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- The South African Society of Occupational Medicine
- Southern African Institute for Occupational Hygiene
- South African Society of Occupational Health Nursing Practitioners
- Mine Medical Professionals Association



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Front cover photograph

Dr Botembetume Maboso, occupational health practitioner in Lesotho, stands outside the Mafeteng District Hospital Occupational Health Service Centre.
Source: Katiso Simon Motopi

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From the Editor . . .



**Gill Nelson,
Editor-in-chief**

As I write this editorial for the third of our online issues, President Cyril Ramaphosa has just announced that we will be moving to level 2 lockdown. I echo the caution given by health experts to continue to be vigilant about keeping ourselves and others safe, in anticipation of a second wave of COVID-19.

The lockdown resulted in us working from home and missing out on socialising with friends, and visiting our families. It also

had a profound effect on research. Suddenly, we could no longer brainstorm ideas face to face, and were limited to e-mail exchanges and video meetings that come with many frustrations. Students and independent researchers alike, were affected. Those who were in the process of collecting data, or had planned to start doing so this year, were ethically and physically not able to progress – study sites were shut down, study participants were off limits, and data collection was postponed indefinitely.

Many students had to change their research topics and find datasets to analyse instead. But this 'solution' has several drawbacks, including the difficulty of identifying appropriate datasets. Fortunately, during the last decade, researchers have been encouraged (and sometimes instructed) to share their data – to make it available for others to validate their original analyses and, as importantly, to allow others to analyse the data to answer new research questions.

Data sharing during the COVID-19 pandemic has allowed healthcare workers, policymakers and entire governments to make evidence-based decisions. Despite many papers being published without peer review (see, for example, <https://www.medrxiv.org/>) and then subsequently retracted (<https://retractionwatch.com/retracted-coronavirus-covid-19-papers>), we would not know as much as we do if data had not been shared. Without district-, country-, and regional-specific data, we would not know that South Africa currently has the 5th highest number of confirmed COVID-19 cases in the world. Treatments for COVID-19 have been postulated and then disclaimed, and some suggested controls to mitigate the spread of the virus have been implemented, while others have been refuted. Data continue to be generated and shared, and our knowledge and understanding of the virus increase daily.

Data sharing is an integral aspect of research integrity. The fifth responsibility in the 2010 Singapore Statement on Research Integrity, under *research findings*, is that "researchers should share data and findings openly and promptly, as soon as they have had an opportunity to establish priority and ownership claims".¹ Many journals have data sharing policies. Plos One has insisted that authors share their data, since 2014.² Other journals that require data sharing are *Science*, *Nature*, and *BioMed Central*. Some funding organisations also require

data sharing. Since 2003, the USA's National Institutes of Health (NIH) has stipulated that applicants for large grants include their data sharing plans for timely release for use by other researchers.³

The concept of data sharing is accompanied by the premise that data will be stored in a secure and accessible format. But how much thought do we really give to data storage? We have moved from storing data using punch cards in the 1800s to the mid-1900s, to magnetic tapes and magnetic disk storage in the latter part of the 1900s.⁴ Some of you might remember the 8 inch, 5¼ inch and, later, the more rigid 3½ inch 'floppy disks' of the 1980s and 1990s. Then we moved to CDs and DVDs and, in 2000, we started using flash drives or USB drives. Now, thanks to the Internet, we can store our data in the Cloud. Everyone knows about security risks to data, and the (high) possibilities of laptop theft, crashed hard drives, and misplaced flash drives. So we (hopefully) back up our data regularly and frequently until the final thesis is written or the paper is published.

In addition to data security, accessibility is important – beyond the published paper. How would you access data that were collected using punch cards in the 1940s? Does your laptop or PC have a disk drive to open a dataset stored on a floppy disk or CD? For data sharing to be possible, it is essential to transfer data to new storage media and readable formats as they become available. In addition, data that can be extracted from a dataset by only one person, using complex programming language, are also not truly accessible. We have long moved away from the lone researcher to more collaborative research teams, where people with varied skills play equally important roles. Just as all authors of a paper are responsible for research submitted to a journal for publication, so too are all members of the research team responsible for ensuring that the data are securely and appropriately stored, and accessible for sharing in the future.

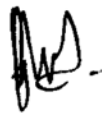
We have research papers and opinions emanating from far and wide in this issue. Under the current circumstances, it would be negligent of us to not report something about COVID-19, and Ayesha Karodia and her diverse group of colleagues discuss an aspect that has received little attention in South Africa – that of the risk of transmitting SARS-CoV-2 in abattoirs. But while the world has, literally, been taken over by the virus, we have not forgotten other important occupational health issues. Botembetume Maboso and his colleagues in Lesotho, Zimbabwe and South Africa have written about silicosis in ex-mineworkers – a group for which little information on occupational lung diseases is available. An opinion piece about medical surveillance, from Robin George, is particularly relevant in this respect. In addition, Kobus Fourie and Prof. Hein Brand present their findings from a study on workers' stress. Stress has become an added feature of our lives under COVID-19, especially among healthcare workers.

August is Women's Month in South Africa, and Elize Soer's article (published online by Gender Justice on 3 July 2020) provides a segue from the health effects of SARS-CoV-2 to the economic

consequences of the South African government's lockdown on women who work in informal sectors, such as waste picking and the sex industry. She also talks about the suffering of marginalised and vulnerable groups, including migrant workers and children.

On a positive note, please join me in celebrating nine remarkable women from the National Institute for Occupational Health (NIOH) who are relentlessly leading COVID-19 online training. You might have read about them in various newsfeeds but we honour them here as well, as our friends and colleagues.

I look forward to a world in which we can again attend conferences, meet up with our colleagues, and network with new ones in interesting locations, even if just across the provincial borders. Until then, take precautions to protect yourselves, and stay safe.



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The COVID-19 pandemic has disrupted the planning of OH conferences, congresses, symposiums and workshops in southern Africa and across the world. For current notifications of new dates for these events, go to our 'Events' page on the website: www.occhealth.co.za/events

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Rescheduled to 12–14 Nov 2020

ICOH WOPS-CV Joint Conference 2020 Joint Conference of Occupational Medicine and 23rd Asian Congress on Occupational Health

Seoul, Republic of Korea
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25–26 Nov 2020

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Occupational lung disease among Basotho ex-miners in a large outreach medical assessment programme

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INTRODUCTION

As a result of the late 20th century epidemic of silicosis, tuberculosis and HIV in the South African mining industry, the burden of lung disease in ex-miners, particularly gold miners, distributed across rural areas of South Africa and neighbouring countries, has become a subject of intense interest and the target of three major initiatives.

In 2016, the Tuberculosis in the Mining Sector (TIMS) programme, funded by the Global Fund for AIDS, Tuberculosis and Malaria, commenced.¹ This effort followed recognition by the Southern African Development Community (SADC) of the role of mining, and particularly that of the South African gold mining industry, as the dominant industry in the region contributing to the regional tuberculosis epidemic, and of the desire by the SADC to harmonise tuberculosis management across the region.²⁻⁴ The settlement of a class action suit for both silicosis and tuberculosis in 2019 created the Tshiamiso Trust, which is responsible for the identification, contact and medical assessment, where possible, of all former dust-exposed employees of the six major mining companies that were sued.⁵ The Trust covers about 70% of all mineworkers recruited into the South African gold mining industry. In parallel with the class action suit and some earlier lawsuits, political pressure built up to reform the ailing

ABSTRACT

Background: Current initiatives in southern Africa to medically assess former migrant miners for silicosis and tuberculosis, including statutory and lawsuit-derived compensation programmes, require burden of disease information.

Objective: To use clinical information collected on ex-miners examined at the Occupational Health Service Centre (OHSC) in Lesotho, operated under the Tuberculosis in Mining Sector in Southern Africa (TIMS) project, to measure the burden of lung disease and respiratory impairment.

Methods: Demographic, occupational and medical history information, chest radiology, spirometry, GeneXpert testing for tuberculosis, and pulse oximetry outcomes were analysed, and descriptive summary measures calculated, in a group of ex-miners examined in 2017 and 2018.

Results: The study sample comprised 2 758 Basotho former underground miners, with median age of 62 years and median length of service of 28 years. Among ex-gold miners (n = 2 678), disease prevalence was high: radiological tuberculosis (consistent with previous or current disease) 60.9%, silicosis 42.5%, HIV 30.7%, silicotuberculosis 25.7%, and current active tuberculosis 6.8%. Of those with tuberculosis diagnosed microbiologically, 6.7% had no radiological evidence of tuberculosis and 54.1% did not report cough.

Conclusion: The findings have public health and compensation implications. There are large numbers of ex-miners with potentially compensable disease under both the statutory system and a settlement trust set up following litigation. This overlaps with a tuberculosis-HIV co-epidemic which requires screening and treatment for tuberculosis and HIV, and managing a considerable disability and care burden on families and the Lesotho health system. Coordinated planning and substantial resources are needed for these programmes to do justice to their mandates.

state miners' compensation system.⁶⁻⁸ This has resulted in the office of the Compensation Commissioner for Occupational Diseases, in cooperation with the large mining companies and some international agencies, setting up or expanding examination centres for ex-miners to facilitate access to benefit medical examinations (BMEs).⁹

For the past century, the Crown Colony of Basutoland, which became the Kingdom of Lesotho in 1966, has been a major source of miners for the South African gold mines. Lesotho is a landlocked country within the borders of South Africa, with a population of 2 255 370 in 2020.¹⁰ It is therefore home to a large number of ex-miners who were employed in the South African gold, platinum and coal mines. Large-scale recruitment of black migrant workers occurred from the 1970s to the 1990s, particularly in the gold mining sector. During the peak employment period of 1988 to 1992, based on data supplied by TEBA Ltd., the major South African mining recruiting organisation, approximately 870 000 miners passed through the South African mining industry, of whom approximately 15% (132 500) were from Lesotho.¹¹

There are few sources of information on occupational lung diseases among Basotho mine workers. A 2004 hospital survey of tuberculosis

Table 1. Variable definitions, measurement techniques, and data quality

Variable	Means of measurement/collection	Quality control/comment
Age (years)	Calculated from birth date on ID document and date of visit to OHSC	
Length of mine service (years)	Estimated from first and last year of service	A one-week validation check of clinical files found 83% with a confirmatory record of service
Occupation (high dust, low dust)	Longest job occupied. High dust: rock drill operator, winch operator, stope team member, loader operator, construction worker, blasting assistant, etc. Low dust: belt attendant, chair lift attendant, loco operator, general worker, etc.	0.2% missing
Commodity: (gold, platinum, coal)	Commodity sector of longest service	
Smoking history (ever, never)	Recorded by medical practitioner. Ever: ever smoked for ≥ 6 months. Never: never smoked or smoked for < 6 months	1.1% missing
Silicosis (ILO $> 1/0$, with or without tuberculosis)	Chest X-ray classified by medical practitioner with ILO classification training, after treatment of attendee for any active tuberculosis	Random sample of 300 chest X-rays read independently by two specialist occupational physicians familiar with ILO classification. Reported 80-90% and 90% agreement, respectively, with clinic reading
Silicotuberculosis	Silicosis plus tuberculosis, active and/or radiological, including parenchymal, pleural or mediastinal abnormality suggestive of inactive or active tuberculosis	As for silicosis
HIV status	HIV test offered to all not on ART. HIV-positive: status known (shown in participant's medical booklet), or diagnosed at the OHSC (Uni-Gold™ rapid test, Trinity Biotech). HIV-negative: tested negative at OHSC or elsewhere within previous 12 months (shown in medical booklet)	0.6% missing
History of past tuberculosis treatment	Self-reported	Where possible, verified on Lesotho medical booklet, mine exit medical certificate, MBOD certificate or tuberculosis DOT card
Radiological changes suggestive of tuberculosis	Read by medical practitioner. Parenchymal, pleural or mediastinal abnormality suggestive of inactive or active tuberculosis	As for silicosis
Current active tuberculosis	Tuberculosis diagnosed at OHSC on positive GeneXpert with or without clinical and/or radiological features of tuberculosis, or tuberculosis diagnosed elsewhere and on tuberculosis treatment at time of attendance	GeneXpert testing of sputum sought on all attendees, regardless of presumptive tuberculosis status, but excluding those already on tuberculosis treatment or within 12 months of treatment completion. Sputum obtained from 96% of attendees
Cough (> 2 weeks)	Recorded by medical practitioner	0.4% missing
Shortness of breath (any)	Self-reported	0.6% missing
Shortness of breath at rest	Assessed clinically by medical practitioner	
Peripheral capillary oxygen saturation (SpO ₂) (%)	Measured on multi-parameter patient monitor (Aquarius G91025, Aquarius Electronics, London, UK)	11.9% missing
BMI (kg/m ²)	Height and weight measured on a Charder scale (HM 20IM)	
FEV ₁ , FVC, FEV ₁ /FVC as % of predicted	Measured on Easy on-PC spirometer (nidd Medizintechnik AG, Zurich, Switzerland). Predicted value $0.9 \times$ ECCS (European Community of Coal and Steel) reference value	ATS criteria applied. Spirometer calibrated regularly during testing and annually by supplier. Only results that met validity criteria included in the analysis

ART: antiretroviral therapy; OHSC: Occupational Health Service Centre; DOT: directly observed treatment. BMI: body mass index; FEV₁: forced expiratory volume in one second; FVC: forced vital capacity; ATS: American Thoracic Society

cases in Maseru reported that 38.4% had worked in the South African (mainly gold) mines.¹² A prevalence survey, conducted in 2001, of Basotho gold miners one year after retrenchment, revealed a profound burden of disease: past tuberculosis 26%, HIV 22.3%, silicosis 24.6%, and active tuberculosis 6.2%.¹³ A one-year follow up of this cohort estimated a minimum annual tuberculosis incidence of 3 085 per 100 000, and an annual HIV incidence of 5.2%.¹⁴ The ex-miner experience occurs against the background of a continuing co-epidemic of tuberculosis and HIV in Lesotho. In 2018, Lesotho recorded an HIV prevalence of 23.6%¹⁵ and the world's highest tuberculosis annual incidence of 611 per 100 000. The tuberculosis incidence rate was three and five times that of the World Health Organization (WHO) Africa region and global rates, respectively.¹⁶ Tuberculosis-related mortality rates were equivalently high.¹⁶

An opportunity to update our knowledge of the burden of disease in this neglected population arose from the TIMS programme. The main purpose of the programme was to screen miners (currently or previously employed), their families, and other residents of mine-sending communities for tuberculosis, and to link them to treatment as needed. Another purpose was to screen miners for lung disease that qualifies as occupational disease under the Occupational Diseases in Mines and Works Act (ODMWA), viz. pneumoconiosis, permanent obstruction of the airways, and tuberculosis (meeting eligibility criteria), and to assist miners with these conditions to apply for compensation in South Africa.

