater than 90% efficiency. This made the use of high-efficiency filtration over extended service intervals possible in high dust concentration mining environments. Further advancements in filter technology, allowing for increased filter life and durability, came in 2007, when Sy-Klone International applied nano fibres to base filter media, resulting in the first particle-shedding, high-efficiency intake and recirculation filters for mining HVAC intake air systems.² These innovations were evaluated by the PMRD of NIOSH³ and the Queensland Government in Australia, and contributed substantially to the development of compliant air quality in operator enclosures in real-world mining environments.

In 2009, the Queensland Mine Inspectorate performed a groundbreaking real-world evaluation, the RESPA® Trial 2009,⁶ which demonstrated the technology's contribution as an engineering control to reduce and maintain RCS dust concentrations below threshold limits.

During this time, research by the PMRD validated additional engineering control technologies, which, as subcomponents to the operator enclosure air quality system, contribute to the continuous delivery of acceptable air quality in real-world mining environments.⁴

In 2012, the International Society of Environmental Enclosure Engineers (ISEEE) was established as a non-profit organisation, filling a need in the industry to focus on real-world testing, certification of air quality performance, and education around operator enclosure air quality. The ISEEE's research emphasised the importance of intake airflows and dilution of operator-generated CO₂, and identified inadequacies in ventilation systems that lacked adequate intake airflow in their HVAC designs.^{7,8}

By 2015, the ISEEE had initiated the Advanced Cab Theory Workshop (ACTW),⁹ which was a culmination of years of proprietary research as well as research performed by NIOSH/ PMRD and others. The workshop is designed to educate all stakeholders responsible for operator enclosure

^a Under NIOSH, the Pittsburgh and Spokane Research 'Centers' were renamed the Pittsburgh Research Laboratory and Spokane Research Laboratory. Both laboratories currently reside under NIOSH's Office of Mine Safety and Health Research.

air quality. During the workshops, a unique cab is utilised – specifically designed to educate about cab theory, multivariable fluid dynamics, engineering controls, and air quality monitoring, and to provide experience on how the cab functions as a complete system to provide acceptable air quality to the operator.

Mining equipment manufacturer, Epiroc (<https://www.epiroc.com/en-za>), sent one of its cab design engineers to participate in the ACTW in 2015, which led to a change in their understanding of cab design. This change caught the attention of the ISO TC-82 Mining representative who, in 2018, asked to use the content of the ACTW in the development of an operator air quality standard for the mining industry. Subsequently, a working group (ISO TC-82 Mining Working Group Nine (WG9)) was formed. The first standard developed by WG9 was ISO 23875:2021.

The ISO Working Group comprised 27 subject matter experts from 10 mining countries, including occupational hygienists, academics, mining machine manufacturer HVAC experts, cab design engineers, and filtration specialists.

The standard draft received comments from the Earth Moving Equipment Safety Round Table (EMESRT), the Queensland Mine Inspectorate, the PMRD, the Mine Safety Health Administration, the American Industrial Hygiene Association (AIHA) Mining Working Group, members of Australia's ME18 – Australian mirror committee to ISO TC-82 mining – and the Australian Institute of Occupational Hygiene (AIOH). Every effort was made to be inclusive.

The standard was published in February 2021, after receiving 100% positive votes during multiple ballots. Since publication, the standard has been adopted as a national standard by the European Union (EN/ISO 23875:2022), Sweden (SS/EN/ISO 23875:2022), and Australia (AS/NZ ISO 23875). This widescale adoption of the standard is a victory in our efforts to improve health outcomes for mineworkers.

The second article in this series, 'Technical aspects of ISO 23875', will examine the content of the standard, the structure, and its practical relevance to heavy equipment manufacturers, retrofit engineers, maintenance personnel, machine operators, occupational hygienists, and corporate leadership.

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An insight into RMA's Prevention Programme

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Background

In the September 2022 edition of *Occupational Health Southern Africa*, Rand Mutual Assurance (RMA) published an article on the launch of its Prevention Programme. RMA administers claims for occupational injuries and diseases as required by the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 (COIDA). RMA has the licence to administer claims for both the mining and metals-related industries.

In April 2022, RMA launched the Prevention Programme, which is a strategic focus area of the business. RMA believes that the prevention of injuries and diseases at work is crucial to contribute to enhanced employee productivity for employers and, more importantly, to improve the health and safety of employees. RMA understands the impact of working conditions and environments that contribute to workplace fatalities, injuries, and diseases. It is for this reason that RMA launched the Prevention Programme to help its members reduce the number of incidents by assisting them with various health and safety initiatives.

Purpose of the Prevention Programme

RMA's Prevention Programme is a pilot project that supports the employers in the metals class. This class consists of various industries, ranging from foundries to automotive plants, light and heavy steel work, and garages. The programme partners with various stakeholders, including employers, employer associations, and unions to reduce occupational incidents by offering a blend of occupational health and safety and financial wellness solutions. The aims of the programme are to improve employee safety, reduce the incidence and severity of injuries and diseases, and reduce the debt burden of employees.



RMA's Prevention Programme is based on the view that safe and healthy workers are more productive workers

Photograph: courtesy of RMA

Insights from 2022

Upon reflection, RMA can share the following insights from the pilot project implemented in 2022.

First, the metals class is varied with regard to the types of businesses that operate and the size of the companies. Companies that have signed up to the Prevention Programme range from family-owned and -run businesses to large international companies. The variance in the types of companies and their size influences how occupational health and safety is viewed and applied in these organisations.

The understanding and application of legislation, the way in which the prevention of incidents is conducted, and the resources provided for safety management are significantly different between these types of organisations.

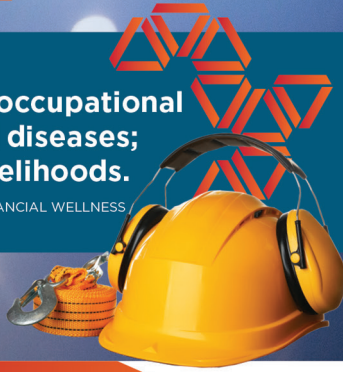
The pilot project started with a small sample of 10 companies that signed up to the programme in 2022. It became evident that prevention (used interchangeably with health, safety, and wellness) is fairly established in the larger organisations and poor, if considered at all, in smaller organisations with 40 and fewer employees. In the smaller organisations, safety is very much either a 'nice-to-have' or is addressed in 'pockets' because of a lack of expertise in these organisations, budget or financial constraints, a lack of understanding (and knowledge) of the legislative requirements and the need for legal compliance, or because the primary focus of small-medium enterprises is survival. Prevention, in its all-encompassing fields, is simply not prioritised. In the event of a major accident that results in a fatality or serious injury, these factors will be of no concern to the various investigating bodies as the Occupational Health and Safety Act and its regulations ought to have been in place, irrespective of the above issues. It is of the utmost importance for employers to be cognisant of the consequences of failing to fulfil their legal health and safety obligations.

Having developed insight into this lack of prevention capacity, as identified in the pilot project companies in 2022, RMA has the reassurance that the Prevention Programme is necessary. By rolling out the programme, we will be able to help companies ensure that, at a minimum, they become legally compliant. No company wants to be known for being unsafe or not caring for its employees. This gives us the confidence that the Prevention Programme is vital, not only to drive lower compensation claims, but also to establish RMA as a social insurer that cares and serves with compassion. The view that safe and healthy workers are more productive workers lies at the heart of RMA's Prevention Programme.

The second insight from the programme in 2022 is related to the larger organisations where health and safety is fairly established, and where one would expect legal compliance. 'Fairly established' can be defined as having some resources dedicated to managing health and safety, such as human resources and finances. However, it was evident from the audits conducted at these organisations that there is much room for improvement to assure best practice. We found that some of the most basic of safety principles are overlooked, or go unattended, or that complacency has set in. With the help of a 'fresh pair of eyes', these unsafe conditions and actions needed to be addressed. Unlike the smaller companies, the larger organisations have invested in

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safety by employing dedicated personnel who are qualified to manage safety; assumingly, they have an allocated budget for this. However, the evidence indicates that budgets are inadequate. Additionally, the safety teams are not always 'heard', are disempowered, and are unable to implement corrective actions (timeously) to ensure that safety is prioritised. In some cases, the teams are demoralised when leadership does not take safety seriously. The findings showed that:

- corrective action was not taken when employees did not wear personal protective equipment (PPE);
- legal appointments were not in place;
- legal liability training was not provided to executive management;
- there was a lack (or poor guarding) of equipment;
- hazardous materials were being used without (or with incorrect) PPE;
- there were issues relating to unsafe equipment;
- there was a lack of safety training; and
- there was poor incident management.

In larger organisations, it is expected that significant business focus is on safety as the consequences of neglecting this can result in financial, reputational, and legal ramifications. It is sadly a reflection that prevention is not a business imperative. RMA believes that further attention, awareness, and education around prevention at a managerial level is warranted. The need for a cost-benefit discussion between RMA and these organisations is evident. Spending R1 million in compensation for occupational injuries and diseases must surely ring alarm bells, especially during the economic hardships facing our country. This financial risk serves as a motivation to join RMA's Prevention Programme; investing in safety is cost effective in the long term.