Mafeteng is one of the 10 politico-administrative districts in Lesotho. The Mafeteng Occupational Health Service Centre (OHSC) is one of 11 TIMS centres set up in southern Africa to offer screening services. From January to September 2017, Mafeteng OHSC was the only centre offering such services in Lesotho. In October 2017, an OHSC was opened in the capital city of Maseru. Thereafter, the Mafeteng OHSC serviced miners from about half the country, including Mafeteng, Qacha's Nek, Quthing, Mophale's Hoek and part of Maseru.

The objective of our study was to estimate the burden of disease

in a sample of ex-miners examined under the TIMS programme in Lesotho, using data collected at the Mafeteng OHSC. Of interest were the diseases silicosis, pulmonary tuberculosis and HIV, and related indicators of respiratory impairment, namely, lung function and arterial oxygen saturation. The focus was on miners who had worked underground in the gold mining sector at some stage of their mining careers.

METHODS

A cross-sectional retrospective record review was undertaken on ex-miners who attended the Mafeteng OHSC from January 2017 to November 2018. Invitations to miners (active and former) to have screening examinations were extended throughout Lesotho by means of public gatherings, media (radio stations), word of mouth, outreach campaigns, and civil society organisations. Participants were thus self-selected rather than randomly selected from a sampling frame.

Included in the study were ex-miners who had worked underground in South African gold, coal, and/or platinum mines for a minimum period of 12 months. During the study period, Mafeteng OHSC serviced 3 166 individuals, including active and ex-miners, their families and members of their communities. Of these, 2 758 (87.1%) met the inclusion criteria.

MEASUREMENT

The Mafeteng OHSC was equipped to undertake digital radiography, GeneXpert (Cepheid, USA) tuberculosis testing (an automated diagnostic test, endorsed by the WHO, identifies *Mycobacterium tuberculosis* DNA and resistance to rifampicin), spirometry and peripheral capillary oxygen saturation (SpO₂) measurements. Participants' histories (personal, medical and occupational) were recorded by the OHSC medical practitioner.

This analysis was conducted using data collected as part of routine clinical operations. A data extraction tool was developed,

Table 2. Demographic and exposure characteristics of ex-miners examined at Mafeteng OHSC, 2017–2018 (N = 2 758)

Characteristic	n	Median	IQR	Range
Age (years)	2 692	62	57–68	28–98
Mine exposure (years)	2 758	28	20–34	1–52
Characteristic	n	%	95% CI	
Age group (years)				
< 39	23	0.8		0.4–1.2
40–59	958	34.7		32.9–36.5
≥ 60	1 711	62.1		60.3–63.9
Occupation				
High dust	2 005	72.7		71.0–74.4
Low dust	748	27.1		25.4–28.8
Commodity				
Any gold	2 678	97.1		96.4–97.7
Gold exclusively	2 115	76.7		75.1–78.2
Coal exclusively	27	1.0		0.6–1.4
Platinum exclusively	53	1.9		1.5–2.4
Smoking history				
Ever smoker	1 983	72.7		71.0–74.4
Never smoked	744	27.3		25.6–29.0

IQR: interquartile range; CI: confidence interval

and information of interest was captured from medical records. Definitions of variables, and information on measurement techniques, and quality and completeness of the data, are provided in Table 1. Demographic and exposure characteristics included age, length of service, occupation, type of mine, and history of smoking. Clinical and disease characteristics included radiological silicosis, HIV status, history of past tuberculosis treatment, radiological change suggestive of tuberculosis, current tuberculosis status, cough, shortness of breath, oxygen saturation, body mass index (BMI), GeneXpert test result, and spirometry results (percentage predicted of FEV₁ and FVC, and of FEV₁/FVC). For purposes of describing the clinical profile of individuals with active tuberculosis, we excluded cases whose treatment commenced elsewhere, as their clinical status might have changed by the time of their visit to the Mafeteng OHSC.

The chest X-rays were read by a medical officer trained in South

Africa in the International Labour Organization (ILO) radiograph system for classifying pneumoconiosis¹⁷ and checked by two occupational medicine specialists. As silicosis is not visible on the chest X-ray in a substantial proportion of gold miners,¹⁸ this study was concerned with radiological silicosis, defined as profusion 1/0 or greater, with or without tuberculosis, using the ILO international classification.

Permission to analyse and publish the data was provided by the Wits Health Consortium-TIMS project. Ethical clearance was issued by the Human Research Ethics Committee of the Ministry of Health of Lesotho (ID: 142-2018).

STATISTICAL ANALYSIS

Data were captured using Numbers software (version 6.2.1, Apple Inc., 2008–2019). Statistical analysis was performed using Wizard Pro 1.9.38 (wizardmac.com). Medians, interquartile ranges (IQRs)

Table 3. Disease status and clinical characteristics of ex-miners who had ever worked in gold mining (N = 2 678)

Disease	n	%	95% CI
Silicosis	1 139	42.5	40.7–44.4
HIV	817	30.7	29.0–32.5
Silicotuberculosis	688	25.7	24.0–27.4
Current active tuberculosis*	181	6.8	5.9–7.8
Current tuberculosis	75	2.8	2.2–3.5
Past history of tuberculosis	1 443	54.1	52.2–55.9
Radiological changes suggestive of tuberculosis	1 631	60.9	59.1–62.8
Clinical characteristic			
Cough	771	28.9	27.2–30.7
Shortness of breath	803	30.2	28.5–31.9
Shortness of breath at rest	35	1.3	0.9–1.8
Oxygen saturation, SpO ₂ , (%)			
≤ 90	79	3.3	2.7–4.2
90–94	564	23.9	22.2–25.6
≥ 95	1 718	72.8	70.9–74.5
BMI category			
Normal	1 445	57.1	55.2–59.0
Underweight	444	17.4	16.0–18.9
Overweight	486	19.1	17.6–20.6
Obese	163	6.4	5.5–7.4
FEV ₁ (% predicted)			
< 60	331	15.2	13.8–16.8
60–79	419	19.2	17.6–21.0
≥ 80	1 427	65.5	63.5–67.5
FVC (% predicted)			
< 60	98	4.5	3.7–5.5
60–79	310	14.2	12.8–15.8
≥ 80	1 769	81.3	79.6–82.8
FEV ₁ /FVC (% predicted)			
< 60	147	6.8	5.8–7.9
60–79	403	18.5	16.9–20.2
≥ 80	1 627	74.7	72.9–76.5

*tuberculosis on treatment diagnosed elsewhere plus tuberculosis diagnosed at the OHSC

and total ranges were used to summarise numeric variables after confirming non-normality. Frequencies and proportions with 95% confidence intervals were used to summarise categorical variables.

RESULTS

Characteristics of the study population

The demographic and occupational characteristics of the study participants (N = 2 758) are summarised in Table 2. The median age of the ex-miners was 62 years (IQR 57–68) and the median length of service was 28 years (IQR 20–34). Almost all (n = 2 678; 97.1%) had worked in gold mines at some stage, with relatively few having worked in platinum and coal mines. Most had worked exclusively in gold mines (n = 2 115; 76.7%) and in occupations classified as high dust exposure (n = 2 005; 72.7%). Ever smokers made up 72.7% (n = 1 983).

Table 3 presents the clinical outcomes of those who had worked in gold mines at any stage of their career (n = 2 678). The disease prevalences were: silicosis 42.5% (n = 1 139), HIV-positive status 30.7% (n = 817), silicotuberculosis 25.7% (n = 688), and current active tuberculosis 6.8% (n = 181). More than half (n = 1 143; 54.1%) of the participants had a history of previously treated tuberculosis. Of those with current active tuberculosis (diagnosed at the OHSC or elsewhere), the tuberculosis was recurrent in 48.1% (n = 87).

All those with tuberculosis diagnosed at the OHSC (n = 75) during the study period had worked in a gold mine at some stage in their careers. Of these, 42 (56.0%) had recurrent tuberculosis. Clinically, 41 (54.7%) had neither cough nor fever and five (6.7%) had normal chest X-rays. Of these 41, two (4.9%) screened as negative, based on symptoms and chest X-ray findings.

Of the markers of respiratory impairment at attendance, severe peripheral oxygen desaturation ($SpO_2 \leq 90\%$) was reported in 3.3% of the sample (n = 79). Spirometry outcomes were limited to percentage of predicted. The proportions of ex-miners with < 60% predicted values were: 15.2% (n = 331) for $FEV_{1,}$ 4.5% (n = 98) for FVC, and 6.8% (n = 147) for FEV_{1}/FVC , suggesting a predominance of obstruction.

Of the 53 ex-miners who had worked exclusively in the platinum mining sector, 46.2% (n = 24) were HIV-positive, 11.3% (n = 6) had silicosis, and 5.7% (n = 3) had active tuberculosis. Among exclusive ex-coal miners (n = 27), 33.3% (n = 9) were HIV-positive and 11.1% (n = 3) had silicosis. None of the coal miners had active tuberculosis.

DISCUSSION

This report, based on data collected in the TIMS programme at the Mafeteng OHSC, reveals a very high burden of silicosis, tuberculosis, HIV and lung impairment in ex-miners living in Lesotho. It is, to our knowledge, the largest study of the burden of mining-related lung disease in living migrant former gold miners conducted in the last 50 years.

The study is timeous, given the current large-scale compensation initiatives that require information about ex-miners. Most of the research into silicosis and related tuberculosis in the South African mining industry has been conducted among in-service miners. An important exception is white ex-miners who had better access to the state examination facilities in Johannesburg until 1994 and were thus the subject of important studies published in the 1990s and beyond.¹⁹ Although the South African compensation legislation de jure covers all eligible miners, irrespective of racial ascription or country of origin, in practice, most migrant black miners have access to the compensation system only while employed.

COMPARISON WITH OTHER STUDIES

Table 4 provides a comparison of the findings from our study with those from three previous studies of ex-miners from the South African gold mines. The most comparable study is that of Basotho ex-gold miners carried out in 2001, following a mass retrenchment at one mine.^{13,14} Comparative findings are similar mean duration of service (26.9 vs 25.6 years), but older mean age (62.0 vs 49.4 years) and a higher HIV prevalence (30.7% vs 22.3%) in our study. Strikingly, the prevalence of silicosis (with or without tuberculosis) was much higher in our study (42.5% vs 24.6%), as was that of silicosis with tuberculosis (25.7% vs 10.6%). The prevalences of active tuberculosis were similar (6.8% vs 6.2%) but self-reported tuberculosis treatment was much higher in our study (54.1% vs 26%).

The higher prevalence of silicosis in our study might be partly explained by the more sensitive but less specific ILO radiological threshold that was used ($\geq 1/0$). A threshold of $\geq 1/1$ was used in the earlier study.¹³ We also restricted our analysis to those who had worked underground where dusty jobs are concentrated. However, the results are consistent with a powerful continuing cohort effect of both HIV and latency (retained silica dust in the lung) on the risk of tuberculosis post-employment, and of late appearance of

Table 4. Summary of prevalence studies on silicosis and tuberculosis in South African ex-gold miners

Author, year	Year of study	Place	N	Mean age (years)	Mean years in mining	Silicosis (%)	TB (past treatment, TB on CXR) (%)	Silicosis + TB (%)	Active TB (%)	HIV-positive (%)
Steen <i>et al</i> , 1998 ²³	1997	Thamaga, Botswana	234*	56	14.6	26.6; 31 [†]	29 (past treatment) 24 (CXR)		1.7 [‡]	
Trapido <i>et al</i> , 1998 ²⁴	1994	Libode, Transkei	288	53	12.15	22; 36 [§]	51 (past treatment) 33; 47 (CXR) [§]			
Girdler-Brown <i>et al</i> , 2008 ¹³	2001–2002	Lesotho	610	49	25.6	24.6 [¶] (4 readers)	26 (past treatment)	11**	6.2	22.3
This study, 2020	2017–2018	Lesotho	2 678	62	28.0	42.5 ^{††} (1 reader)	54 (past treatment) 61 (CXR)	26	6.8	30.7

CXR: chest X-ray; *underground gold miner subgroup; † ILO profusion > 1/0 (prevalences from both readers); ‡ 4 new tuberculosis cases (using 234 as denominator); § ILO profusion $\geq 1/0$ (prevalences from both readers); || reported in White *et al*, 2001²⁷; ¶ ILO profusion $\geq 1/1$ (prevalence from reader with 'best overall agreement'); **calculated from Figure 2; †† ILO profusion $\geq 1/0$

radiological silicosis.^{18,20} In addition, ageing has been shown to be a strong independent risk factor for active tuberculosis in gold miners²¹ and has also been associated with increased silicosis frequency at autopsy, independently of duration of exposure.²²

Compared to the ex-gold miner studies conducted in the 1990s,^{23,24} the miners in our study had a slightly higher mean age, but a considerably higher mean duration of exposure, prevalence of silicosis, active tuberculosis, and silicosis combined with tuberculosis. Both of the earlier studies had less restrictive inclusion criteria which would have reduced observed disease prevalence because of the inclusion of lower risk and asymptomatic ex-workers. The effect of a higher HIV prevalence in the current cohort than those studied in the mid-1990s would have further contributed to the current excess burden of tuberculosis.²¹

Finally, there is information from two samples of ex-miners examined specifically for compensation purposes. In a study of 300 ex-gold miners in the (former) Transkei, conducted from 1997 to 1999, the prevalence of radiological silicosis (threshold undefined) was 33.4%.²⁵ The prevalence of silicosis combined with tuberculosis (presumably radiological) was 28.4%. More recently, the Q(h)ubeka Trust, formed following a silicosis lawsuit settlement, had examined 3 519 ex-gold miners by 30 April 2020.⁷ The calculated prevalence of compensable disease (silicosis \geq ILO 1/0 with or without lung function loss and/or radiological signs of past or current tuberculosis) was 55.7%. The findings from our study are comparable with those from these two studies.

The numbers of exclusive platinum and coal ex-miners were small. Silicosis is a component of coal mine dust lung disease²⁶ but is uncommon in platinum miners.²⁸ Cases of silicosis were found in both groups, together with high prevalences of HIV. This indicates that ex-platinum and ex-coal miners, who are covered by the ODMWA, should be included in programmes aimed at improving access to BMEs.

IMPLICATIONS

From 1973 to 2012, the number of miners from Lesotho was of the order of 190 000, and represented 12.6% of all new entrants into the South African mining industry recruited via TEBA.¹¹ While the proportion of miners from Lesotho declined from the 1970s to the 1990s, the actual number of individuals from Lesotho increased with the large-scale increase in employment. Since 1988, total gold mining employment has been declining, reaching approximately 98 000 in September 2019.^{11,29} As a result, the ex-gold miner population now greatly outnumbers the active miner population. It is difficult to estimate the number of living ex-miners in Lesotho but, assuming that 60% of the total recruited cohort are still alive, and allowing for the fact that not all worked in the gold mining industry, and that some may have taken South African citizenship after 1994,³⁰ the number of ex-gold miners in Lesotho could be around 95 000.

The public health implications of these findings are profound. Silicosis is a chronic disease associated with lung function impairment at higher grades of severity, but the most serious impact of silicosis on public health in this setting is that it greatly increases the risk of tuberculosis.³¹ When silicosis occurs together with HIV, the increased relative risk of tuberculosis (compared to miners with neither condition) is 16-fold.³² Even if successfully treated, it is now appreciated that tuberculosis has significant chronic post-treatment sequelae.^{33,34} In this sample of gold miners, the features of chronic respiratory ill-health included lung function impairment (mainly

obstruction) and chronic hypoxaemia, which should entail assessment for oxygen supplementation.³⁵ The high burden of mining-related disease among ex-miners has thus imposed a substantial public health burden on the health system, social structure and economy of this small, low-income country.

The findings also have a number of implications for the current outreach compensation programmes for ex-gold miners. First, the prevalence of silicosis, at least in long-service ex-gold miners, is very high. In this study, although all chest images read as ILO 1/0 or greater are reported as silicosis, some proportion would not meet the criteria for first-degree compensation (i.e. without tuberculosis) used by the Medical Bureau for Occupational Diseases (MBOD) or the Tshiamiso Trust.

Second, this group has a very high prevalence of tuberculosis – active and past. Tuberculosis on its own, occurring 12 months or more after leaving employment, is not compensable under either the ODMWA or the Tshiamiso Trust deed. However, a large proportion of ex-gold miners with silicosis (25.7%) had evidence of old tuberculosis fibrosis on the X-ray and/or active tuberculosis, i.e. silicotuberculosis. The radiological distinction between the two diseases, silicosis and tuberculosis, individually, and combined disease, requires specific expertise and experience,^{36,37} and the final criteria for compensation purposes may well differ from the readings in this study. Nevertheless, it is likely that a large proportion of claimants will qualify for the second-degree category of silicosis plus tuberculosis under the ODMWA and/or for Silicosis Class 3 under the Tshiamiso Trust deed.

Finally, the high prevalences of active tuberculosis (6.8%), some of which was undiagnosed at the time of the visit, and HIV (30.7%) in these ex-gold miners, place a particular responsibility on any compensation programme and health service, whether public or private/corporate, to screen for both of these diseases in this population, and to refer those found to be positive to local health services. This creates a corresponding demand on these health services to offer the necessary early diagnosis, treatment, care and follow up.

STRENGTHS AND LIMITATIONS

The strengths of this study are the large sample and consistency in collection of data from a single clinical centre. GeneXpert tuberculosis testing was carried out on almost all participants and HIV status was based on history or test results. This has, to our knowledge, not been achieved in any previous study of ex-miners.

A limitation is that information was collected as part of a clinical screening programme rather than for research purposes. The chest X-rays were read by a single reader and a sample was reread by two occupational medicine specialists. Given the well-established differences between readers using the ILO system,²⁸ it is possible that, for example, a B-reader would have given different silicosis judgements. If such differential readings were random, this would not necessarily have produced a substantially different prevalence of silicosis.²⁸ However, bias in reliance on a single reader cannot be excluded.

Although spirometric volumes were recorded at the clinic visit, only percentages of predicted values were captured into the database. As a result, the calculation of the prevalence and degree of impairment did not include the FEV₁/FVC ratio. Similarly, as duration of mine service but not calendar dates were captured, disease latency could not be analysed.

Ex-miners who presented for screening were aware of the screening programme, possible benefits of treatment or compensation, or

both, and were able to access the centres from different parts of the country. Miners with ill-health or long mining service might have been more motivated to attend than healthy miners or those with shorter service. This would have resulted in higher proportions of disease than would be calculated in a random sample, which would have included more short-service and asymptomatic workers. Miners identified as very ill during the mobilisation campaigns were referred directly to local health services and thus may not have reached the OHSCs. With only two OHSCs serving the whole of Lesotho, many ex-miners had to travel long distances to reach these facilities. Modes of transport included those that were self-organised or via civil society organisations working with TIMS. Poor access to health services thus limits generalisability of the findings to all parts of the country.

CONCLUSION

We sought to add information about the extent of mining-related diseases among migrant ex-gold miners, specifically, to that collected previously in Basotho miners, Botswana, and the Eastern Cape. This information should be useful to current compensation initiatives in implementing programmes for clinical assessment of silicosis and tuberculosis, claims management and payment. In this regard, the large databases of medical assessments of claims of ex-miners, conducted within the TIMS programme and by compensation trusts, present an opportunity to better understand the burden of disease and healthcare needs of this population, and to fill gaps in our knowledge.

The findings confirm the continuing triple epidemic of silicosis, tuberculosis and HIV, affecting ex-miners in Lesotho,^{31,38,39} and the need for a public health plan and resources to continue to screen ex-miners and their families for these diseases, and to provide the necessary curative and supportive treatment. The call on mining companies, the health systems in the affected countries, regional and international agencies, and civil society organisations to coordinate action and find resources to prevent and mitigate the suffering of these ex-miners, remains urgent.

LESSONS LEARNED

1. Among migrant ex-gold miners from the South African mines living in Lesotho, there is a high burden of silicosis and tuberculosis, including undiagnosed and asymptomatic disease, HIV infection and associated respiratory impairment.
2. There is a need to train local medical care providers in diagnosis and management of these combined and overlapping diseases, e.g. in distinguishing silicosis from tuberculosis, and obstruction due to dust exposure or previous tuberculosis from asthma.
3. Screening and compensation programmes should make provision for maintenance of accurate and accessible databases of occupational and clinical information for research purposes.

DECLARATION

Dr Maboso worked as on-site doctor at Mafeteng OHSC from January 2017 to December 2019 under the TIMS project. Dr Barnes has worked for a number of mining companies, providing occupational health guidance, assurance and technical support, and has provided input

required to prepare for legal action. He was directly involved in the establishment and operation of the Mafeteng OHSC and 10 other OHSCs established by the Wits Health Consortium, for the Global Fund, across the Southern African Development Community. Prof. Ehrlich has previously written expert reports on silicosis for plaintiff attorneys in litigation.

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AUTHOR CONTRIBUTIONS

Conception and design of the study: BMM

Data acquisition: BMM

Data analysis: BMM, KMM

Interpretation of the data: BMM, RE, KMM

Drafting of the paper: BMM, RE, LBM, SJM, ML

Critical revision of the paper: RE, DM, VG, KMM, DFB

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Causes of stress in vehicle manufacturing employees and perceptions of the effectiveness of a stress management intervention programme

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ABSTRACT

Background: Stress has become a part of everyday life for most employees. Studies have shown the negative effect that stress has on employee wellbeing. Stress management intervention (SMI) programmes are commonly implemented by organisations to reduce work-related stressors, as well as to assist employees to cope with and minimise the impact of stress.

Objectives: We aimed to explore the causes of stress at a vehicle manufacturing company, and the perceptions of employees about the effectiveness of an SMI programme.

Methods: A qualitative interpretive approach was followed, using a case study design. The research was conducted at a vehicle manufacturing company in Pretoria, South Africa; eleven purposively sampled permanent white- and blue-collared employees who had participated in an SMI programme were included. Data were collected from personal interviews and a focus group discussion. The data were analysed using the ATLAS.ti software.

Results: Some of the causes of stress in the workplace, identified by the participants, were company ethics and culture, interpersonal conflict, management style, deadlines, workload, type of job, job profiles, job insecurity, incompetence of employees, lack of resources, and remuneration. Most participants (90.9%) evaluated the SMI as being very effective.

Conclusion: The causes of stress amongst workers are multifactorial. Effective SMIs can assist to alleviate stress and to equip employees with skills to manage stress. This promotes a healthy workforce and increases productivity. If SMIs are not implemented effectively, there might be loss in productivity, increased absenteeism, and deteriorating health in the workforce.

INTRODUCTION

Stress is part of everyday life for most employees. Technology, social habits, values and company structures are constantly changing; individuals, organisations and governments have to adapt, accordingly.^{1,2} Many studies have shown the negative effects of stress on employees' physical and psychological wellbeing.¹⁻⁴ Organisations may experience an increase in absenteeism and reduced productivity when stress is not effectively managed.^{3,4} To prevent these negative effects, stress management intervention (SMI) programmes can be implemented, which focus on reducing work-related stressors and assisting employees to minimise the negative impacts of stress.⁵

The SMI construct belongs within the broader concept of employee wellness.⁶ The wellness model has increased in popularity as a positive, strengths-based, holistic approach to understanding human functioning,⁷ and is based on the theory of positive psychology which helps people to not only exist, but to flourish.⁷ Job stress, however, forces the employee to deviate from normal functioning.⁸ Severe long-term stress can lead to burnout, and can be defined as a constant negative, work-related state of mind.⁹ This exhibits as exhaustion, distress, loss of motivation, reduction of effectiveness, and the development of attitudes that are personally and socially dysfunctional.¹⁰

No single factor can be highlighted as the sole cause of work stress.¹¹ Stress increases when employees observe a situation

to be too difficult to manage, and a threat to their wellbeing.¹¹ Distress (negative stress) can originate from a condition where the demands of a job are in conflict with the resources provided to get the job done.¹¹ The job demand resources (JDR) model^{12,13} clarifies some of the causes of work stress, such as the influence of personal characteristics, and allows the identification of mutual and moderating influences that link employee characteristics, demands and resources. These, in turn, determine outcomes such as work performance and engagement.¹³

Causes of work stress include competitiveness, internationalisation, and performance management.¹³ Other potential causes are inadequate office space, insufficient equipment (e.g. computers), and heavy workload in terms of the work-staff ratio.¹⁴ Personal life stressors also play an important role.

Stress in the work environment is a major health problem for both employees and the organisation, and can lead to illness, burnout, absenteeism and labour turnover.¹⁵ Chronic stressors, resulting in more than just initial discomfort, are the most influential causes of stress for an employee. Mental health disorders associated with work-related stress, such as anxiety and depression, contribute the most to sick leave.¹⁵ Stress also influences a person's decision-making capability which could result in poor choices and outcomes.¹⁶

STRESS MANAGEMENT INTERVENTIONS

Stress management interventions follow three main strategies, namely prevention (primary level strategy), treatment (secondary level strategy) and rehabilitation (tertiary level strategy).^{5,17}

Stress can be prevented by altering the source of stress and the risk to employees.¹³ Interventions include redesigning jobs, changing work time schedules, providing co-worker support groups, and increasing employee decision-making authority.^{10,18}

Stress management training (treatment) is designed to help individuals cope with stress in the work environment. The individual takes responsibility for resolving his/her stress issues.¹⁹ Treatment can be divided into somatic, cognitive and multimodal types.^{20,21} Somatic treatment refers to relaxation methods and breathing techniques, progressive relaxation, and visualisation.²¹ Cognitive treatment includes mindfulness, affirmations and thought stopping, with a focus on the specifics of the stress-generating situation, and an attempt to alter its interpretation.¹⁰ The source of stress is eliminated by providing training in conflict resolution, assertiveness, time management, anger management, and/or problem solving.²² Multimodal treatment combines somatic and cognitive treatments with other techniques, such as a relaxation response, self-hypnosis, meditation, and refuting irrational ideas.²⁰

Rehabilitation, as a stress intervention, takes place after an employee has been diagnosed as suffering from the effects of stress. The focus is on assisting him or her to return to work.¹⁰ The most common form of rehabilitation is case management, where different service providers coordinate a programme to get the employee back to work.¹⁰

The employees of a vehicle production company in Pretoria, South Africa, attended an SMI training workshop eight months before the data were collected. As an SMI, the company made use of treatment (secondary-level strategy) to assist some of their stressed employees, in the form of a one-day workshop, where a facilitator guided the employees on identifying stress and building resilience to stress. Some of the elements of the multimodal treatment were used, namely, relaxation methods, breathing techniques, visualisation, thought stopping, conflict resolution, assertiveness, time management and problem solving. The training focused on anti-stress information, application exercises and behaviour change.

The purpose of this study was to identify causes of work-related stress and to determine employees' perceptions of the effectiveness of the company's SMI.

METHODS

The study was conducted over a period of five months in 2013. Eleven study participants were purposively selected from 22 employees. All eleven had participated in the SMI programme.