The third insight from 2022 pertains to the eagerness for collaboration in preventing injuries, loss of life, and occupational diseases in employees, by labour organisations. Stakeholders from both the employer (such as employer associations, e.g. the Steel and Engineering Industries Federation of Southern Africa (SEIFSA)) and employee representatives (such as trade unions, e.g. National Union of Metalworkers of South Africa (NUMSA)) have demonstrated a keen willingness to support RMA's Prevention Programme. It is imperative for safety initiatives to succeed. Safety must be tackled by all participating entities within an organisation. RMA's stakeholders' involvement in the Prevention Programme extends beyond the promotion of the programme; it includes further education, awareness, and training around prevention of injuries and diseases.

The final insight relates to perspective. Although there was a slow start in terms of members joining the Prevention Programme in 2022, there is no doubt that it is much needed in the metals space, as indicated by the number of claims received by RMA. There is a need to drive further participation in the programme if it is to make a tangible difference to the severity and incidence rate of injuries and disease in the metals class. Complementing our members' existing health and safety systems and helping them to become legally compliant (and take them to best practice) is at the top of our agenda.

Interventions provided by RMA to create healthier and safer workplaces is the focus for 2023. Sustainability is critical to making a significant difference. This year, we aim to implement solutions and interventions for continuous improvement and the inculcation of safety as a key business imperative. Ultimately, we want our members' employees to return home healthy and safe every day.

For further information about how the Prevention Programme could work in your organisation, contact the RMA team at rmaprevention@randmutual.co.za 

Multi-concerted efforts to eliminate tuberculosis, silicosis, and other occupational lung diseases: legacies in the southern African region and policy reform efforts

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BACKGROUND

Private sector contributions to the reduction of tuberculosis (TB), silicosis and other occupational lung diseases in the southern African region cannot be ignored. These are needed now more than ever, as the contributions have assisted in making significant strides in the fight against TB in South Africa. The private sector, particularly the mining sector, has made a tremendous contribution to safeguarding the safety and health of employees in the last eight to 10 years. This required a concerted effort by all stakeholders, including member states, mining corporations, and employees, and funding partners such as the Global Fund and the World Bank. Historically, TB incidence rates in the Southern African Development Community (SADC) region have been highest in the mining sector, with rates as much as three to eight times higher than in the populations from which mineworkers originate.^{1,2} Through some intensive investments by all stakeholders, the tide is turning, particularly in the South African mining industry.³ A total of 462 515 miners were screened for TB in the year 2022; 0.26%, 3.17%, and 0.58% were diagnosed with TB, multidrug resistant (MDR)-TB and extensively drug resistant (XDR)-TB, respectively. All workers' and families' contacts that were traced were put on TB medication. The same cannot be said about other African Union member states. A recent study reported that TB prevalence among miners in Africa is estimated at 3 000–7 000/100 000, which is about three to 10 times higher than that in the general population; communities living in the vicinity of the mines had much higher TB rates than the general population.⁴

One of the activities of the South African Government and the private sector, particularly the controlled mines, is compensation for current mineworkers and ex-mineworkers. Although the system is highly fragmented, it does work, as many more current and former mineworkers are compensated in South Africa than in many SADC countries. The compensation system is managed by 1) the Department of Employment and Labour (under the Compensation for Occupational Injuries and Diseases Act 130 of 1993 (COIDA)), which compensates injuries and diseases other than those regarding the lungs of mineworkers, 2) the Department of Health (under the Occupational Diseases in Mines and Works Act 78 of 1973 (ODMWA)), which compensates current and ex-mineworkers for occupational lung diseases, and 3) private insurance companies licensed by the Department of Employment and Labour, such as Rand Mutual Assurance (RMA), which receives levies from mining companies and compensates workers on behalf of the Department of Employment and Labour.

Zambia also has a well-established sustainable government compensation system, described elsewhere,⁵ which is supported by the Zambian ministry of Labour and Social Security (MLSS). However, the private schemes provide compensation only to private sector employees, leaving scores of civil servants without insurance against diseases.

Generally, countries in the SADC region have compensation systems that are not responsive and not relevant to the intended beneficiaries, especially mineworkers and ex-mineworkers who have the highest burden of TB, HIV, silicosis, and other occupational lung diseases. In addition to having inadequate benefits and a narrow legislative scope of coverage, most compensation systems in the SADC region are complex and ineffective and have several barriers to benefits and services. The informal sector, particularly the artisanal small-scale miners, is not covered.

The challenge is compounded by difficulties experienced by mineworkers and ex-mineworkers in accessing occupational health and compensation services. In August 2012, heads of SADC member states, in collaboration with mining entities and other key stakeholders, signed a declaration on TB in the mining sector to address the high burden of TB. The declaration emphasised the scourge of TB, HIV, silicosis, and other occupational respiratory diseases.

The SADC and the East Central and Southern African-Health Community (ECSA-HC) are the project's principal recipients, through the Global Fund, supported the 'TB in Mines Phase 3' (TIMS III) project. They are employing a coordinated multi-country and multi-sectorial response to effectively respond to the TB burden in the SADC mining sector, by strengthening critical elements of basic occupational health and compensation systems. In doing so, ECSA-HC will facilitate technical assistance to SADC countries such as Lesotho, Mozambique, South Africa, and Zambia to design and implement action plans to strengthen their compensation systems. This adds to other efforts implemented by the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) under the project, supported by the World Bank. Lessons learnt will be shared and used to create effective and sustainable compensation frameworks for replication in other SADC countries with significant mining activities.

METHODOLOGY

A regional occupational compensation strengthening meeting was held, in person, at The Capital on The Park Hotel in Sandton, Johannesburg, South Africa. Data for the report were collated from the meeting concept note, meeting agenda, presentations, observations, and dialogues.

The meeting was attended by 25 participants from South Africa, ECSA-HC, and the African Union Development Agency (AUDA)-NEPAD. The South African participants were from the Department of Health, the Medical Bureau for Occupational Diseases (MBOD), the Department of Employment and Labour, the Compensation Commission, the Minerals Council of South Africa, the United Association of South Africa (UASA), Solidarity, Association of Mineworkers and Construction Union (AMCU), National Union of Metalworkers of South Africa (NUMSA), Rand Mutual Assurance (RMA), the Regional Coordinating Mechanism (RCM) of TIMS, and Dr Cleopas Sibanda, an occupational health physician and consultant from Eswatini.

RESULTS

The primary objectives of the meeting were to review the regional compensation situational analysis report of the four SADC member states' (Lesotho, Mozambique, South Africa, and Zambia) compensation policy status, and to develop an implementation roadmap and plan for South Africa. The meeting was officially opened by the Chairperson of the RCM; Jabu Xaba, representative of the South African Mining Association; and Dr Barry Kistnasamy, the Compensation Commissioner for occupational lung diseases in mineworkers. All highlighted the importance of the compensation of workers and ex-workers as a basic and fundamental human right enshrined in the United Nations, International Labour Organization (ILO), and several member states' constitutions. They pledged to support the current work under the Global Fund and the SADC region to promote the fundamentals of the constitutional rights of workers and ex-workers.

Report on the situational analysis of compensation systems in southern Africa

Dr Sibanda presented an overview and genesis of compensation and its trajectory. The report described the results of the analysis of the compensation systems of four southern African countries: Lesotho, Mozambique, South Africa, and Zambia. The aim of the study was to develop and implement action plans to strengthen occupational compensation systems through in-country participatory processes, using a tripartite-plus approach, which includes governments, employers, employees, and other affected key stakeholders, particularly ex-mineworkers.

The meeting participants generally agreed that compensation systems leave much to be desired in several SADC member states. TB is still not a compensatable disease in most member states. Many compensation laws cater only for private sector employees and exclude civil servants. However, South Africa has implemented a better system. Although the South African system is fragmented, it is currently fulfilling its mandate and remains best practice in the region. The South African compensation system dates to the early 1900s, and has evolved to include everyone of all races since the early 1990s. South African compensation is embedded in law, and comprises several ministries, administrative authorities, and information systems. Importantly, TB is compensatable and workers and ex-mineworkers, including those from neighbouring countries who worked in the South African mining industry, are eligible for compensation.

The challenge, as presented in the second paragraph of the background in the report, is that compensation is only given to workers employed in 'controlled mines', viz. those that are registered with, and report to, the relevant departments or ministries. Workers will not be compensated if an employer does not register with, and pay

levies to, the relevant approved compensation structure. However, if an employee is insured by a private insurance company, it is assumed that he/she will be compensated privately. The process is not regulated, however, and reporting is not compulsory except for Rand Mutual Assurance, which is licenced and reports to the Department of Employment and Labour.

Key issues highlighted from the report:

- The situational analysis report was not anchored in a single international best practice, which presented a challenge as the South African Government could not benchmark its compensation system. The meeting requested the consultant (Dr Sibanda) to create a table to illustrate what best practice comprises and how South Africa and other selected countries fare against it.
- The narrative that TB in South Africa is three to six times higher in the mining sectors than the general populations is a concern. Mining experts have expressed that, currently, TB incidence rates in the sector are far lower than those in the general population of South Africa.

Development of an action plan

The meeting participants agreed to continue with the development of an action plan, as Dr Sibanda is working on, describing best practices. The South African Government, workers' unions, and mining industries appreciated the Global Fund's support in harmonising the region's compensation systems. The country will work with SADC member states to align their actions, particularly on harmonisation and integration of information systems, including elements of compensation that are missing from their legislation, such as the compensation of workers employed in uncontrolled mines. A systematic approach was agreed upon, and the action plan was divided into six categories or levels, viz strategic/policy, administrative, operational, systems, research and development, and resources.

Policy level: the stakeholders and the team understood the complexities of integration at this level, but recognised that it requires political commitment. The level seeks to integrate a legal framework for occupational health and safety and workers' compensation in South Africa to reduce fragmentation, expand the scope of coverage, and increase the compensation benefits.

The administrative level will enhance collaboration and facilitate synergies for the administration of occupational health and safety, and compensation; and improve access to compensation benefits and services. The meeting participants requested the Compensation Commissioner to secure a declaratory order for clarity, which will ensure that workers who are not currently covered by legislation receive compensation at the expense of the employer. The meeting members committed to promote occupational health and safety policy and process harmonisation, as espoused by the SADC mining protocol.

The operational level will raise awareness of compensation systems/processes among all key stakeholders, strengthen the compensation claim process, and collaborate regarding roadshows and outreach. This will promote and support: 1) risk-based medical surveillance and integration of occupational hygiene and medical surveillance; and 2) the primary prevention interventions through various means, such as funding the inspectorates to adequately advise, inspect, and enforce compliance in all industries.

At the **information system level**, all stakeholders will seek to create an integrated information management system for occupational health and safety, and workers' compensation stakeholders. They will ensure that all created information systems are interoperable, safe, and government-owned to ensure sustainability. The system should be able to present agreed aggregate data at a continental level, with all African Union member states feeding into it.

The **resource level** seeks national, regional, and continental deliberate, collaborative efforts to undertake resource mobilisations, which will be used strategically to tackle common regional challenges.

The **research and development level** will actively work with research and academic institutions to promote research and implementation of recommendations based on research outcomes. Members will work closely with academic institutions to offer basic occupational health and safety training to all students who endeavour/wish to work in high-risk industries.

CONCLUSION

The national and regional efforts to eliminate TB in mining are showing some positive results, as the prevalence of TB in the South African mines is far lower than it was before the investments. The private sector's contribution to TB control is critical for sustainable and inclusive economic growth. Harmonisation of the occupational health and safety policies is also critical, particularly primary prevention and compensation policies. This will ensure that when workers fall sick or die, they and their families will not be left worse off, and the public health systems will not be burdened with

a high volume of patients due to lack of medical cover. There is a need to strengthen a coordinated information system, and report to effectively measure the contribution of the private sector in reducing TB prevalence in working populations.

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Vision Zero implementation in Africa

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Background

The concept of Vision Zero was launched at the World Safety Congress in Singapore in 2015. It is a campaign that promotes a mindset that all workplace injuries and work-induced ill health are preventable. The high note of the launch was the presentation and story shared by Michael Lopez-Alegria, a former commander of the International Space Station. The bottom line was that there is a shift to the culture of prevention, which was clearly supported with the Vision Zero 7 Golden Rules.

I recall walking up to the (then) Secretary General of the International Social Security Association (ISSA), Hans-Horst Konkolewsky, to congratulate him on the very successful launch of the Vision Zero campaign and the need for us to take the campaign to Africa. I asked for any left-over materials from the launch to be sent to us in Africa for both regional and country-level launches. Not too long after the meeting, I received Vision Zero flags and badges in Lagos, Nigeria. National and enterprise launches of Vision Zero were held across all regions of the world. Currently, the Vision Zero 7 Golden Rules are being translated from English into 11 other languages.

Vision Zero in Africa

The conversation in Singapore gained momentum in Africa with correspondence between several governments' health and safety agencies and institutions, individual health and safety practitioners, and the ISSA. These interactions led to the following launches:

- African Vision Zero regional launch in Abidjan, Cote D'Ivoire, 28 April 2018
- Nigeria Vision Zero country launch in Lagos, Nigeria, 24 May 2018
- Ghana Vision Zero country launch in Accra, Ghana, 30 October 2018
- Zambia Vision Zero country launch in Livingstone, Zambia, 14 December 2018

A number of other countries showed interest in the launch of Vision Zero but the collective preparation towards the OSHAfrica International Conference in 2019 slowed the pace of individual country efforts. Shortly thereafter, the COVID-19 pandemic took the stage and our collective priorities shifted from the launch of Vision Zero to a response to the Pandemic. Countries like South Africa, Kenya, Tanzania, Senegal, Cameroon, and Zimbabwe are among those that were on the path of a national launch of Vision Zero before the outbreak of COVID-19.

While Vision Zero launches gained momentum in Africa, there was growth in daily applications to ISSA from health and safety practitioners across Africa waiting to be registered as Vision Zero trainers; this was an applaudable development. Several practitioners were using the ISSA materials to carry out Vision Zero training in African countries. Most organisations in Africa learned about Vision Zero through the coordinated efforts of these practitioners, attendance at the national Vision Zero launches, and/or through the efforts of the registered Vision Zero trainers.

Enterprise and sectoral launches

While Vision Zero is structured through International, national, and enterprise approaches, innovation is an integral part of it, due to its inherent flexible nature. In Nigeria, the enterprise launch was a popular idea, but in Zambia, the sectoral approach was more popular. The two approaches have the same outcome in the long run.

Before the interruption of business processes that came with COVID-19, a few organisations had shown interest in Vision Zero enterprise launches in Nigeria. On 17 May 2019, the first enterprise launch of Vision Zero in Africa was successfully held by a Nigerian Government agency in charge of maritime operations across the country – the Nigeria Maritime Administration and Safety Agency (NIMASA). The commitment shown by the leadership of this Agency, and their willingness to implement the 7 Golden Rules to achieve systems improvement, was impressive. Executive directors of the organisation witnessed the 'Vision Zero Oath of Safe Practice' by health and safety representatives in the Agency. This was a very colourful event that was reported in all national newspapers.

In Zambia, the sectoral launches of Vision Zero were led by the Workers' Compensation Fund Control Board (WCFCB). The sectoral launches that took place in Zambia before the COVID-19 outbreak were:

- Agricultural sector launch in Mkushi, Zambia – 28 August 2019
- Hospitality sector launch in Mfuwe, Zambia – 26 September 2019

The collective launches brought together all the players in these sectors who signed off Vision Zero implementation and the 7 Golden Rules. Zambia has taken the Vision Zero campaign a step further – to the education sector where many campaigns were launched in schools under the slogan 'Safe Workers of Tomorrow' (SWOT). The SWOT programme is designed to create health and safety education and awareness among children at primary and secondary school levels. Sectoral launches in Zambia that were prevented by the COVID-19 pandemic included:

- Small-scale mining sector
- Road and transportation sector
- Petroleum sector
- Water and sanitation sector

A resolution from the OSHAfrica International Conference 2019 in South Africa was to host an all-African Vision Zero event. Discussions with Prof. Kar-Heinz Noetal, President of ISSA Construction Section, at the ISSA Mining 50th Year Anniversary Event in South Africa, further helped to shape this idea. It evolved into the 'Vision Zero Africa Conference', which was held in November 2021 in Lagos, Nigeria; participants from 18 countries attended the conference. The conference will be held every two years in an African country. Zambia hosted the second conference on 7 and 8 September 2023. Uganda has secured the rights to host the 2025 conference.

How has Vision Zero been implemented in Africa?

It is important to note that, at its launch, Vision Zero was first seen in Africa as a campaign. However, it evolved into a strategy. This transition helped the understanding of Vision Zero as a clear business strategy and not a campaign that would be replaced over time. The word 'strategy' was a game changer for Vision Zero as many business leaders and organisations related better to this word than 'campaign'. Business leaders and executives of organisations who have either attended Vision Zero launches and events, or sent delegates to attend these events, were more receptive and willing to embrace and implement Vision Zero.

The 7 Golden Rules is a catchy phrase that is relatable and defines the expectations of the Vision Zero strategy. In Zambia, for example, the company, Zambia Sugar, already had a programme called 'Target Zero' in place. For such corporations, it was easy to align their existing programmes with the Vision Zero strategy, using the 7 Golden Rules as guidance. Several other cities and countries in Africa had programmes that had 'Zero' in the names.

Noticeably, once organisations understood the concept behind the Vision Zero 7 Golden Rules, little convincing was needed. The organisations saw this as attractive and worth identifying with. Leadership commitment, which is the first Golden Rule, was easy to achieve in many organisations. This is the ideal place to start as the next steps needed for the implementation of the Vision Zero strategy follow from here. At the early stages of implementation, organisations' leaders were asked for written commitment, but there was reluctance and we stopped asking for this. Instead, efforts focused on showing organisations how the Vision Zero strategy could transform them.