Interviews and a focus group discussion were conducted to gain insight into participants' subjective experiences of the SMI programme. Similar information was elicited from both sources. Semi-structured interviews included questions such as, "Were there any areas in the work situation that caused you stress before the SMI? Please give some examples", and "Was there any improvement in your handling of stress after the SMI? Please elaborate."

Informed consent was obtained from the participants and the company, and ethical clearance from the University of Pretoria Department Postgraduate Committee.

The data were analysed using ATLAS.ti, a computer-based qualitative analysis programme. Predetermined coding was based on the interview and focus group guides. Other codes were emergent,

i.e. concepts, actions or meanings that evolved from the data. The relationship between the concepts was explored, using axial coding based on content analysis. This analysis is dependent on creating labels (codes) that can be applied to the data to identify meaningful categories for analysis and interpretation. Themes were identified from these categories.

RESULTS

As shown in Table 1, most of the 11 participants were male ($n = 8$; 72.7%), and most were black ($n = 8$; 72.7%). Ages ranged from 25 to 64 years with a mean of 31 years. There were four blue-collared and seven white-collared participants.

Table 1. Demographic characteristics of study participants

Race	Age	Sex	Blue/white collar	Job title
Black	26	Female	White	Logistics student
Black	26	Female	White	Buyer
Black	28	Female	White	Economic officer
Black	25	Male	Blue	Student
Black	26	Male	White	Lab assistant
Black	29	Male	White	Logistics student
Black	30	Male	Blue	Student
Black	64	Male	Blue	Foreman inbound PDC
Indian	28	Male	Blue	Process engineer
Indian	32	Male	White	Senior buyer
White	30	Male	White	Manager: after sales

PDC: parts distribution centre

PERSONAL STRESS FACTORS

Personal life causes of stress were identified as family relationships, finances, study commitments, physical health, mental health, and death:

"I was expecting my first child and so also that transition could have been stressful" and "... relationship wise I think I had my share of stress"

"I think money brings stress" and "... the salary when I began, it was not good at all and I remember I almost didn't come to the site"

"... that is a very hard thing to juggle actually studying and working at the same time"

"In 2000 I lost a son, my first born, in a car accident ... I still have sleeping problems ... I also don't eat".

JOB-RELATED STRESS FACTORS

Several themes as causes of job-related stress were identified. Some employees indicated that company ethics and culture played a significant role in increasing stress in the work environment. For example, issues related to the black economic empowerment (BEE) policies of the company included the policy of recruiting 'cheap' workers rather than focusing on quality. There were also references to an "uncomfortable environment" and "management style and resources" by some of the participants as reasons for experiencing stress. In addition to lack of resources, "contract non-renewal", "slow computers" and "restricted

computer networks" were mentioned. The handling of authority was also perceived to be a stressor:

"I always speak my mind even if I go to the Director" and "... you find that your own line manager he has given you the task and he wants it before the end of shift and two managers have come, they want something from you before the end of shift and at the end of the day you are confused, which one is the priority, which one should I do first?"

Some of the employees said that they were not recognised as decision makers and that there was a lack of respect for decisions they made. Other issues raised were not solving problems and communication:

"If you're stressed, you're just over thinking about a lot of things and you're not working up to your optimum level" and "... I told her listen, I don't like what you are doing and not like agree with what you are doing" (an employee communicating with her line manager)

"... you find it so hard to like communicate with those people".

Job profiles and the absence of guidance in getting acquainted with a new job also caused stress:

"... a certain supplier or an individual is not doing their proper job. You really get frustrated because you cannot do your part of your job"

"So in terms of information ... I had to discover things by myself so to speak".

Further stressors were difficulties in prioritising, working overtime, not enjoying the work, and difficulties with work-life balance:

"... understanding other individuals having the pressure to actually commit to a deadline" and "This manager wants that, this manager wants this, the GM wants that"

"There is a lot of overtimes that I did ... so that I can finalise my work" and "... sometimes we're leaving at one o'clock just to make sure that everything gets finished"

"Working with production it can be quite stressful and you feel like, you know what, it is better for me to just get out of the gate" and "... many times I don't like the work".

THE EFFECTIVENESS OF THE STRESS MANAGEMENT INTERVENTION

The study participants indicated that their stress management improved after participating in the SMI workshop:

"I got everything under control. I managed to bring my stress levels down" and "I did exercising" and "I maybe sometimes just go out and walk"

"I now learned ... proven techniques on how to manage stress so ... now I'm able to give informed advice" and "... you destress by just laughing and joking, making things exciting".

Handling of authority improved, productivity increased, and the employees learned to prioritise tasks:

"You don't just rush into things and say things how you used to say it" and "... [whenever] I tell somebody to do something, I explain to them what we are doing and ... I hand them the bigger picture"

"... start with your manager, explain your problem"

"I managed to bring my stress levels down. So that is when I started to be productive again"

"... now I could identify areas that I needed to tackle".

They were able to master their time management, be more assertive and help others, and experienced better health:

"I noticed that the stress of time management was now alleviated, by that practical thing of writing things down"

"I'm always making my point heard"

"Over the year I've learned to be more assertive"

"If my friend is not feeling well or stressed out at work or whatever, I would say whatever works for me that I can recommend"

"... backaches and pain ... it does happen less frequently now, yes".

Benchmarking salaries against the wrong industrial sector also caused some concern:

"They benchmark my salary against somebody sitting at Pick n Pay doing a buyers job ... whereas I'm bearing a horrible stress ...".

Some participants also highlighted remuneration and budget-related issues:

"If you look at the average person's salary here compared to somebody outside, we are below par".

The SMI programme that was implemented in the company was experienced as positive and effective by the majority of the participants (n = 10; 90.9%), in terms of personal stress management, ability improvement, authority management, time management, improved assertive behaviour, meaningful personal counselling sessions, and improved personal health:

"Definitely over time ja, it was a helpful course, it was definitely worthwhile" and "... two colleagues are head on head ... I know using humour as well just lighten the situation and tends to help just to defuse the tension a bit".

In addition, effectiveness was mostly indicated in terms of relatively successful applications, meaningful exercises, effective use of work

tools, increased productivity, prioritising learning, and mastering time management:

"I've got a lot of workload most of the time, I just take my time off. I just walk around just to be out of the office".

There were, however, some reservations about the effectiveness of the SMI programme in the company. One of the participants indicated that he/she could not apply what had been taught during the workshop.

Employees had suggestions for future SMIs in the company, viz. role-play exercises, use of company examples (case studies), providing knowledge on how to identify stress, teaching employees how to measure stress, one-on-one counselling sessions, annual refresher courses, sharing with others, an assessment centre, and aiding in programme operations.

DISCUSSION

The company's use of a multimodal form of treatment for their stressed employees appeared to have some positive impact and to reduce employee stress.

Stressors exist in organisations and management should empower employees and effectively enhance their occupational stress handling capabilities by implementing SMIs.^{17,23} Employee skills and abilities should be enhanced by continuous training to empower them to cope with their frequent strenuous work requirements, such as deadlines and high production targets in a manufacturing environment.²³

It is important that, in general, managers, human resources personnel, welfare staff, medical personnel and safety officers have a clear understanding of the main issues involved in workplace stress prevention and management.^{15,24}

Rapid staff turnover may indicate that employees are highly stressed.²⁵ Interpersonal conflict played a significant role in causing stress in the company in this study. Most negative interactions at work revolve around colleagues, superiors, subordinates and company culture. When the relationships between individuals are hampered, exchange of information becomes problematic, which reduces the ability to work effectively.²⁶

Incompetence was also identified as a stressor, as reported by Leung et al. (2011)²⁷ in a study in Hong Kong. When certain employees are not properly trained, they might cause stress to their colleagues.²⁷ Incompetence is also listed under the Maslach burn-out inventory components.²⁸ Reduced personal accomplishment is associated with a sense of failure to produce positive results and a feeling of being incompetent at work.²⁸

Some of the effects of stress that were identified by participants, such as physical deterioration, mental health problems, eating disorders, emotional problems, productivity loss, sleeping disorders, and absenteeism, have been reported in other studies on continuous stress in the workplace.^{3,27}

Stress coping mechanisms vary from person to person, and include refraining from eating, indulging in food, exercising and doing sport, having sex, laughing and joking, talking to significant others, self-isolating, watching movies, interacting with family, confronting the stressors, chewing nails, making use of support from management, and relying on family support. An individual's personality and coping strategies are amongst the factors that will determine how they manage stress.²⁶

STUDY LIMITATIONS

Other factors that might have improved employees' resilience to cope with stress were not taken into account in this study, e.g. other courses that formed part of the training and development programme for employees, such as time management, conflict handling and presentation skills. Openness during feedback might have been restricted, due to personal reasons. Maybe social desirability played a role here. This was a very small sample size and only 50% of the SMI programme attendees participated. However, there is no reason to believe that those who didn't participate would have had different perceptions of either causes of stress or the SMI.

RECOMMENDATIONS

A quantitative study should be conducted in the company to validate the results of this qualitative research. The combined results could be considered by the company in the design of future SMI programmes. SMIs should be conducted in more companies, and their effectiveness evaluated to improve the quality of the intervention and benefits to employees.

CONCLUSION

Causes of stress at the vehicle manufacturing company were identified as: remuneration and budget-related issues, lack of resources, incomplete job profiles, job insecurity, incompetence, deadlines, workload, type of job, interpersonal conflict, management style, and company ethics. An SMI programme that was initiated by the company was perceived by the employees as very being effective.

LESSONS LEARNED

1. An SMI can be very useful to destress employees.
2. Employees benefit from knowledge on how to identify stress.
3. Employees can be taught skills on how to manage stress.
4. Participants did not always remember all the content and details of company-initiated programmes.

DECLARATION

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

AUTHOR CONTRIBUTIONS

Conception and design of the study: HB, KF
 Data acquisition: KF
 Data analysis: HB, KF
 Interpretation of the data: HB, KF
 Drafting of the paper: KF
 Critical revision of the paper: HB, KF
 Accountability for all aspects of the work: HB, KF

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COVID-19 and its effects on the food production industry of South Africa

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INTRODUCTION

An outbreak of COVID-19 occurred at Tyson's pork-processing plant, Indiana, USA, in April 2020; more than 900 employees tested positive.¹ This resulted in the plant voluntarily closing in an effort to control the spread of the virus. While the outbreak was probably due to the long work hours and close contact of workers at the abattoirs and meat-processing plants, it has led to the question, "Will this affect food safety and act as another route of transmission for COVID-19?" A review by Pressman et al.² with references to Mycroft-West et al.³ and Van Doremalen et al.⁴ suggests that there is a possibility that meat can serve as a fomite. However, more research needs to be conducted in terms of how long the virus can survive on meat due to its biological nature and the chilling processes used.

There are many steps in the prevention of the spread of human diseases in abattoirs, e.g. sterilisation of equipment, daily health checks of personnel, and general hygiene spot inspections by government officials. Additional steps have been taken by the directors of the provincial veterinary public health departments in South Africa to control this risk, by sending guidelines to abattoir owners regarding the use of personal protective equipment (PPE), additional disinfection recommendations for equipment, and the management and monitoring of the health of workers.

Globally, the COVID-19 epidemic is impacting on food production.⁵ This is partly due to the adoption of stringency measures that have constrained the labour market, as well as economic impacts on demand.⁵ In South Africa, the government's goal is to maintain food security in the context of disease containment approaches, recognising that morbidity and mortality due to COVID-19 also impact on food production. Meat-processing plants in the USA, Europe and Australia have been sites of major outbreaks of COVID-19.^{6,7}

AFFECTED ABATTOIRS AND MITIGATION STRATEGIES IMPLEMENTED

The meat slaughtering and processing industries are under pressure as outbreaks among workers spur the pandemic. In the USA, at least 167 plants have had outbreaks, with 9 400 people having been symptomatically ill and 45 workers dying.⁸ Thirty-eight meatpacking plants have halted production since the start of the coronavirus pandemic.⁹

The concentrated nature of the industry is having a critical impact

on local supply and meat prices. On 28 April 2020, President Donald Trump signed an executive order to keep meat plants open, despite the ongoing outbreaks,¹⁰ to decrease the impact of a meat shortage. The order by the president did not prevent companies such as Tyson Foods, one of the largest US meatpacking companies, from shutting down four of its plants, along with three other companies, in the week of the announcement. What the executive order has provided is better access to PPE and a set of standards for protecting workers.