Creative implementation of the Vision Zero 7 Golden Rules

Vision Zero implementation across organisations is flexible. Although implemented differently, the outcomes are similar. Once commitment from leadership is achieved, any item within the 7 Golden Rules that they want to take as a next step is up to the organisation. Some organisations commit to all the seven rules at the same time, while others prefer to commit to a few at a time; once those first rules gain traction, the organisation takes up another rule. There have been cases where the rules 'Invest in people' and 'Improve competencies' have been merged into one item by an organisation in its commitment plan, and this works for those organisations. Mergers were motivated by the realisation that the organisation could not improve competencies without investing in people. In other words, they saw these as two closely related items, which they collapsed into one item, resulting in 6 Golden Rules. The outcome is the same.

Identifying targets is another item with which organisations easily relate in the implementation. We agree that this is something with which organisations may already be familiar, but they are now able to profile it as one of the requirements in the Vision Zero guiding principles. Now it is done with documentation, using pre-agreed-upon checklists. This is carried out as an organisation-wide programme, while units and departments independently conduct their routine hazards identification programmes. In Nigeria, after leadership commitment, NIMASA hired an external consultant to conduct fire risk assessments across their two operating facilities in Lagos to identify fire hazards, which are common in their operations. Consequently, there is improved incident reporting within these organisations, and they are beginning to use these data to implement corrective actions and set targets in areas needing attention.

The Vision Zero advocates, now known as the African Vision Zero Network, have closely supervised the activities of NIMASA since the enterprise launch of Vision Zero by their organisations, and have taken credible steps towards workplace health and safety improvement, using the Vision Zero 7 Golden Rules. At the time of the launch, the organisation did not have a defined health and safety department. Rather, there were pockets of health and safety activities scattered across several departments. But today, using the leadership commitment approach, they have created a complete health and safety department headed by a qualified health and safety practitioner in the capacity of a deputy director. This is

one of the achievements of the implementation of Vision Zero in this organisation. Since this development, much has been done in terms of capacity building in health and safety, and emergency responses. Recently, attempts have been made for a tele-medicine plan to support responses to cadet and crew members in vessels who may need support in Nigerian territorial waters. I understand that a draft document has been tabled for approval. There are discussions underway with the Institution of Occupational Safety and Health (IOSH) for training and certification of all employees of NIMASA, including cadets in training.

One item within the elements of the Vision Zero 7 Golden Rules that many African organisations found difficult to understand was Rule 5, which deals with ensuring safety and health in equipment and machines. Some organisations have existing systems, such as machine guarding and training employees on the safe use of these machines. We pointed out the need for safety in the procurement and supply chain. While many are still stuck trying to understand this new concept, we have been able to get the buy-in of some organisations, using the following call to action: *"We should not purchase equipment or machines because they are cheap, we should purchase equipment and machines because they are safe."* They were able to relate to this and some even shared their experiences with procurement processes in the supply of not-fit-for-use personal protective equipment (PPE). Implementation of this rule has been slow due to bureaucracy, perceptions of job threat, and purchasing processes by supply chain managers.

Despite these challenges, we have seen some organisations design very smart health and safety programmes and events, and take advantage of established dates in the International Labour Organisation (ILO) and World Health Organization (WHO) calendars. They go beyond these dates and design their own programmes to speak to prevailing issues around health and safety within their workplaces. While there is room for improvement, it is important to recognise what organisations have achieved and to continue to encourage and remind them why they should keep at it.

The 2019 OSHAfrica Declaration

The OSHAfrica Declaration of 2019 is a policy document that came out of the OSHAfrica Conference in South Africa. The document clearly emphasises the inherent benefits of the implementation of the Vision Zero 7 Golden Rules. These rules were tweaked to speak to African workplace health and safety realities. The call for workplaces to use this strategy for health and safety improvement was one of the high notes of the conference. We have since seen many health and safety professionals from several cities and countries in Africa calling for this document to use in their workplaces and to reference in their work.

Some of the highlights in the OSHAfrica recommendations of the Vision Zero 7 Golden Rules are:

- Promoting the need for visible actions from leadership – walking the talk
- Involving host communities in our overall health and safety programmes; and communities' participatory systems, which cover a large part of environmental health and safety
- Advocating for risk-based thinking and making workplace risk assessments gender sensitive and gender responsive, while considering intra-job variability and social contexts
- Emphasising evidence-based targets, with policies on implementation, enforcement, monitoring, and evaluation
- Consistently collecting occupational health and safety data at all levels (enterprise, country, and global)

- Developing occupational disease hazards surveillance systems with the intention of informing prevention and control measures
- Eliminating child labour, while promoting decent work
- Understanding human interaction with machines and the work environment, with a view of minimising risks
- Ensuring the use of safe equipment to reduce workplace hazards, as safe technology protects human capital
- Encouraging life-long learning from childhood (4–8 years) to adulthood.
- Promoting prevention by using pictorial images
- Instituting a culture of value for employees, and improving social interactions
- Changing the role of employees in occupational health and safety from passive to active
- Ensuring employees' involvement in setting the stage for health and safety in workplaces

From these points, it is easy to understand where the creativity for the implementation of the Vision Zero strategy came from. What OSHAfrica did was simply to use the 7 Golden Rules to clarify contextual areas needing urgent attention, as seen in the case of child labour and gender inclusivity, which are two key issues confronting African workplaces. We also identified, earlier, a number of challenges faced by the implementation of the Vision Zero strategy.

How are we evaluating the implementation of the Vision Zero 7 Golden Rules in Africa?

Evaluation is proving to be more difficult than expected, as most organisations are too busy to address it. Nevertheless, we are pushing forward and demanding data and reports to enable us to walk the organisations through the process. We are using the Proactive Leading Indicators document, published by ISSA (2020), to assist us in *measuring* health and safety outcomes. However, we are also seeing a number of other creative approaches for measuring the outcomes while using the 7 Golden Rules. These innovative approaches have given us further ideas on how to measure health and safety accomplishments, using the Vision Zero strategy.

A distinct assessment model was presented at the recently concluded Occupational Risk Prevention (ORP) Fundación Internacional Congress held in Bilbao, Spain from 26 to 28 April 2023. This model is already in use by Hitachi Rail in Japan. It appears to be an easy model to adopt and we are considering using it across workplaces where the Vision Zero strategy is in use in Africa. We are hopeful that, using this approach, we will be able to overcome the evaluation challenges, and be able to show empirical evidence for the positive outcomes of Vision Zero implementation in business in Africa. 📌

UPCOMING EVENTS

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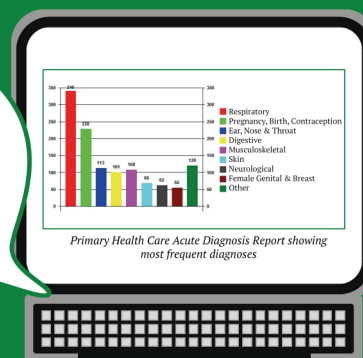
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Countdown to the ICOH2024 Congress: all aboard the 'Marrakesh Express'

Claudina Nogueira: Occupational health consultant/Project manager, University of Pretoria South Africa; SASOM ExCo member; ICOH Vice President: Scientific Committees (2018– 2024); WHWB Board member
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Daan Kocks: SASOM Chair; ICOH National Secretary for South Africa
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Claudia Frost: SASOM National Office Coordinator
e-mail: info@sasom.org

The Officers of the International Commission on Occupational Health (ICOH) and members of the ICOH Secretariat and the National Organising and Scientific Committees of the upcoming ICOH2024 Congress met face-to-face, onsite in Marrakesh, Morocco, for the last time before the congress, from 6 to 10 January 2024. The four days of meetings were spent finalising the planning of the congress and scheduling the sessions of the scientific programme.

The rich and diverse scientific programme is well aligned with the congress theme, viz. *Enhancing occupational health research and practice: closing the gaps!*, and will bring together world-renowned occupational safety and health (OSH) professionals, industry leaders, policymakers, and researchers in their particular fields of expertise, to share their knowledge and experiences.

One opening keynote, 10 plenary, and 32 semi-plenary presenters have accepted invitations to participate in the congress. A total of 350 scientific content hours will be provided by the aforementioned

presenters and across 150 Special and Free Paper Sessions, as well as 12 e-poster sessions. The Global Policy Forum, titled 'Strategies to improve occupational health and safety policies and implementation in low- and middle-income countries', will be an excellent opportunity for congress participants to learn from several experts, leaders of national and international organisations, and political decision-makers working in the field of OSH.

Accepted abstracts for oral and poster presentations will be published in an online supplement of *Occupational Medicine*, a key international journal in its field and part of the Oxford Academic, Oxford University Press platform, with an impact factor of 5.1 (Source: Journal Citation Reports, Clarivate, 2023).

ICOH and the congress organisers look forward to welcoming many OSH practitioners from around the world in Marrakesh, the 'Ochre City', at the end of April 2024.



The congress 'cutting crew' at the main entrance of the *Palais des Congrès*, in Marrakesh, Morocco

L to R: Fadwa Darid (Morocco), Sara Soltani (Morocco), Pasquale Fruscella (Italy), Prof. Loubna Tahri (Morocco), Valeria Boccuni (Italy), Dr Diana Gagliardi (ICOH Secretary General, Italy), Prof. Abdeljalil El Kholti (ICOH2024 Congress President, Morocco), Prof. Seong-Kyu Kang (ICOH President, Republic of Korea), Claudina Nogueira (ICOH Vice President and Scientific Co-Chair: ICOH2024 Congress, South Africa), Hamid Jaiti (Morocco), and Khadija Ait Ohanni (Morocco)

Inset: Prof. Kamal Wifaq (Scientific Co-Chair: ICOH2024 Congress, Morocco)

Photograph: courtesy of ICOH2024 Congress organisers

SASOM ANNUAL GENERAL MEETING 2023: A REVIEW OF THE YEAR'S HIGHLIGHTS

The South African Society of Occupational Medicine (SASOM) hosted its annual general meeting (AGM) on Friday, 17 November 2023, in association with the 7th International Conference of the History of Occupational and Environmental Health, in Durban, KwaZulu-Natal. The AGM was held in a hybrid format, at the Coastlands Musgrave Hotel, using the SASOM Zoom platform, with onsite attendance for SASOM members who attended the ICOH conference. The last SASOM ExCo meeting of 2023 was held on Monday, 13 November, in fully virtual mode.

At the AGM, Prof. Daan Kocks (SASOM Chair) read the 2023 annual report prepared by the SASOM 2023 National Secretary, Dr Frank Fox, and highlighted the financially sound report of the Society as well as the following activities and outcomes for 2023:

SASOM national office

- The SASOM office bearers for 2023 and 2024 are: Prof. Daan Kocks (Chair), Dr André Kotzé (Vice Chair), Dr Frank Fox (Secretary), and Dr Geoffrey Tafaune (Treasurer). As at 31 October 2023, SASOM had 502 paid-up members in good standing, representing an increase of 11% from 2022. This number includes 451 standard members, 23 student members, 10 honorary life members, nine retiree members, and nine corporate (affiliate) memberships. A total of 397 members (79%) renewed their memberships in 2023 and 95 new members (19%) joined the Society. SASOM also counts among its members representatives from other countries, e.g. Botswana, Canada, Eswatini, Kuwait, Namibia, United Kingdom, Zambia, and Zimbabwe.
- SASOM Guidelines are provided free of charge to members in good standing, as a membership benefit. The Guidelines are regularly revised to ensure that they remain relevant for good practice in occupational health/medicine. Six full sets of SASOM Guidelines and five Guidelines on 'Medical Requirements for Fitness to Drive' were sold to non-members from November 2022 to October 2023.
- On behalf of SASOM, Prof. Kocks thanked SASOM EXCO member, Claudina Nogueira, for her facilitation of the publication of SASOM's pages in *Occupational Health Southern Africa* (OHSA), and Prof. Mary Ross and Claudia Frost (SASOM National Office Coordinator) for drafting and facilitating the continuing professional development (CPD) questionnaires, respectively. Members can earn three CPD/CEU points per questionnaire, potentially earning 12 points per annum (since the beginning of 2023, the Journal has published four issues per annum instead of six as in previous years). Despite all the hard work and time that goes into developing the questionnaires, participation from SASOM members is disappointingly low; less than 10% of members submitted answers to the questionnaires during 2023.
- Formal communication with organisations engaged in the enhancement of occupational medicine continued with SASOM ExCo members (co-opted) from the National Institute for Occupational Health (NIOH), the Compensation Commissioner (CC), ICOH, the South African Society of Travel Medicine (SASTM), and the Mine Medical Professionals Association (MMPA).
- SASOM liaison with other organisations continued at both national and international levels, e.g. the South African Department of Employment and Labour (with SASOM being an active participant in, and contributor to, the Occupational Health Forum); *Occupational Health Southern Africa*; the Council for Health Service Accreditation of Southern Africa (COHSASA); the International

Occupational Medicine Society Collaborative (IOMSC); and the American College of Occupational and Environmental Medicine (ACOEM).

- SASOM's involvement in the Department of Employment and Labour's Technical Committees for Hazardous Biological Agents and Ergonomics Regulations has resumed in 2024.
- SASOM is a member of the newly established Specialist Practice Committee of the South African Medical Association (SAMA), having joined in July 2023. The Committee is tasked to act in the interests of the specialist disciplines in healthcare delivery and to represent the profession in discussions and consultations with funders of healthcare.
- Short-term priorities being addressed by SASOM include the challenges that have been identified as affecting the occupational medical practitioner (OMP) service delivery for occupational health, as they relate to the definitions of the Board of Healthcare Funders (BHF)/Practice Code Numbering System (PCNS) in terms of tariff billing and other profession transgressions.
- An occupational health interest group was started in Zambia during 2023, with the intention of paving the way for the potential establishment of a SASOM Zambia Chapter. The interest group held seven meetings during 2023, with an average attendance of 15 participants per meeting, most of whom were from the Zambian mining industry.
- The SASOM website (www.sasom.org) remains interactive and is continuously updated. Webscripto continues to act as the web developer, and the SASOM national office as content manager. Summary website statistics for the period 1 November 2022 to 31 October 2023 are as follows:
 - o Number of unique visitors (excluding repeat visits): 7 673 (up from 5 913 in 2021/2022)
 - o Number of unique visitors, including repeat visits: 25 644 (down from 27 455 in 2021/2022)
 - o Top six trending pages in decreasing order: member login, home page, members' information, membership, SASOM Guidelines, and vacancies.

SASOM and ICOH activities

- The ICOH mid-term meeting for the current triennium (2022–2024) was held in hybrid mode from 15 to 17 May 2023, in Angers, France, hosted by the University of Angers. The event included the following meetings: ICOH Officers, two ICOH Board meetings, and a meeting attended by leadership representatives of the ICOH Scientific Committees (SCs). For the first time, selected ICOH National Secretaries (NSs) were invited to participate (one from each region), including Prof. Kocks, ICOH NS for South Africa (and representative of the African region) and Chair of SASOM, who participated virtually and presented his NS report on the second day of the meeting. Claudina Nogueira, ICOH Vice President for SCs and ExCo member of SASOM, attended and presented in person.
- The 7th International Conference on the History of Occupational and Environmental Health (organised by the ICOH SC on the History of Prevention of Occupational and Environmental Diseases) was held in Durban, South Africa, from 15 to 17 November 2023. SASOM was represented on the organising committee of the conference, and members chaired sessions and delivered oral and poster presentations. The conference abstracts were published in the Journal (Volume 29, Issue 4, 2023).
- SASOM invited members in good standing who have registered to participate in the upcoming ICOH2024 Congress in Marrakesh, Morocco, to submit applications for partial funding to attend the congress, and selected four eligible recipients of the SASOM grant.

SASOM awards

- The SASOM award for best publication in OSHA for 2022 was bestowed on Leandr  To a from the Central University of Technology in the Free State, whose profile was published in the Journal (Volume 29, Issue 3, 2023). Her paper, titled 'Chest radiography: optimising the radiation dose at industrial mines in the Northern Cape province of South Africa', was published in the first issue of OSHA in 2022.
- The 2023 SASOM Medal of Excellence, which is awarded to candidates for the Fellowship of the College of Public Health Medicine of South Africa – Division of Occupational Medicine – was awarded to Dr Martin M ller who attained his MBChB degree from the University of Stellenbosch in 2003. Martin started his career as a general practitioner, but gradually gravitated towards the preventive aspect of occupational medicine. In 2015, he returned to academia to complete a diploma in Occupational Medicine followed by a master's degree (MMed) in Occupational Medicine in 2023. Martin is interested in risk-based medical surveillance and is currently consulting in the private sector.



Dr Martin M ller

Photograph: courtesy of SASOM

Webinars and conferences hosted by SASOM

- SASOM held a CPD-accredited virtual annual congress, themed *Occupational Health Practice in 2023: shining a light on the shadows of medicine*, over four months (June to September 2023) to offer its members four congress sessions in webinar format with individual sub-themes, and four presentations in each session. Prof. Kocks, Dr Tafaune, and Ms Nogueira facilitated and

coordinated the scientific programme, and Mrs Frost provided technical and logistics support. The 17 presenters were both international and local; seven hold leadership posts in ICOH. The congress was well attended (391 delegates across the four sessions, including presenters) and represented countries from across the globe. The webinar recordings are available in the 'Members only' area on the SASOM website and show how SASOM is extending its range and sphere of influence in occupational health at national, regional, and global levels. From 2024 onwards, SASOM plans to hold its Annual Congress and other scientific events in a hybrid format.

- The Public Health Association of South Africa's (PHASA's) Occupational and Environmental Health (OEH) Special Interest Group (SIG), in partnership with SASOM, hosted a hybrid workshop titled 'Bridging the gap between academia and the workplace: re-imagining occupational health training – Preparedness of the occupational medicine provider to enter the working world'. The workshop was facilitated by Dr Blanche Andrews (Stellenbosch University) and formed part of the programme of the annual PHASA conference, which was held at the Boardwalk Convention Centre, Gqeberha (Port Elizabeth) from 10 to 13 September 2023.
- SASOM and its Northern Cape Chapter, the Asbestos Relief Trust, the Kgalagadi Relief Trust, and Cipla, sponsored and/or co-organised a CPD-accredited hybrid workshop at the Red Sands Country Lodge near Kuruman, on 12 October 2023. Sixty-six delegates participated – 12 in person and 54 online. This was the second hybrid event co-organised by the SASOM national office in 2023.