In Europe, countries that have reported outbreaks in abattoirs include Germany, France, Ireland and the Netherlands.¹¹ Despite Europe's attempt to increase health and safety protocols, more than 1 000 workers have tested positive.¹² The consequence was the temporary closure of the abattoirs, for periods ranging from one day to several weeks. Europe's industry comprises many small companies, allowing shutdowns to place the welfare of workers above the economic and production losses. Germany has gone so far as to ban meatpacking subcontractors via agencies as it recognises the role that they play in the exploitation of migrant workers.⁸ The new law will increase the cost of meat but will improve regulations surrounding the working and living conditions of workers.¹³⁻¹⁸

POTENTIAL EFFECTS OF COVID-19 ON THE FOOD INDUSTRY

Direct effects

Mass infection of employees has been seen at many meat-processing plants, globally. These outbreaks could have direct impacts on the industry itself following high numbers of absenteeism, resulting in an inability to complete work, a break in the supply due to the inability to slaughter, and the cancellation of shipments due to high infection rates and attempts to prevent further geographical spread of the virus.¹⁹

Another problem in the USA, due to the shutting down of abattoirs, is the large number of animals that have nowhere to go. Farms and feedlots work on a finely tuned set period to grow animals to slaughter. The closure of many abattoirs has disrupted the slaughter of these animals, causing a backlog of animals at feedlots. This has resulted in the increased euthanasia of animals due to decreased farming space and, therefore, a decrease in animal populations in general, leading to future meat shortages.²⁰

Indirect effects

In the USA, the meatpacking industry has doubled production outputs and reduced the cost of meat in the last three decades. While this may seem impressive, the hidden cost has been exposed to the coronavirus. The conditions under which employees work, commute and live are overcrowded. The industry is reliant on rural and immigrant populations for cheap labour to keep costs low and meat affordable to the consumer.¹⁰

Food safety security

Indicators of food security are food price levels, food inflation indices, and measures of local production.²¹ Consumers, at the start of the pandemic, unexpectedly began bulk buying of essential household

items, resulting in an unanticipated shortage of products on shelves which, in turn, caused instability in the supply chain. The South African government proactively supported food security by monitoring food prices and enforcing strict regulations on businesses to prevent price inflation. Businesses guilty of price inflation were penalised. At the beginning of the national lockdown, the prices of milk, eggs and cheese increased by 2.9% compared to a 0.7% increase for meat products.²² At the end of the five-week period, prices for all food categories had deflated except for milk, eggs and cheese, oils and fats, and 'other' foods.²² Local production of red meat in March 2020 did not decrease from that in January 2020.²² The meat industry is diverse in terms of large-scale farmers supplying high-throughput abattoirs, as well as

Table 1. Risk factors for disease in abattoirs and butcheries^{19,24}

Risk factor	Problem/reason	Solution
Structure of facilities and operation	Close working spaces do not allow for social distancing of 1.5 m	Fewer workers; slower speed lines to enable social distancing; physical barriers between workers; group workers to ensure less contact between different people
Socio-economic status of workers	Migrant labourers come to work despite being sick (cannot afford to lose jobs)	Stronger enforcement of labour laws; encourage sick workers to remain at home (apply for UIF, share sick leave, or take an advance in sick leave)
Overcrowded working conditions		Rearrange workforce and working hours; allow shift work so that there are fewer workers in the limited workspace at all times
Workers residing in densely populated residential areas and multigenerational households		Screening for COVID-19 symptoms daily; have a dedicated isolation room where a worker can remain if he/she feels unwell; identify the relevant healthcare facility to which a worker can be referred for treatment and quarantine if needed, as the home environment might not be suitable for self-isolation
Public/shared transport	Low income workers are predominately employed in the sector; cannot afford private transport	Provide dedicated private transport for workers where distance can be maintained, everyone wears a mask, hand sanitisation is done before entering the vehicle, and the vehicle is cleaned or sanitised after every trip
Cold conditions	Decreased immunity and increased virus viability ²⁵	Activate UV lighting in cold rooms once workers have left for the day
Loud machinery	Increased shouting and increased viral aerosolisation	Provide physical barriers for workers, e.g. face shields and masks; provide communication headsets; train workers to use non-verbal (physical) cues for silent communication as far as possible
Poor ventilation		Position fans so that they do not blow air from one worker onto another; install high-efficiency air filters ¹⁹
Humidity and temperature	For SARS-CoV-1 the dried virus on smooth surfaces has been reported to retain its full viability for 24 hours with a half-life of five days at temperatures of 22–25 °C and relative humidity of 40-50% (typical air-conditioned environment). ²⁶ Viability under similar conditions was reported for MERS-COV. ²⁷ No data were available for COVID-19, but caution should be taken until further research is done	Virus viability is rapidly lost (> 3 log ₁₀) at high temperatures and high relative humidity (e.g. 38 °C, and > 95%, respectively). In aerosolised form, human coronavirus 229E is generally less stable in high humidity ²⁸
Long shifts	Increased contact with virus; increased discomfort from wearing masks, resulting in incorrect use (e.g. not covering nose)	Stagger shift schedules; split days; increase frequency of breaks
Ineffective hygiene practices		Provide education and training, and posters to remind staff to wash hands and sanitise (with pictures to overcome language barriers)
Poor sanitation		Develop a standard operating procedure (SOP) to increase disinfection of high-touch surfaces with anti-viral agents
Tool and equipment sharing		Educate workers about the risk of contracting COVID-19 from tool sharing as well as check daily to ensure workers have their own tools
Uncomfortable masks worn for long hours		Increased breaks
Improper donning and doffing of PPE		Education and training
Increased contact in canteens		Increase sanitisation of surfaces; stagger break times; add barriers between chairs and tables
Other		Provide masks as part of PPE and wash daily with overalls; provide adequate hand wash basins with soap in dispensers and disposable towels to dry hands; develop a protocol for what to do when a worker is believed to be infected

low-throughput and rural abattoirs facilitating small-scale farmers. The government is providing financial relief schemes to distressed small-scale farmers.²³ These actions demonstrate that South Africa is unlikely to experience shortages of food.

Abattoirs and butchers – risk factors for transmission

Abattoirs in the USA, Europe and Australia have been identified as hot spots for outbreaks of disease. Butcheries form part of the meat supply chain and have therefore been added to the risk table (Table 1) as they share many of the risks with abattoirs.

Risk of transmission of the virus from infected workers to food products, and from food products to consumers

The stability of COVID-19 has been reported to be 72 hours on plastic, 24 hours on cardboard and 48 hours on stainless steel.²⁹ This is relevant for producers, retailers and consumers, as cardboard and stainless steel form the basis of most preparation surfaces or packaging materials. In a study conducted in 2010 at the University of Hong Kong, it was found that the SARS coronavirus can survive for at least two weeks after drying at temperature and humidity conditions found in an air-conditioned environment.²⁶

The best method to control the spread via fomites would be to stop the virus coming into contact with food products and equipment. This can be achieved by wearing PPE (especially face masks to stop respiratory spread and prevent workers from touching their faces), as well as regular handwashing and sanitisation of all surfaces.²⁴

When purchasing food items, consumers should sanitise and discard packaging in areas away from food preparation surfaces, and transfer plastic-covered items to other containers. Cardboard packaging poses a problem for sanitisation due to its porous and absorbent nature. Therefore, we suggest discarding the cardboard packaging, where possible, or allowing products to stand for at least 24 hours in a room away from other food, due to the viability of COVID-19 on cardboard.⁴

Coronaviruses are sensitive to heat and ultraviolet rays.³⁰ COVID-19 is stable at 4 °C and can be stored for several years at –80 °C.³⁰ It is sensitive to heat and can be inactivated in five minutes at 70 °C or at 56 °C for 30 minutes (the most commonly used method to inactivate COVID-19 in the laboratory).³⁰ In addition, 75% ethenol-, peracetic acid- and chlorine-containing disinfectants can be used to effectively inactivate COVID-19.²⁹

This information is important to consumers with regard to food preparation as the virus can survive refrigeration. We recommend storing raw and cooked meat separately and respecting cooking instructions, taking note of temperature and duration.

The virus is stable on inanimate objects at cold temperatures. What, though, is its stability on organic products such as beef, pork and poultry from abattoirs, or seafood, and what is the potential for transmitting the virus through consumers even if the cold chain is maintained? Research by Mycroft-West et al.³ suggests that, because meat is rich in heparan sulphate (glycosaminoglycans), this property can provide “anchors for COVID-19 to interact with host tissue epithelia”.³ While there is no evidence for foodborne transmission of COVID-19 at present, further investigation is warranted.²

Trade

COVID-19 is challenging food security and safety in both developed and developing countries. The World Organisation for Animal Health (OIE) has raised the issue of potential contamination of meat imported from countries with severe outbreaks. Globalisation has led to

international food trade agreements which contribute to food security. Countries are responsible for implementing practical systems in intensive agriculture as well as non-commercial/rural farms to protect human health along the food supply chain. Principles and guidelines have been developed by the Codex Alimentarius Commission³¹ (an international committee regulating food standards to contribute and facilitate fair practices of international food trade) to support the continuation of open food trade during production and distribution of food amidst the pandemic. The fundamental principles for reducing the risk of any contamination of food supply are environmental sanitation, personal hygiene and stringent food hygiene practices.³¹

In South Africa, ports of entry remain open to import and export agricultural commodities. South Africa is a net exporter. However, the minister of trade and industry was instructed by the Department of Agriculture, Land Reform and Rural Development to impose export restrictions should food products be in short supply.³²

To date, livestock species, including pigs, chickens and ducks, appear to be resistant to infection in experimental studies.^{33,34} It is hypothesised that livestock in contact with COVID-19 human cases have a high risk of exposure, as shown in cats.³⁵ Due to the lack of information on susceptibility of other livestock species, including cattle, sheep, goats and aquatic animals, one cannot rule out the role of food-producing animals and meat-processing in the pandemic, despite risk assessments and experimental studies showing no evidence.³⁵

The OIE ad hoc Group on COVID-9 and Safe Trade in Animals and Animal Products³⁵ has pledged to:

1. Monitor new knowledge related to COVID-19 that may affect risks to human health or animal health associated with international trade in animals or animal products
2. Monitor risk assessments for animals and animal products, regarding COVID-19 infection
3. Recommend if risk mitigation measures for trade may be justified while balancing science-based risk with other considerations.³⁵

CONCLUSION

The food production industry must actively implement practical and effective strategies to reduce the risk of outbreaks of COVID-19 within abattoirs and the meatpacking industry. These strategies can reduce the transmission of the virus between people via physical contact and aerosolised particles, allowing for continued food safety and security, and preserving continued trade to avoid negative economic impact.

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Legally compliant medical surveillance in the workplace

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Medical surveillance is an important intervention in contributing to employee workplace health. Medical surveillance programmes should meet the relevant legislative requirements to ensure legality. This article highlights the perception that, based on personal experience in occupational health practice, there is a common tendency for occupational health practitioners and employers to flout the legislation, thereby rendering their medical surveillance programmes invalid.

Medical surveillance is an important control measure to contribute to worker health and safety. The Occupational Health and Safety Act (OHSA)¹ defines medical surveillance as “a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or in prescribed cases by an occupational medicine practitioner”. The OHSA¹ defines biological monitoring as “a planned programme of periodic collection and analysis of body fluid, tissues, excreta or exhaled air in order to detect and quantify the exposure to or absorption of any substance or organism by persons”.

THE OBJECTIVES OF MEDICAL SURVEILLANCE

These include:

- Determining whether workers are physically and mentally fit to perform their jobs
- Establishing a baseline health profile for individual workers against which subsequent deviations and changes can be evaluated
- Preventing, detecting and treating occupationally related adverse health effects
- Ensuring workers are informed of the health hazards and risks associated with their work
- Ensuring that the work environment does not increase the risk of adverse health effects on workers
- Recommending appropriate interventions to protect the health of workers.

The OHSA¹ and the Mine Health and Safety Act (MHSA)² delegate responsibility to employers to ensure the health and safety of workers in the workplace. In accordance with legislation, every employer is obliged to identify the hazards to which workers are exposed in relation to any work they perform. Thus, every employer needs to ensure that risk assessments are conducted to identify hazards to health in the workplace. Furthermore, where hazards are identified, the employer is obliged to perform occupational hygiene assessments to quantify workers' exposure to hazards.

Regulations in the OHSA¹ and MHSA² stipulate that medical surveillance is mandatory where workers are exposed to specific hazards. Examples of applicable regulations include the Noise-Induced Hearing Loss Regulations,³ Asbestos Regulations,⁴ Hazardous Biological Agents Regulations,⁵ and Ergonomics Regulations.⁶

In order to meet the requirements of legislation regulating medical surveillance, employers are mandated to appoint occupational health practitioner(s) (OHPs) – as set out in Section 13 of the MHSA² and the Regulations of the OHSA¹ – to implement medical surveillance programmes. This regulation implies that OHPs, who include occupational nursing practitioners and occupational medical practitioners (OMPs) with the requisite qualifications in occupational health and occupational medicine, respectively, have a legal mandate to perform the examinations and tests in terms of medical surveillance.

Once appointed, the OHP assumes the responsibility to perform all duties in accordance with the scope of practice, competencies and medical ethics, which are legally defined.

Appointed OHPs tasked with implementing medical surveillance programmes should be familiar with the health hazards in the workplace. This familiarisation can best be achieved through direct participation in the risk assessment process to identify hazards to health. The hazards identified in the risk assessment will enable the OHP to develop occupational risk exposure profiles for each job category, which assist with the design and implementation of a hazard-based or risk-based medical surveillance programme, as required by legislation. The process outlined here invalidates the “spray and pray” approach, which subjects every worker included in the surveillance programme to the same battery of examinations and tests, irrespective of whether or not they are exposed to specific hazards.

The “spray and pray” or “one size fits all” approach is also likely to flout the Employment Equity Act⁷ (EEA) which, in Section 7, prohibits medical testing unless certain conditions are met, e.g. the test is required or permitted by legislation. Therefore, both the employer and the OHP are in breach of the EEA⁷ when prohibited tests are performed during medical surveillance programmes.

The legislation does not allow employers to decide what tests workers should undergo in the absence of a risk assessment. This raises the question of whether, in the absence of a valid risk assessment that meets the legislative requirements, a medical surveillance programme is legal. By extension, the issue is raised of whether OHPs who implement surveillance programmes in the absence of a valid risk assessment are in breach of professional ethics.

Under the International Code of Ethics for Occupational Health Professionals,⁸ the roles of OHPs should be clearly defined, which requires a clear understanding of occupational health practice and ethical principles. OHPs should be allowed free access to the relevant workplace and to relevant information needed for achieving occupational health objectives. OHPs should be recognised as experts in their field and must be allowed full professional independence when executing their responsibilities.

OHPs should avoid activities or situations that may compromise their integrity. They should not, under any circumstances, allow their judgement to be influenced by conflicts of interest. OHPs

should avoid being drawn into situations where perverse incentives influence their decisions regarding medical surveillance, e.g. ignoring ethics and sound practice principles to secure employment or work contracts.

OHPs should be aware that no legislation permits an employer to indemnify an appointed OHP from meeting the professional responsibilities as defined in occupational health and safety law.

CONCLUSION

In conclusion, OHPs should fulfil the role of gatekeepers in ensuring that medical surveillance programmes in the workplace are legally compliant. OHPs should avoid conflicts of interest. OHPs should strive to maintain the highest standard of ethics in the practice of occupational health.

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Sex, drugs and COVID-19

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President Cyril Ramaphosa announced that a national lockdown would commence on 26 March 2020 in response to COVID-19 or what some have labelled, the ‘panic pandemic’.¹ Since the start of the lockdown, reports and articles on the economic effect of the lockdown have been ubiquitous.²⁻⁴ The South African Reserve Bank (SARB) predicted that South Africa’s gross domestic product (GDP) would shrink by 6.1% in 2020 and other sources claimed that the contraction would be around 8%.^{2,5} Most sources noted that the unemployed and informal workers will suffer the most and that “the hardship will fall hardest on black people, and especially black women and children”.⁵

Although it is thus noted that the lockdown will have a worse influence on some than on others, the general belief seems to be that economic growth is beneficial for everyone while economic contraction harms everyone. This is based on the conceptualisation of ‘the economy’ as a homogenous and abstract system as well as an implicit faith in the ‘trickle-down’ effect.* This article argues that this assumption conceals some of the heterogeneous effects the lockdown has had (and will have) on different economic systems in South Africa (SA). In order to illustrate this point, I will discuss some of the effects of the lockdown on two economic systems that are sometimes (mistakenly) seen as separated from SA’s official economy, namely the informal economy and the illicit economy. Some of the gendered aspects of these economies will also be discussed, especially in relation to sex work which can be characterised as part of both the informal and illicit economies.†

The ‘trickle-down’ effect has been widely critiqued by academics and activists.^{6,7} Yet, in almost all of the media coverage concerning the impact of COVID-19 and the lockdown on ‘the economy’, it is assumed that this impact will be homogeneously damaging. It is clear that there will be massive job losses‡ and millions will be pushed further into poverty. Nonetheless, companies like Amazon, Microsoft, Oracle and Alphabet (Google’s parent company) have profited greatly. Lockdown situations around the world have led to increases in the number of people who work from home and shop online. Moreover, educational institutions, hospitals, police and military institutions are outsourcing more and more of their core functions to private tech companies.⁸

In the midst of a turn towards tech-alternatives and requests for a future run on artificial intelligence, it is important to remember that

these systems function because of human workers. Tens of millions of workers labour in warehouses, content-moderation mills, data centres, electronic sweatshops and lithium mines so that the economically advantaged can work from home and order online. Technology will certainly be a fundamental part of strategies to protect public health in the coming months and years, although this raises significant questions about how that technology will be used and under whose oversight – a discussion that falls outside of the scope of this short article. Instead, I used tech companies as a blatant example of how some sectors of ‘the economy’ have benefited, while others have suffered.

The position of technology companies is a rather obvious example of the heterogenous economic effects of lockdowns. If we turn our attention to the so-called informal and illicit economies, the effects become more complex. It is difficult to give an exact definition of ‘informal economy’ since it is so connected to the ‘formal economy’. However, the International Labour Organization’s (ILO’s) current working definition includes small, unregistered enterprises and all employment without adequate social and legal protection.⁹ Informal employment accounts for about a third of employment in SA.[§] Nonetheless, it has received very limited and narrow support from the government, and interventions usually consist of training and micro-finance loans centred on a very small group of informal workers.

Moreover, there are stark gender divides in informal employment. According to a 2015 analysis of SA’s labour market dynamics, women earn less than men within the same broad categories of employment and are also concentrated in the types of employment with the lowest pay.¹⁰¶ Since 1994, informal employment has made up a greater share of total employment for women than for men, mostly due to the fact that household and domestic work is classified as informal work.[¶] Childcare is also still commonly seen as ‘women’s work’ and this responsibility influences the incomes of female informal workers. For example, female waste-pickers often have to bring their children with them when they work in hazardous conditions on landfill sites. In an interview with Rogan and Alfes, a waste-picker from Durban explained that she found it difficult to keep pace with her male counterparts because she had to bring her child to work:

* Very basically, the ‘trickle-down’ effect or theory refers to the notion that policies that benefit the wealthy will benefit everyone because the profits will ‘trickle down’ into society.

† This also demonstrates how interconnected various economic systems are.

‡ Estimates are around 1 million in SA alone.⁵

§ The labour market in SA has historically been characterised by informality and flexibility because the apartheid system was based on highly flexible migrant and contract labour.¹²

| This is because informal economies (much like formal economies) often have a pyramid structure with employers being the group with the highest earnings at the top. Men make up the majority of employers and “moving further down the different levels of the pyramid, the risk of poverty increases, as does the percentage of workers who are women”.⁹

¶ About 70% of women in the informal economy work in domestic and ‘elementary’ occupations.¹²

“We collect recyclable materials by climbing into moving trucks when they enter the landfill. You need to act very quickly to catch up with the truck. We push each other whilst we are trying to get onto the back of the truck. Sometimes I don’t know what to do because I can’t leave my child on the ground. No one cares about you or your child. I no longer work as efficiently as I did when I didn’t have my child with me” (cited in: Rogan and Alfors, 2019⁹).

Gender-based violence (GBV) is also common in informal economies in SA. In preparation for the ILO’s 2018 Conference Discussion on GBV in the Workplace, Women in Informal Employment: Globalizing and Organizing (WIEGO) conducted a series of interviews with informal workers. During the interviews, a group of female waste-pickers from KwaZulu-Natal province reported that physical intimidation regularly impacted their incomes.¹¹ Male waste-pickers physically intimidated them in order to access the most valuable pieces of waste first, and forced them at knifepoint to buy recyclables.¹¹ The municipality provides security at the landfill site, however, generally, the officers do not intervene or they collect recyclables and sell them to the women in exchange for sex. Rape is also common and about two rape cases are reported per month.⁹ It is therefore evident that women in the informal economy often work in an environment of insecurity and fear, in which GBV and exploitation are widespread.

Before the lockdown, professor of Development Economics, Imraan Valodia, noted that “whilst the government offers a vast package of support measures to big business, its policy is largely irrelevant to the survivalist segment of small business”.¹² However, government policies have not been irrelevant. Not only do they support the big businesses against which survivalist entrepreneurs compete, but they sometimes negatively affect these entrepreneurs. For example, it is often difficult and expensive to access water in informal workspaces such as roadsides and markets. People who sell cooked food (mostly women) need access to water before they can start cooking, and frequently spend their peak selling time looking for water. Not only does this decrease sales but, in Durban, there is a municipal by-law which states that only a legal permit holder can oversee a trading stall. When the legal permit holder has to leave the stall to look for water, the goods can be confiscated by the police. One food seller in Durban declared that, “When I run around looking for water, sometimes I come back to my goods being stolen... the policeman comes and takes my things if I’m late. They ask for permits and they do their own theft” (cited in: Rogan and Alfors, 2019⁹).

There is also a ban on imported second-hand clothing in SA, with the aim of protecting clothing retailers. However, there is a large illegal market in second-hand clothes.¹³ When police officers catch sellers with illegal garments, they can impose a fine and confiscate the goods. This can demolish the income of survivalist sellers and even leave them indebted to the importers of second-hand clothes. This demonstrates how government policies are not necessarily irrelevant to survivalist entrepreneurs, but actively disadvantage them in favour of larger retailers. The second-hand clothing trade is also significant because it is located at the nexus between the informal and the illicit economies.

Sex work is another sector that is part of both the informal and illicit economies, again demonstrating how intertwined different economic systems are. In spite of outcries from non-governmental organisation (NGOs) such as the Sex Workers Education and Advocacy Taskforce (SWEAT), sex work has remained criminalised in SA. Selling and buying sex are illegal and other aspects of sex work, such as running or owning a brothel or “enticing a woman into prostitution”, are also prohibited.¹⁴ The criminalisation of sex work has not prevented people from selling sex to make a living, but has undermined sex workers’ access to justice and exposed them to exploitation and abuse by law enforcement officials. It is thus clear that sex work was already a precarious occupation before the lockdown. This is not only because the trade is criminalised and stigmatised, but also because sex workers are often from marginalised groups, such as migrants and gender non-conforming people who have been pushed out of their families because of homophobia.¹⁵

Along with most of the informal economy, sex work has been affected negatively by the lockdown. Sex work can be conducted online, as we shall see; nonetheless, it is generally physical and intimate work. South Africa has about 158 000 sex workers* who were already negatively impacted when fear of COVID-19 began to spread, since customers and workers were afraid of contracting the virus. The increased police presence since the start of the lockdown has certainly increased the risks associated with conducting sex work. Sex workers have also reported interruptions to condom supplies, and people living with human immunodeficiency virus (HIV) have experienced a decrease in access to essential medicines. Moreover, sex workers do not have access to some of the emergency assistance available to other workers. Many assistance schemes require proof that employment has been lost as a result of COVID-19 and, because sex work is criminalised, workers do not have the necessary paperwork and proof of unemployment.¹⁵⁻¹⁷

Organisations such as SWEAT and Sisonke have created solidarity fund raisers to assist sex workers, and there has been an increase in online sex work as people have attempted to adapt to lockdown conditions.¹⁸ This is where the definition of sex work becomes particularly pertinent. The United Nations (UN) defines sex workers as “female, male and transgender adults aged over 18 years who sell consensual sexual services in return for cash or payment in kind, and who may sell sex formally or informally, regularly or occasionally”.¹⁹ This definition highlights two fundamental characteristics of acceptable, but often criminalised, sex work: it must be consensual and the participants must be over the age of 18. From the discussion above it is evident that appropriate sex work has suffered due to COVID-19 and the lockdown. However, more illicit sex markets related to human trafficking and child pornography have flourished.

The Global Initiative Against Transnational Organized Crime (GIATOC) recently released a report about the ramifications of COVID-19 for human trafficking. The report noted that some forms of human trafficking, especially those related to the commercial sexual exploitation of children and domestic servitude, are likely to increase.²⁰ Since the start of lockdowns around the world, there has been an increase in online child sexual exploitation material (CSEM). The demand for CSEM has increased since more predators have been

* According to a 2013 study by SWEAT, these workers often support families of up to seven dependents with their incomes.¹⁶

confined to their homes, and the supply has increased as people have become more desperate to acquire incomes. The increased demand has also probably exposed children who were already being used for CSEM to greater frequencies of exploitation and violence.²⁰ Although the report does not mention it, it seems plausible that the increased frequency of exploitation might be related to the fact that schools are closed and children are more likely to be trapped in homes with their exploiters who are often also their caregivers.

It is not only children who have become more vulnerable. Due to an increase in movement restrictions, many migrants have been forced into immobility, "unable to continue on their journeys or return home".²⁰ Migrants who are continuing with their journeys are more reliant on smugglers for assistance in environments that are hostile to migration. Smugglers often have connections to traffickers who seem to be taking advantage of the situation. Trafficking and sex work are intertwined, and the GIATOC noted that sex workers are more exposed to trafficking during lockdown.*

Transnational criminal networks are often involved in multiple illegal activities, including human trafficking and trade in prohibited drugs. COVID-19 and its ramifications seem to have presented drug dealers with both challenges and opportunities. Challenges include disruptions in supply chains, restricted access to some markets, and blocked distribution channels.²¹ On the other hand, in countries such as Afghanistan,[†] the drug trade is a significant source of income for people with very limited options. As more people's livelihoods are diminished in the aftermath of COVID-19, the pool of exploitable labour that drug markets depend on widens, and workers become more likely to accept even worse terms, similar to the 'formal economy'. As the GIATOC noted, "structural changes caused by abrupt shocks tend to persist long after the shocks or crises are over".²⁰ In addition to a more desperate and cheaper labour source, COVID-19 might also lead to further monopolisation in illicit markets since the shock could 'weed out' the weaker organisations. This will evidently harm some organisations, while it is likely to benefit others in the long term.

It is probable that supply chains of opium-based drugs (primarily heroin) will be disrupted. Conversely, the drug expert, Jason Eligh, stated that the supply of crystal meth or tik in SA is unlikely to run out in the near future.²¹ In spite of this, many drug dealers have raised their prices based on the assumption that buyers will expect prices to rise in the midst of COVID-19. There has also been an increase in the sale of 'adulterated' drugs.[‡] In some cases, this has been the consequence of actual supply-chain disruptions, and in other cases, dealers have been opportunistic.²² Organisations have also found creative ways to transport drugs, and crystal meth has been found in shipments of medical supplies and food parcels. The last few months have also seen a rise in the trade of fake pharmaceuticals, especially medicines linked to COVID-19. Fake or counterfeit medicines are often sold online and can contain dangerous ingredients if they are

not properly formulated. Sellers of fake pharmaceuticals are exploiting widespread fear and panic to sell their products.²³

It is impossible to discuss illicit markets without mentioning the ban on alcohol and cigarettes in SA. Reporting on the ban has largely discussed it in a negative light. The tax income that the state is losing as a consequence of the ban has received notable attention. Hellen Ndlovu, the director of Regulatory and Public Affairs at South African Breweries (SAB), was cited in multiple articles. She emphasised that excise tax and value-added tax (VAT) would be lost. She claimed that SAB would have paid R14 billion in excise taxes this year, which equates to an average monthly contribution of more than R1 billion that will be lost as a consequence of the ban.²⁴

There was already a well-established illicit alcohol market prior to the lockdown; the illicit trade in alcohol was valued at R13 billion in 2017, which accounts for more than 15% of the total alcohol market in SA.²⁵ There is no doubt that the ban on alcohol, which was partially lifted in late April, boosted the illicit trade.[§] In almost all of the articles that discuss the alcohol ban, the licit and illicit sale of alcohol are seen as completely dichotomous. However, many of the beverages that are sold on the black market are obtained from the licit market, albeit not always in licit ways,[|] and sold by people who do not have liquor licences. This also implies that the initial tax has already been paid on beverages that are resold.²⁶ This factor was not accounted for in SAB's calculations of lost tax revenues. It also implies that the ban did not harm everyone, but harmed some and benefited others. While SAB's profits evidently decreased, many organised criminal cartels and smaller backyard brewers have benefitted. Although the ban has ended, it seems as if cartels have seized the opportunity to grow their business and strengthen their stronghold in the market.²⁷

Similar to the illicit trade in alcohol, there was already a booming trade in illegal cigarettes prior to the lockdown. Illegal cigarettes accounted for about 33% of the cigarettes sold in SA and approximately 42% of the informal market. Illegal cigarettes come from a variety of sources. They can be smuggled into SA from neighbouring countries via illicit networks or they can be counterfeit versions of legitimate cigarette brands. However, the bulk of illegal cigarettes sold in SA come from "local, licenced tobacco manufacturers who do not declare all their manufactured product to the South African Revenue Services (SARS)".²⁸ Not only are the manufacturers of illegal cigarettes well known, but they are also reported to be significant funders of multiple political parties, including the African National Congress (ANC) and the Economic Freedom Fighters (EFF).²⁹ The same cartels who are involved with human trafficking and narcotics also collect revenues from selling illicit cigarettes and alcohol, and it seems likely that their power has increased during the lockdown.