Condolences

It is with a heavy heart that SASOM and its members offer deepest condolences to the family, friends, and colleagues of Professor Emeritus Tony Davies, a long-time friend of SASOM, promoter and ambassador of the occupational health and medicine disciplines in southern Africa, and a stalwart protector of workers. Ever the inspiration and a guiding light to generations of OSH professionals and occupational medical practitioners, Prof. Davies' legacy lives on. He will be sorely missed by all of us! 



Upcoming ICOH2024 Congress

The third and final announcement for the upcoming congress was launched at the end of February 2024. New information includes the list of invited semi-plenary speakers and the topics and organisers of the 75 Special Sessions. The final scientific programme is now available on the ICOH2024 Congress website (www.icoh2024.ma)

Photograph: courtesy of
ICOH2024 Congress organisers

SAIOH news

As part of our service to members, in this newsletter we provide feedback on the latest developments within the Southern African Institute for Occupational Hygiene (SAIOH). SAIOH exists for its members and is reliant on them to continue to serve this noble profession ethically. Therefore, we invite your inputs and feedback on any matters communicated below.

SAIOH PRESIDENT'S ADDRESS

Naadiya Mundy: SAIOH President

e-mail: president@saioh.co.za



Naadiya Mundy

Photograph: courtesy of SAIOH

We are living in truly extraordinary times and 2024 will, I am sure, be no different. I would like to take this opportunity of welcoming you into the new year and reminding you that we are where we are because of you – thank you.

Exhaling clarity on electronic nicotine delivery systems (ENDS): considering occupational hygiene management in our daily lives

Occupational hygiene, which is an essential discipline within the broader field of occupational health and safety, is committed to managing and mitigating workplace hazards to protect the wellbeing of employees. It involves a systematic approach to identifying, assessing, and controlling various activities that may pose risks and hazards to workers' health. One prevailing concern, demanding attention within the realm of occupational hygiene, is the use of electronic nicotine delivery systems (ENDS), commonly known as e-cigarettes or vaping devices. Traditional combustible tobacco cigarettes present substantial risks to human health, extensively documented and comprehensively understood, with many of these health effects manifesting only after prolonged cigarette smoking over decades.

Direct scientific comparisons with combustible tobacco cigarettes are challenging, regarding most health effects.¹ Electronic nicotine delivery systems employ a battery-powered heating element to vaporise a liquid solution, often containing nicotine.¹ Housed within metal or plastic tubes, these devices incorporate a cartridge filled with liquid (typically propylene glycol, vegetable glycerine, flavourings, nicotine, humectants and, in some instances, metals),² which, upon heating, produces an aerosol. Users inhale this aerosol by drawing on the device, akin to the action of smoking a conventional tobacco cigarette, subsequently exhaling the aerosol into the surrounding environment. As ENDS have gained popularity as an alternative

to traditional tobacco products, their presence in workplaces introduces new challenges for occupational hygiene practitioners. The evolving landscape of nicotine consumption, coupled with the potential health impacts of ENDS aerosols, demands a nuanced discussion within the framework of occupational hygiene.

The National Institute for Occupational Safety and Health (NIOSH) in the United States of America (USA) recommends that employers “establish and maintain smoke-free workplaces that protect those in workplaces from involuntary, second-hand exposures to tobacco smoke and airborne emissions from e-cigarettes and other electronic nicotine delivery systems”.³ The World Health Organization (WHO) advises against the indoor use of electronic smoking devices (ESDs), particularly in smoke-free settings.⁴ These recommendations aim to reduce the potential risk, for bystanders, of inhaling the aerosols emitted by these devices, and to uphold the effectiveness of smoke-free regulations. The issue of aerosol exposure is a significant concern for environmental health, primarily due to the particles' ability to deeply infiltrate the respiratory system and cell membranes.⁵ They have the potential to translocate from the airways into the bloodstream⁶ and deposit in various organs, including the brain, carrying with them condensed toxic compounds.⁷ The quality of indoor air is a critical concern for human health, as individuals typically spend much of their time indoors where particle concentrations are often elevated.⁸

Nicotine contributes to central and peripheral nervous system effects and causes dependence and addiction; “exposure to nicotine from e-cigarettes likely elevates cardiovascular disease risk in people with pre-existing cardiovascular disease(s)”.¹

There has been limited research on the health effects of ENDS aerosols; however, some contain heavy metals such as lead (Pb), nickel (Ni), and chromium (Cr), which occur from the contamination of e-liquids or leaching from elements of ENDS devices.⁹ The discovery of potentially harmful metals in e-liquids raises concerns as these metals have the capacity to transfer to the aerosol and be inhaled. Lead, Cr, copper and Ni have adverse effects on human health even at low levels of exposure. Lead is a toxicant that can contribute to neurological damage, particularly in developing brains; high levels of Ni and Cr are linked to short-term health effects such as decreased lung function, bronchitis, and asthma, and long-term risks of cancer.⁹⁻¹¹

The integration of occupational hygiene with ENDS presents a challenge in maintaining workplace health and safety standards. As ENDS continue to reshape the landscape of nicotine consumption, it is evident that a comprehensive approach within the framework of occupational hygiene is essential to safeguard the wellbeing of the workforce. The chemical complexity of ENDS aerosols demands a thorough understanding of their composition and potential health effects. Occupational hygiene practitioners play a crucial role in assessing, monitoring, and controlling these exposures to effectively mitigate risks. Ventilation systems and engineering controls are critical in the arsenal of occupational hygiene strategies. Effectively managing the dispersion of ENDS aerosols, through well-designed ventilation systems, contributes significantly to maintaining

a healthy indoor air quality. Moreover, the implementation of clear workplace policies, supported by robust education and training programmes, is paramount in fostering worker awareness and ensuring compliance with safety guidelines.

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NATIONAL COUNCIL FEEDBACK

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Membership fees

SAIOH is aware that, in the current economic climate, many of our members find it difficult to renew their memberships and, in our bid to proactively respond to this, we found it hard to justify a substantial increase in professional membership fees. Your membership and participation are what builds SAIOH, and we have, therefore, increased the 2024 membership fees by only 3%. We call on all our members to timeously renew their memberships, upload their CPD points, and participate in our exciting plans for 2024.

Strategic plan

The SAIOH strategy for 2023–2027 was circulated to all SAIOH members in October 2023, after being launched at the SAIOH annual general meeting. The SAIOH Council is meeting in May to ensure that targets are being met and to explore further strategic developments for the Institute and its members.

Ethics

SAIOH's memorandum of incorporation (Mol) has been concluded by the legal team and submitted to members for their information. SAIOH's legal advisors will soon begin the task of reviewing the SAIOH ethics policy and procedure(s), enabling the Ethics Committee to start its work in earnest. The ethics plan forms an important part of the SAIOH strategy (strategy #3).

Please note

As from 1 January 2023, all SAIOH-certified members are required to provide proof that they have completed an acceptable occupational hygiene ethics training course.

SAIOH branch activities

The Gauteng branch hosted its third meeting on 4 August 2023 at the National Institute for Occupational Health (NIOH) offices in Johannesburg. Prof. Anja Franken (from North-West University) discussed 'Invitro permeation of platinum group elements.' On 1 December, the branch held its last meeting for 2023, online, during which a call was made for nominations for new Gauteng branch committee members.

The Mpumalanga branch hosted its second meeting on 11 August 2023 at Seritiza Coal in Middelburg. Two presentations were made by personal protective equipment (PPE) providers and one by Trysome, regarding the new technology to control indoor air quality (IAQ) in heavy-duty mining vehicle cabs. On 24 November, the branch held its third and final meeting of 2023, at Exxaro Matla. This was a hybrid event.

The KwaZulu-Natal branch hosted its second hybrid meeting on 31 August 2023. Prof. Jérôme Lavoué (University of Montreal, Canada) presented on industrial hygiene statistics and the use of ExpoStat in occupational hygiene.

The Western Cape branch hosted a hybrid meeting on 15 September 2023. Tobias van Reenen (Council for Scientific and Industrial Research (CSIR)) presented the new building regulations draft, SANS 10400-0, covering indoor ventilation.

The final Western Cape branch meeting took place on 17 November 2023, in person, and was followed by an election of the new branch committee members and a lawn bowls social competition.

IOHA and OHTA feedback

Deon Jansen van Vuuren, in his role as SAIOHs interim caretaker, attended three online International Occupational Hygiene Association (IOHA) National Accreditation Recognition Committee (NARC) meetings on 17 August, 19 October, and 7 December 2023.

The IOHA Board of Directors held its autumn meeting in Cape Town, hosted by SAIOH, on 22 October 2023. This coincided with the SAIOH 2023 Conference. SAIOH and the Professional Certification Committee (PCC) were represented by Corlia Peens (PCC Chairperson), as an observer, and Deon Jansen van Vuuren.

SAIOH also hosted a formal dinner for the IOHA Board Directors and SAIOH Council on 23 October 2023 at the African Gold Restaurant. It was a huge success and enjoyed by everybody.