It is critical not to conflate 'licit' and 'illicit' with 'good' and 'evil', as most of the news articles about illicit markets did. As in many other parts of the global south, gangs and cartels exercise a great deal of territorial control in regions of SA and, in many cases, they can

* One reason for this is that sex workers frequently live in the places they work and the closure of brothels, bars and nightclubs has heightened their risk of losing their accommodation along with their livelihoods. One inspiring trend is solidarity groups that have formed among sex workers. For example, in Amsterdam, sex workers have set up a crowd funding initiative to support their peers.²⁰

† About 90% of the world's opium is produced in Afghanistan.³⁸

‡ Adulterated drugs are mixed with other substances that decrease the purity.

§ It is important to note that beer is the most commonly sold type of alcohol in the legal market, while illicit traders focus on high margin, low volume products and are more likely to sell hard liquor. Licit and illicit traders thus focus on different types of demand.²⁵

| There has been a sharp increase in the looting of alcohol stores and storage facilities since the start of the lockdown.²⁷

become arbiters of governance and power. Gangs often protect the communities in their territories in order to maintain local legitimacy, and can become figureheads of stability in times of crisis. Gangs and cartels can thus become entrenched in local governance. In SA, this is clearly the case in some suburbs of the Cape Flats, such as Steenberg, where the Mongrels exercise a great deal of authority. Since the start of the lockdown, the Mongrels (under the leadership of Leon 'Poppie' Meyer) have set up soup kitchens to feed people in one of SA's poorest communities. Naxz Modack, another underworld figure, has launched feeding schemes in Eldorado Park in Johannesburg and in Cape Town. He has commissioned security companies to deliver food parcels and pots of food to multiple poor communities, predominantly in Manenberg, Bonteheuwel, Athlone and Mitchells Plain.²²

Distributing food parcels certainly does not justify the violence and brutality that cartels and gangs inflict. However, it is important to remember that state apparatuses also inflict violence and brutality. Activists in the recent #BlackLivesMatter protests have highlighted this, but it has also been evident in reports of police violence against lockdown violators and protestors in countries such as SA and Zimbabwe.^{30,31} There are almost innumerable histories recounting the violent actions of nation states and, as we saw from the example of the illicit cigarette trade in SA, state actors sometimes benefit from illicit markets. Moreover, there is not always a sharp distinction between licit and illicit markets, as demonstrated by the fact that illicit alcohol is often obtained from licit sellers but sold by people without liquor licenses. It is, of course, true that gangs do not always distribute food out of pure altruism and that they benefit from community loyalty in the long term. However, as Leon Meyer observed, "Why does that lady go to that drug merchant asking for help? Ask her, because the politicians and government officials come when they want the votes, and when they've got their vote it's all over" (cited in: Hyman, 2020²²).

The literature on gender, drugs and crime has tended to emphasise women's victimisation, and there is a recurring narrative of dependence, exploitation and dysfunction.³² In contrast, the state has attempted to represent itself as a protector of women's rights and a champion of gender equality. During President Cyril Ramaphosa's national address on 17 June 2020, he discussed GBV as "another pandemic that is raging in our country". He mentioned various steps that the government was taking to curb GBV and commended the South African Police Service (SAPS) for their "excellent work in arresting almost all of the alleged perpetrators". This evidently ignores the fact that SAPS officers are often perpetrators of GBV, as demonstrated by the example of SAPS officers abusing female waste-pickers. Moreover, he blamed GBV on "the actions of violent men"³³ Although this seems obvious on a shallow level, it ignores more structural drivers of GBV and individualises the problem.

In reference to victims of GBV, President Ramaphosa even claimed that "we will speak for them where they cannot"³³ Although the president did not specify who this 'we' is, he was presumably speaking on behalf of the government. The narrative that emerges is thus one that presents the state as the protector of women against violent men. This is problematic for various reasons. As mentioned, it individualises GBV. Furthermore, it creates a 'good' versus 'evil' dichotomy between the state and 'violent men'. The president did not only present these men as separated from society but, in an

earlier address on GBV, he stated that they were attacking "the very foundation of our democratic society" and "our common humanity".³⁴ If violent men are depicted as outside society or as 'attackers' of society, then we run the risk of overlooking the complex drivers of GBV within our societies.

It is also worrisome that the state is allegedly speaking 'for' victims of GBV. This again perpetuates the notion that women are merely helpless victims who cannot speak for themselves and have to be protected by the (masculine) state. It can be argued that the president was speaking on behalf of deceased victims. However, this is still problematic because it overlooks the voices of thousands of protestors who continue to demand action on GBV. The state was thus not speaking for people who have been affected by GBV, but was responding to the outcries of survivors and activists.

In order to disrupt the narrative of the valiant state as the protector of women against violent men, we should also recognise the agency of women in illicit economies. Women in illicit economies, particularly in those related to drugs and sex work, do experience discrimination and are often victims of GBV. However, as the sociologist Tammy Anderson reminded us, "the situation is not quite as simple as it has been made out to be: 'victimisation' and 'empowerment' can be, and often are, inter-related".³² On the one hand, men are more likely to occupy more lucrative and higher status roles in illicit drug economies, and male actors in these economies often live out violent masculinities. According to Anderson, this gives men 'structural power', especially in relation to the possession of resources.

On the other hand, women exercise a more relational form of power that enables illicit economies to function. This is particularly evident in the realm of sex work which supplies "the drug economy with necessary money capital".³² Due to socially constructed gender roles, women often act as facilitators in drug deals and do a lot of the 'behind-the-scenes' work that supports drug markets.* Although men still generally hold structural power in illicit economies, women's 'supporting' roles are not necessarily performed for men's benefit. Anderson argued that "While it is true that women's agency does not earn them a more structurally recognized position of power in the illicit drug market, less recognized is that their agency may empower them to better excel in future conventional (i.e. legal) activities than their male counterparts".³²

Anderson's discussion of women's agency in illicit economies supports the argument that there is not a 'good' versus 'evil' dichotomy between licit and illicit markets. In fact, when seen through a gendered lens, it seems as if illicit economies are structured relatively similarly to licit economies. In both cases, 'women's work' is central to the functioning of markets, yet it is often overlooked. In relation to illicit economies, Anderson noted that "the market is dependent on their agency, yet it disallows their accumulation of structural power".³² This same point is equally applicable to the 'formal' economy which depends on women's capital as consumers and on their 'behind-the-scenes' labour. Moreover, women are allowed to become 'empowered' within the 'formal' economy but are discouraged from changing its structure. The argument that women's roles in illicit economies sometimes enable them to participate more effectively in 'formal' economies again challenges the distinction between different economic systems.

* This 'behind the scenes work' includes, but is not limited to: providing housing, subsidising male dependency, and purchasing and selling drugs (Anderson³²).

As mentioned at the start of this piece, reports and articles on the economic effect of the lockdown have been ubiquitous. Concurrently, President Ramaphosa declared that the state would implement an economic strategy that will “drive the recovery of our economy”.³⁵ According to Finance Minister Tito Mboweni, this strategy involved stimulus measures that would amount to R800 billion. This included the monetary response of the South African Reserve Bank (SARB) which cut the interest rate and made concessions to banks. In order to benefit from the stimulus package, spaza shops would have to have licences and bank accounts and be registered with SARS.³⁶ The stimulus package includes a COVID-19 block exemption for the retail sector. However, other businesses that want to access funds have to be owned by South Africans (thus excluding migrants); they have to “demonstrate strong business fundamentals” and have a detailed business plan. They also have to be able to demonstrate that they will recover within 18–24 months.³⁷

This article has attempted to demonstrate that speaking of ‘the effect’ of the lockdown on ‘the economy’ is highly misleading. Similarly, claims that the stimulus package will save ‘our economy’ obscures the heterogeneous repercussions that it is likely to have. The previous paragraph mentioned only a few of the policies in the government’s stimulus package. However, we can see that retailers and banks are likely to benefit while people working in the ‘informal’ economy could become even more marginalised. The situation becomes more complex when we consider the links between different economies in SA. This was demonstrated by the fact that illicit tobacco sellers often obtain their products from larger licit tobacco manufacturers. At first glance, it thus seems as if the illicit cigarette trade is flourishing to the detriment of the licit trade, but this is clearly an oversimplification.

Furthermore, it is problematic to assume that licit economies are ‘good’ while illicit economies are ‘evil’, as much of the reporting on the two interrelated economies did. This was demonstrated by the fact that cartels and gangs are supplying food parcels to struggling communities. This does not mean that the brutal actions of gangs are justified. Instead, we can see similarities between the ways in which gangs and governments function. This point becomes clearer if we consider the gendered aspects of illicit markets, since they are analogous to the gendered dimensions of licit markets. This also disrupts the government’s narrative on GBV, which positions the (masculine) state as a protector of women against ‘evil’ men. All of these factors have implications for the policies that are adapted in response to COVID-19. Summarily, we cannot assume that a stimulus package will benefit ‘our economy’ because this leaves crucial questions unasked. Who will benefit and in which ways?

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AUDA-NEPAD COVID-19/OSH regional response activities

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INTRODUCTION

The global impact of the COVID-19 pandemic has been unprecedented with significant, extensive and far-reaching consequences for the health and safety of working populations. Africa has not been spared despite the pandemic shifting much later into the African space than most other continents. The pandemic has disrupted the working space and affected all workplace-related safety and health programmes. This includes activities such as workplace tuberculosis (TB) and HIV programmes, due to the shift of attention to the pandemic. As the pandemic gathers momentum in Africa, an urgent need has arisen to guide the continent in articulating strategic and intelligent responses to curtail the potentially devastating effects of COVID-19. As of 7 August 2020, the 55 African Union (AU) member states reported 976 208 confirmed cases, 21 050 deaths and more than 651 455 recoveries from COVID-19. To date, South Africa is heavily affected, with more than half (53%) of the cases on the continent; six nations in Africa account for 78% of the confirmed cases.¹ If the epidemiological and scientific predictions are correct, the continent is likely to see a drop in the number of cases as it moves out of the winter season. However, this might not be entirely true, primarily due to the implemented lockdown and use of masks that might have assisted to curb the spread of the normal flu virus as well as SARS-CoV-2.

Tuberculosis amongst healthcare workers in southern Africa was the leading occupational infectious disease prior to the COVID-19 pandemic. Health workers are particularly vulnerable to the drug-resistant tuberculosis contagion, a risk that is exacerbated by the COVID-19-induced personal protective equipment (PPE) shortages and their quality challenges, and general staff shortages that have crippled TB and HIV care at primary healthcare facilities. This is further exacerbated by fear of healthcare workers to perform even cardiopulmonary resuscitation (CPR) on patients with breathing difficulties, as it is perceived to be dangerous. We cannot forget the high prevalence of tuberculosis and occupational lung diseases in this region.

In response to the COVID-19 pandemic, the African Union Commission, African Union Development Agency (AUDA-NEPAD), and International Labour Organization (ILO) assumed key and strategic roles in guiding the African continent through several key

initiatives, including the development of key occupational safety and health (OSH)/COVID-19 guidance documents and policies, and on-going training and education on COVID-19 and OSH at workplaces. Through the harnessing of available continental expertise and home-grown solutions, the AUDA-NEPAD championed the setting up of an AU OSH expert group to spearhead the African response to COVID-19.

KEY ACHIEVEMENTS

World Day for Safety and Health at Work commemoration

AUDA-NEPAD and the ILO organised the World Day for Safety and Health at Work commemoration as part of the response to accidents and occupational injuries awareness. The World Day was held on 28 April 2020, under the theme *Stop the Pandemic: Occupational Safety and Health Can Save Lives*. The sub-theme was *Saluting health workers in the fight against COVID-19*. This was facilitated through AUDA's newly-established AU Expert Group. Three hundred and sixty-nine participants from 38 African countries and 11 countries outside Africa attended the webinar. Speakers were drawn from the ILO, African Union Commission (AUC), AUDA-NEPAD, International Organisation of Employers (IOE-Africa), International Trade Union Confederation (ITUC-Africa), Africa Centre for Communicable Diseases (CDC), and OSHAfrica. Messages of support came from Mr Rene LeBlanc, president of the International Occupational Hygiene Association (IOHA); Ms Claudina Nogueira, International Commission on Occupational Health (ICOH) vice president for Scientific Committees, and Mr Kevin Hedges and Ms Marianne Levitsky from Workplace Health Without Borders (WHWB).

AU EXPERT GROUP AND SUB-COMMITTEES

The African Union Commission (AUC), AUDA, ILO, and other OSH technical and developmental partners established an AU OSH Expert Group in response to the impact of COVID-19 on OSH in workplaces. The committee is divided into two sub-committees, viz. the OSH/COVID-19 Guideline Committee, and the OSH/COVID-19 Training Committee.