SAIOH Technical Committee feedback

The SAIOH Technical Committee's research on 'Welding fumes, the measurement and the analyses thereof' is in limbo. To help kick-start this research, the Occupational Hygiene Approved Inspection Authorities (OH AIA) Association co-hosted an interactive session at the SAIOH mini-conference on 31 July 2023, at the CSIR's International Conference Centre (ICC). The session was coordinated and chaired by Mr Lloyd Askham, who discussed welding fume measurements, sampling media and, specifically, the use of the Institute of Medicine (IoM) samplers. To keep the momentum going, a sub-committee will be formed by SAIOH and the OH AIA Association to develop a position paper on its research.

SAIOH's second Technical Committee started developing technical procedures and a SAIOH position paper on heat stress management. This Committee will continue doing research on heat stress with a focus on developing a technical paper and enabling SAIOH to provide comprehensive and relevant proposals to strengthen the newly launched Physical Agents Regulations (PAR) – the 'old' Environmental Regulations for Workplaces.

The Council Technical Co-ordinator, Wessel van Wyk, is finalising a position paper on real-time monitoring. As soon as this is approved by the SAIOH PCC Executive Committee's sub-committee, it will be circulated to all SAIOH members and stakeholders.

Dr Ivan Niranjana (SAIOH PCC Vice-Chair) was co-opted to preside over a more active Technical Committee, commencing with peer reviewing of heat stress and real-time monitoring. Research emanating from this Committee will be shared in future communications.

SAIOH Annual Scientific Conference

The hybrid SAIOH 2023 Annual Scientific Conference, with close to 600 attendees, took place from 23 to 26 October 2023, and was extremely successful. The Botswana Association of Occupational Hygiene (BAOH) will host the 2024 SAIOH Annual Scientific Conference in Gaborone, Botswana. The Conference Committee has already had several meetings as it begins its preparations for the conference.



Image: courtesy of SAIOH

Communications

SAIOH continues to communicate daily with its members and stakeholders, using various platforms.

FROM THE PROFESSIONAL CERTIFICATION COMMITTEE (PCC)

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Certification assessments

A summary of results for 2023 assessments is provided in Table 1. Assessment dates for 2024 are provided in Table 2.

PCC assessment improvements

The PCC technical teams continue to revise the PCC oral assessment format and questions in line with the occupational hygiene self-assessment tool. Sixteen of the 17 OH modules are already completed.

Two PCC technical teams are working in parallel. The first is updating the SAIOH self-assessment tool and revising the PCC oral assessment format, and the second is developing questions and the required answers. Improvements in the assessment format will ensure that the growing field of occupational hygiene is covered, and that the assessment format and tools still are relevant and current.

The PCC Chief Examiner is busy improving the application and written format.

Occupational Hygiene Skills Forum (OHSF)

The OHSF took part in the first OHTA Approved Training Provider forum meeting in August 2023. The second meeting took place on 31 January 2024.

Table 1. SAIOH PCC certification assessment results, 2023

Certification category	Written assessments				Oral assessments			
	Assessed	Passed	Failed	Pass rate	Assessed	Passed	Failed	Pass rate
	n	n	n	%	n	n	n	%
OH assistant	203	183	20	90.1	203	183	20	90.1
OH technologist	69	42	27	60.9	52	27	25	51.9
Occupational hygienist	48	29	19	60.4	40	28	12	70.0
Total	320	254	66	79.4	295	238	57	80.7

Table 2. SAIOH PCC registration and assessment dates, 2024

Assessment type	Application closing date	Payment deadline	Assessment date
Written	12 January	16 February	15 March
Oral	12–19 April		
Written	26 April	31 May	28 June
Oral	26 July–2 August		
Written	2 August	6 September	4 October
Oral	15–22 November		
Written assessments (universities)			November/December

The OHTA W201 Multiple-Choice Question (MCQ) Consortium, comprising SAIOH, Workplace Health Without Borders (WHWB), the American Industrial Hygiene Association (AIHA), and the Australian Institute of Occupational Hygienists (AIOH) met in September 2023. This working committee developed and verified MCQs, which were placed in a database that will be accessible to all assessment paper developers to use in the 201OHTA papers and, in SAIOH's case, also for the occupational hygiene assistant papers.

Another 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, and is currently evaluating the Cape Peninsula University of Technology's (CPUT) occupational health qualification. 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. 

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Risk insights and management are reported



Employees are declared fit for duty through a medical



All occupational health legal requirements are met successfully



Early risk identification and management measures are put in place



Mobile and walk-in clinics, where medical surveillance is provided, are present



Injury-on-duty and COID claims are effectively managed



Chronic conditions are monitored

Diabetes: fitness to work

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This article was originally delivered as a presentation at the 2023 Mine Medical Professionals Association (MMPA) Annual Congress by Dr LM Mahlare.

BACKGROUND

Diabetes mellitus is one of the most common endocrine diseases, and one of the leading causes of mortality in the world. The disease is characterised by the body's inability to utilise glucose effectively. It can be due to insulin resistance by the body, or by pancreatic beta cell dysfunction, amongst other things.¹

Type 1 diabetes is thought to be an autoimmune disease affecting the beta cells in the pancreas, which leads to low or no insulin production.¹ Type 2 diabetes can be a combination of insulin resistance, decreased insulin production and/or excessive secretion of glucagon.² Individuals with the disease are either insulin dependent or non-insulin dependent.

Fitness to work in the presence of diabetes mellitus is a contested issue, especially for insulin-dependent individuals.

Statistics

The International Diabetes Federation (IDF) estimated that 537 million adults (20–79 years of age) were living with diabetes in 2021.³ They report that three in four adults with diabetes live in low- or middle-income countries.³ The IDF reported that, as of 2021, the adult population living with diabetes in South Africa was 11.3% – equivalent to more than 4 million adults.⁴

The Global Burden of Disease Study (2019) reported that 41 million people die from non-communicable diseases (NCDs) every year.⁵ Diabetes contributed to around 1.5 million of the deaths worldwide, as reported in 2019.⁶

The mining industry is held accountable, to an extent, by the Minerals Council South Africa as well as the Department of Mineral Resources and Energy (DMRE). The Council established the Masoyise Health Programme, which was implemented in 2018. The programme has recently adopted a 'wellness approach', which is now not only aimed at TB and HIV but has expanded to include NCDs and occupational lung diseases, with the aim of improving the overall health and wellness of employees.⁷

Mines were expected to screen all employees for diabetes in 2022. In its 2022 annual report, the Minerals Council reported that the industry had improved remarkably from previous years.⁸ More than 80% of employees were reported to have been screened for diabetes in 2022 (improved from the 59% in both 2021 and 2020).⁸

Minimum standard of fitness

A 'blanket approach' should be avoided when deciding about fitness to work, and each case should be judged on its own merit. The minimum standard of fitness code of practice⁹ is a good reference tool.

According to the document 'Guidelines for a mandatory code of practice on minimum standards of fitness to perform work on a mine', caution should be exercised when deciding on fitness to work for individuals diagnosed with diabetes mellitus.⁹



Dr LM Mahlare addressing the 2023 MMPA Annual Congress

Photograph: courtesy of MMPA

As per Table 1 and Box 1, sourced from the minimum standard of fitness code of practice (CoP), fitness category 1 and 2 employees diagnosed with diabetes and working on the surface can be deemed fit if their diabetes is controlled. This applies to both insulin- and non-insulin-dependent diabetics (IDDM and NIDDM).⁹

Category 3 employees with controlled NIDDM who work underground are considered fit for their occupation. However, those who have IDDM are deemed unsuitable to work underground except under exceptional circumstances, which is at the discretion of the occupational medicine practitioner (OMP).⁹

Category 4 employees, who are "drivers of non-passenger and ordinary goods conveyance and work involving heavy or potentially dangerous machinery", can be deemed fit to work if they have NIDDM and are controlled. However, the minimum standard states that individuals with IDDM are unsuitable to be placed in this work.⁹

Category 5 employees, who are "passenger and dangerous goods conveyance drivers", according to the CoP, are unsuitable to be placed if diagnosed with either IDDM or NIDDM.⁹

Table 1. Minimum Standard of Fitness code of practice – Mining

Parameter	No hazard	Mines/works surface	Mines underground	Surface or underground	
Fitness category	1	2	3	4	5
Frequency of examination	3 yearly	Annual	Annual	Annual	Annual
Minimum age (years)	16	18	18	21	21
Diabetes	Well controlled Diabetes – OK Well controlled NIDDM – OK IDDM – OK, depending on hazards exposure. Adequate sugar control for the work environment		Well controlled NIDDM – OK IDDM – Unsuitable, except in special circumstances (Refer OMP)	Well controlled NIDDM – OK IDDM – Unsuitable	NIDDM/IDDM – Unsuitable

Source: Guideline for a mandatory code of practice on the minimum standards of fitness to perform work on a mine, 2016⁹

(Annexure 1: Minimum Standards Table – for compliance)

Box 1. Minimum standard of fitness to perform work at a mine (from original document)
Diabetes mellitus

Diabetics may be employed in such occupations as the OMP may consider safe having regard to their condition. Insulin dependent diabetics should not work underground except under exceptional circumstances where the OMP is satisfied that all required health or safety concerns have been met. Well-controlled, mild non-insulin dependent diabetics may be certified fit to work in a particular category of work underground. Well-controlled, mild non-insulin dependent diabetics may be certified fit to work by the OMP as drivers for non-passenger or ordinary goods conveyance.

OMP: occupational medicine practitioner

Source: Guideline for a mandatory code of practice on the minimum standards of fitness to perform work on a mine (Section 8.5.3.1), 2016⁹

SOME CONCERNS REGARDING DIABETES AND FITNESS TO WORK
Hypoglycaemia

The major concern about individuals who have diabetes, regarding fitness to work, is the occurrence of hypoglycaemia while on duty.¹⁰ A severe hypoglycaemic episode is associated with an effect on cerebral function, and can lead to transient cognitive dysfunction, seizures, reduced level of consciousness, or coma.¹¹ It is worth noting that the major cause of hypoglycaemia is the use of insulin, often related to inappropriate use (dosage, administration, timing with food, etc.).^{11,12}

Hypoglycaemia can also be associated with some oral hypoglycaemic agents, primarily sulphonylureas.¹³ Under normal circumstances, every individual has counterregulatory mechanisms in the event of hypoglycaemia. This happens via glycogenolysis as well as gluconeogenesis, where the body will find other means to increase or maintain a normal plasma glucose level until a food or other source of glucose is introduced into the body. Thus, hypoglycaemia takes place mainly in the presence of defective counterregulatory mechanisms or hormone regulation.¹¹

Some individuals with diabetes, especially those with longstanding poorly controlled disease and on insulin, often do not have a functional counterregulatory mechanism, putting them at risk of severe hypoglycaemia. Some individuals have hypoglycaemia unawareness, which is mostly linked to repeated episodes of hypoglycaemia – a state where the body is desensitised to hypoglycaemic episodes for various reasons.¹¹

Under normal circumstances, hypoglycaemic individuals experience symptoms that would alert them to ingest something to elevate their blood sugar levels. These include sweating, irritability, tachycardia, fatigue, difficulty concentrating, light headedness, etc. With time, this can extend to confusion, slurred speech, incoordination, and other symptoms. If hypoglycaemia is not addressed, it can lead to seizures, loss of consciousness, or coma.¹⁴

Individuals with hypoglycaemia unawareness often only present at the later stage when they have neuroglycopenia, and exhibit some of the neurological symptoms mentioned above.¹¹

Hypoglycaemia in the workplace, especially in high-risk areas, can lead to fatal or serious injuries, not only for the employee, but also for colleagues.

Fatigue

A South African study, published as 'Contributors to fatigue of mine workers in the South African gold and platinum sector' by Dr Jodi Pelders and Prof. Gill Nelson, listed common contributors to fatigue; diabetes was one.¹⁵ It is well documented that diabetes can lead to fatigue. The mechanism involved is thought to be the disruption of the body's ability to absorb sugar, which is needed for energy. Therefore, individuals who are uncontrolled would have a high blood sugar level, but their cells would be deficient of sugar, leading to fatigue.¹⁶ Polyuria, in association with high blood sugar, can lead to dehydration, which is also a major contributor to fatigue.¹⁶ This further emphasises the need to control diabetic individuals, as fatigue can be detrimental, particularly in the mining industry in which there are high-intensity jobs, long working hours, and awkward shift work. Even in the absence of diabetes, these factors lead to fatigue.

Other concerns

There are other multiple factors of concern regarding diabetes, which should be addressed individually, with each patient. Patients need to be educated about these problems and how to avoid or control them. These factors include target organ damage, hyperglycaemia, and/or increased risk of diabetic ketoacidosis. Appropriately fitted safety shoes are essential for diabetic workers, especially in the presence of peripheral neuropathy. There is a risk of diabetic foot that is characterised by small, often unnoticed pressure ulcers.¹⁰

Newer molecules

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are a relatively new treatment for diabetes. Most are injectable and should not be confused with insulin when assessing fitness to work.

These agents are protective against hypoglycaemia, unlike insulin. They stimulate the secretion of insulin only after glucose is introduced into the body. Thus, when blood glucose is low, they cease to stimulate insulin secretion. However, when blood glucose is elevated, they also inhibit the secretion of glucagon, and stimulate the secretion of insulin. These agents are neuroprotective, lower blood pressure and cholesterol, and are linked to weight reduction, all of which contribute to a reduction in all-cause mortality.¹⁷

Examples of this class of treatments include liraglutide, dulaglutide, semaglutide, and exenatide. It should be noted that an oral semaglutide was recently approved by the US Food and Drug Administration (FDA).¹⁷ Semaglutide has recently attracted media attention due to abuse by non-diabetic individuals.¹⁸ It must be noted that in some countries, semaglutide and other GLP-1 RAs are registered for treatment of obesity.¹⁹ However, in South Africa, they are currently registered only for treatment of diabetes. Nevertheless, there is currently inadequate stock for diabetic patients as non-diabetics are reportedly using it off-label and without a prescription via the 'black market'.¹⁹ Using the medication off-label and without a prescription, and without monitoring by a qualified medical practitioner, can lead to severe adverse events, such as gastrointestinal-related diarrhoea and vomiting,¹⁷ and, although rare, pancreatitis and cholecystitis.¹⁸

CASE LAW

IMATU and Mr M vs City of CPT

In 2005, the City of Cape Town was taken to court by a Mr M and Independent Municipal and Allied Trade Union (IMATU) after he was declared unfit for his job due to having IDDM.²⁰ Mr M was a 31-year-old male who had been diabetic for more than 20 years. He had been a volunteer reservist firefighter at Fish Hoek since 1991 when at high school. In 2003, he successfully interviewed to become a firefighter. However, after a medical examination, Dr J declared him unfit and unsuitable for the position, although he noted that Mr M was physically fit and had good vision. He attributed his decision to the risk of hypoglycaemia associated with insulin.

Mr M and the union contested the finding. He was referred to a principal medical specialist who supported Dr J's decision. The specialist stated that he had not examined the patient, but that his decision was based solely on the risk of hypoglycaemia associated with the use of insulin. The case was escalated to senior human resources, and then to the Commission for Conciliation, Mediation and Arbitration (CCMA), where it still could not be resolved.

Ultimately, the case landed in the Labour Court, where it was established that the last hypoglycaemic episode was close to 20 years ago, in the first year of diagnosis. It was also noted that, in the years Mr M worked as a reservist, there had been no report of hypoglycaemia. The court ruled that the employment policy of refusing to employ individuals with IDDM as firefighters was unfair discrimination, and that each case should be looked at separately with its own merits.

EMPLOYEE RIGHTS IN THE MINE

The Mine Health and Safety Act includes an instruction to "safeguard the health and safety of mine employees and communities affected by mining operations".²¹ Section 20 of the Act speaks to the rights

of employees to dispute findings of unfitness to perform work. An employee is entitled to appeal to the Medical Inspector in the event of a decision taken that he/she is unfit for an occupation, or against any finding contained in an exit certificate. The appeal must be lodged within 30 days (or 90 days after an exit examination); exceptions may apply at the Medical Inspector's discretion. All employees should be made aware of this right.²²

CONCLUSION

There should be no blanket approach in making decisions regarding employees' fitness to work. Occupational medicine practitioners should familiarise themselves with disease processes as well as complications associated with each condition. The final decision of fitness should not be made on the worst-case scenario or out of fear. As Dr Dipalesa Mokoboto (Department of Mineral Resources and Energy Medical Inspector) said at the Mine Medical Professionals Association (MMPA) Annual Congress in 2023, "The decision of fitness is made using the minimum requirements of the job, not the maximum".

Another experienced OMP, Dr Selborne Marhanele, had the following to say (personal communication, 30 January 2024):

"A few aspects need to be considered when assessing the suitability of employees with diabetes mellitus to perform certain categories of work. The duration of impairment, viewed in conjunction with the experience of the employee in a certain occupation or type of work, may enable the employee to perform such work safely and without risk to their own or fellow employees' health or safety. Experience in a particular occupation may compensate for impairment, allowing the employee to continue working effectively without any increased risk to health or safety. Closely related to duration is the employee's insight into their condition, which should also be considered in assessing fitness to work. Insight leads to, inter alia, early recognition of symptoms, earlier intervention, and better control in the long run leading to reduced risk of unwanted events such as hypoglycaemic episodes. In declaring an employee fit to work, the OMP should also consider any anticipated deterioration in the condition and possible increase in risk. The OMP may therefore set strict conditions that include closer supervision and monitoring in the workplace, and more frequent medical surveillance."

A decision about fitness is not to be taken lightly, as it has consequences for the worker. Employers have a moral obligation to ensure that their wellness programmes are strengthened to increase awareness about non-communicable diseases in the mine, and to motivate employees to lead healthy lifestyles. A healthy lifestyle, coupled with weight loss, has proven to have benefits in reducing cardiovascular risk factors in patients with diabetes.²³ The programmes need to facilitate employees to take care of their chronic conditions prior to complications arising. Failure to do so may have financial consequences for both the employee and employer.

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