Table 1. OSH/COVID-19 guidelines

#	Publication title and ISBN	Contributors	Reviewers
1	AU COVID-19/OSH Risk Assessment Guidelines ISBN: 978-1-990962-91-2	Mr Norman Khoza ^a Mr Sean Chester ^b	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ Mr Wellington Mudenha ^o Dr Dingani Moyo ^e
2	NEPAD AU COVID-19/OSH Guidelines for Mining Industries ISBN: 978-0-621-48631-5	Mr Norman Khoza ^a Dr Talkmore Maruta ^c Dr Thuthula Balfour ^d	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ Dr Dingani Moyo ^e
3	AU COVID-19/OSH Guidelines for the Occupational Safety, Health and Wellness of Health Workers ISBN: 978-0-621-48632-2	Dr Dingani Moyo ^e	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ
4	AU COVID-19/OSH Guidelines for Education Sector ISBN: 978-0-621-48633-9	Dr Charles Mburu ^f Dr Onyimbo Kerama ^g Ms Petrina Nghidengwa ^h Ms Peneyambeko Alina Munkawa ⁱ	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ Mr Norman Khoza ^a Dr Dingani Moyo ^e
5	AU COVID-19/OSH Guidelines for Food and Retail Sector ISBN: 978-0-621-48634-6	Ndinomholo Hamatui ^j George Mwiya Mukosiku ^k Peneyambeko Alina Munkawa ⁱ	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ Dr Dingani Moyo ^e
6	AU COVID-19/OSH Clinical Occupation Health Guidelines ISBN: 978-0-621-48635-3	Dr Dingani Moyo ^e Dr Lanre Ajayi ^l	Ms Bulelwa Huna ^m Ms Elizabeth Lourens ⁿ Mr Warren Mallon ⁿ Ms Jabulile Mhlophe ⁿ Dr Talkmore Maruta ^c Dr Dingani Moyo ^e

^a AUDA-NEPAD; OSH specialist, South Africa; ^b SAIOH registered occupational hygienist, APEX Environmental, South Africa; ^c Senior laboratory specialist, ECSA-HC, Tanzania; ^d Occupational health specialist, Minerals Council South Africa, South Africa; ^e Specialist occupational physician & OSH consultant, Baines Occupational Health Services, Zimbabwe; School of Public Health, University of the Witwatersrand, South Africa; ^f Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya; ^g Occupational health specialist, DOSHS designated health practitioner, Kenya; ^h Deputy director, OHS, Ministry of Labour, Industrial Relations and Employment Creation, Namibia; ⁱ OSH specialist, ILO, Decent Work Team for east and southern Africa (based in Zambia); ^j Namibian Institute of Environmental Health Research (Pty), Namibia; ^k Chief inspector of factories, Ministry of Labour and Social Security, Zambia; ^l Occupational physician and OSH consultant, Medbury Medical Services, Nigeria; ^m Senior specialist, Occupational Health and Hygiene, Department of Employment and Labour, South Africa; ⁿ Specialist, Occupational Health and Hygiene, Department of Employment and Labour, South Africa; ^o SHEQ specialist, South Africa

TECHNICAL CONTENT TEAM

Ms Andriette Ferreira: AUDA-NEPAD Knowledge management design
 Ms Buhle Hlatshwayo: AUDA-NEPAD Communication specialist
 Ms Nthabiseng Moiloa: AUDA-NEPAD Projects administrator
 Mr Brian Mutale Nga'ndu: AUDA-NEPAD Monitoring & evaluation specialist

OSH/COVID-19 GUIDELINES DEVELOPMENT

The OSH/COVID-19 Guideline Committee has developed six guidelines to date. These were developed by experts on thematic areas, reviewed by subject specialists, and translated into French and Portuguese. Table 1 provides details about the guidelines.

OSH/COVID-19 REGIONAL TRAINING

During the first phase of the AU training interventions, 12 training sessions were conducted. Training modules were presented by several subject experts from across the continent:

1. Setting up a coordination team and workstreams to monitor COVID-19 in the workplace
2. Epidemiology and management of COVID-19 in the workspace
3. Return-to-work post-COVID-19 illness and lockdown
4. Impacts of COVID-19 on the workplace: OSH context
5. COVID-19 health risk assessment
6. Available control measures in workplaces related to COVID-19
7. Rational use of personal protective equipment (PPE) during COVID-19
8. Medical screening and testing for COVID-19 at different workplaces
9. Cleaning of hands and environment, including decontamination
10. What to do when an employee tests positive for COVID-19
11. Information management and utilisation including research
12. How can trade unions assist their members during the COVID-19 pandemic?

More than 900 individuals were trained from all over the globe, with the majority from Africa (Figure 1). Countries represented included Algeria, Benin, Botswana, Cameroon, Chad, the Democratic Republic of Congo, Djibouti, Egypt, Eswatini, Gambia, Ghana, Cote d'Ivoire, Kenya, Lesotho, Liberia, Malawi, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, Somalia, South Africa, Tanzania, Tunisia, Uganda, Zambia, and Zimbabwe. A number of participants were from outside Africa.

REFERENCE

1. Coronavirus – African Union Member States (55) reporting COVID-19 cases (976,208) deaths (21,050), and recoveries (651,455). Africanews. 2020 Aug 5. Available from: <https://www.africanews.com/2020/08/05/>

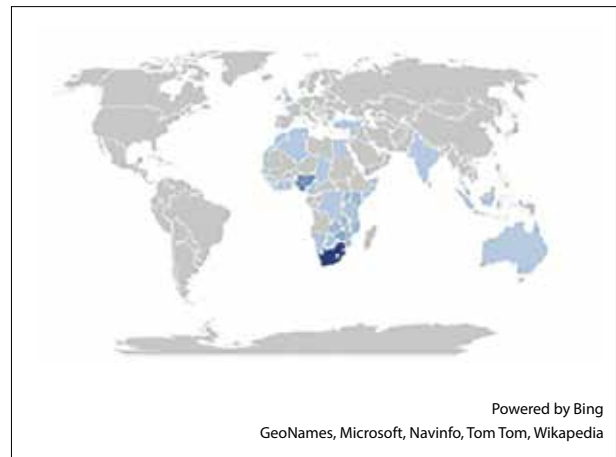


Figure 1. Heat map, indicating countries that participated in the training

CONCLUSION

AUDA-NEPAD and its partners recognise that COVID-19 might be here for some time and, hence, the AU Expert Group was established with a sustainability focus post-COVID-19. The sub-committees are continuing their work with the Training Committee and are planning for phase two. The Guideline Committee is developing two guidelines on the informal sector and infection prevention and control (IPC). The committee will focus on OSH technical guidelines and training post-COVID-19.

RESOURCES FOR UPDATES ON PROJECT ACTIVITIES

Website: <http://www.satbhss.org/>
 Twitter: https://twitter.com/SATBHSS_Project
 Facebook: <https://www.facebook.com/SATBHSS/>
 YouTube: <https://www.youtube.com/channel/UCpfa6BVEg8WhTDIgyDLwfAg>

[coronavirus-african-union-member-states-55-reporting-covid-19-cases-976-208-deaths-21-050-and-recoveries-651-455/](https://www.africanews.com/2020/08/05/coronavirus-african-union-member-states-55-reporting-covid-19-cases-976-208-deaths-21-050-and-recoveries-651-455/) (accessed 5 Aug 2020).

African OSH and Labour Inspectors Network: a strategic initiative of OSHAfrica

Ehi Iden, President, OSHAfrica, Ikeja – Lagos, Nigeria, e-mail: ehi@oshafrika.africa, www.ohsm.com.ng

This strategic project was initiated by OSHAfrica to fill the gap in occupational safety and health (OSH) and labour inspection across the African continent. It is difficult to appreciate and organise workplace health and safety because different standards are used across the 54 countries. Therefore, OSHAfrica explored the issue with the aim of bringing together all relevant actors to share their experiences and learn from each other.

The International Labour Organization's (ILO) Labour Inspection Convention 81 of 1947¹ outlines the requirement for countries to have systems of labour inspection in industrial workplaces. The ILO Convention 155 of 1981 sets the expectation for member states to have "coherent national policy on occupational safety, occupational health and the working environment".² Virtually all African countries have signed and ratified these Conventions and have thereby committed to develop OSH and labour inspection standards and policies. Workplace inspections ensure that organisations implement practices that provide decent and safe workplaces and the protection guaranteed to workers by social laws and regulations.³

Inspectors are also required to report any observed gaps or defects in legislation and processes to governments for further review and implementation.⁴ Thus, the role of inspectors goes beyond inspection of workplace practices to providing feedback to policymakers in order to strengthen existing OSH and labour legislation. We should, therefore, see workplace health and safety inspection as a very important component, without which the system is not complete.

OSHAfrica gathered information on the staffing of inspectorates from discussions that we had with directors of occupational safety and health or factory inspectors in five African countries. The findings are summarised in Table 1.

In our review of OSH and labour inspection in Africa, we identified three critical issues that are common across countries:

- understaffing
- underfunding
- inadequacies in training

While understaffing and underfunding are beyond the immediate sphere of influence of OSHAfrica, we can advise governments on improved staffing and better funding. We decided to contribute to improving the competency and training of inspectors through the creation of OSHAfrica's African OSH and Labour Inspectors Network. This new, strategic forum brings together all OSH and labour inspectors in order to enable inspectors to 'function rightly', and to build capacity and improve competence. To date, we have recruited 222 inspectors from more than 18 African countries, mainly from the western, southern and eastern African sub-regions. Efforts are underway to improve membership from northern and central Africa. Once this has been achieved, the network will be launched formally.

We have set up a Telegram group for network members to share information and ask questions. Through this forum, inspectors in different countries will be able to assist each other. OSHAfrica will be reaching out to several international agencies for support. These include the International Association of Labour Inspectors (IALI), the International Labour Organization (ILO), German Social Accident Insurance (DGUV), European Network Education and Training in Occupational Safety and Health (ENETOSH), and others.

OSHAfrica has three functional scientific committees that can be leveraged to support the network in line with their mandates. We have observed that many inspectors do not have the requisite training or that the training received is grossly insufficient. Appropriate training and retraining programmes, focusing on skills improvement, are required. The Education and Competency Improvement Scientific Committee will support these activities by offering training support, while the committee on Research, Data and Publication will assist in developing strategies to improve data collection and reporting. The OSH Legislation and Policy Improvement Scientific Committee will use its expertise to support member countries to strengthen labour legislation.

Through these efforts, we hope to harmonise OSH and labour inspection across Africa and improve the wellbeing of workers.

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6. Worldometer. Available from: <https://www.worldometers.info/world-population/ghana-population/> (accessed 3 Aug 2020).
7. Worldometer. Available from: <https://www.worldometers.info/world-population/nigeria-population/> (accessed 3 Aug 2020).
8. Worldometer. Available from: <https://www.worldometers.info/world-population/south-africa-population/> (accessed 3 Aug 2020).
9. Worldometer. Available from: <https://www.worldometers.info/world-population/zambia-population/> (accessed 3 Aug 2020).

Table 1. Number of labour inspectors in, and mid-year populations of, five African countries

Country	Number of inspectors	2020 mid-year population ⁵⁻⁹
Egypt	520	102 334 404
Ghana	50 (there are plans to recruit another six)	31 072 940
Nigeria	750 (from < 350 before 2019)	206 139 589
South Africa	170	59 308 690
Zambia	13 (there are plans to recruit another 13)	18 83 955

These are the women who make up South Africa's COVID-19 occupational health outbreak response team

This being Women's Month, we salute South Africa's extraordinary occupational health experts who are leading the country on national COVID-19 guidelines and procedures, online training and education, as well as surveillance and research. This is with the objective of promoting health and safety in workplaces across the country. The national COVID-19 Occupational Health Outbreak Response Team (OHORT) was established soon after the outbreak of the pandemic in South Africa, bringing together various experts and collectively carrying out rigorous daily online training, across many sectors of society, to mitigate the burden of the disease.

These experts have trained essential frontline healthcare workers, CEOs, paramedics, government departments, retailers, shop stewards, the food industry, security and cleaning personnel, and many other sectors on how to deal with COVID-19 cases. These

detailed training sessions include – but are not limited to – what employers should do when a worker tests positive, control measures for workplaces, screening protocol, cleaning and decontamination procedures, compensation matters, the correct methods of donning and doffing of personal protective equipment (PPE), how to carry out biorisk assessments, and guidelines for all other aspects relating to COVID-19. They have worked tirelessly and continue to train workers from both the formal and informal economies. They are mothers, daughters and sisters, but they are also exceptional leaders from the National Institute for Occupational Health (NIOH), a division of the National Health Laboratory Service (NHLS). The NIOH is a World Health Organization (WHO) Collaborating Centre and a Mine health and Safety Council (MHSC) Centre of Excellence.



DR SPO KGALAMONO

Dr Kgalamono is a renowned expert in occupational medicine and is presently the acting executive director for the NIOH. She has over 20 years' experience in occupational health and holds a joint appointment at Wits University's School of Public Health. Over the years, Dr Kgalamono has received many

awards and, in 2011, the Public Health Association of South Africa recognised her as one of the three most influential women in public health in South Africa. She sits on several committees, including the International Working Group on Occupational Diseases, and the Medical Bureau for Occupational Diseases Review Authority.

Research Laboratory for airborne TB detection in workplaces. She sits on several committees, including the International Labour Organization and the WHO.



JEANNETH MANGANYI

Ms Manganyi is a registered occupational hygienist and head of the NIOH Occupational Hygiene Section. Prior to joining the NIOH in 2009, she worked at a private approved inspection authority (AIA) and was involved in both qualitative and quantitative exposure assessments in a wide range of industries, including iron and

steel, railways, power utilities, manufacturing and office buildings. Ms Manganyi is also involved in teaching and training, as well as critical research into respirator fit testing and facial anthropometry for respirator design. Through this, she aims to improve the protection of workers using tight-fitting respirators. Ms Manganyi also serves on technical committees as part of advisory support.



DR TANUSHA SINGH

Dr Singh is the head of the Immunology and Microbiology Section at NIOH and the OHORT chair. With over 21 years of experience in occupational health, she is the recipient of a number of research grants, and holds a joint appointment with the Department of Clinical Microbiology and Infectious Diseases at Wits University.

She is revered for pioneering the Bioaerosol Monitoring Unit – the only one of its kind in South Africa – and the Aspire laboratory, a novel initiative and the only one globally. Dr Singh also spearheaded the development of the Airborne Mycobacteria Tuberculosis



DR NISHA NAICKER

Dr Naicker is head of the NIOH Epidemiology and Surveillance Section, responsible for carrying out critical research, including policy development projects. She is a National Research Foundation-rated scientist and an associate professor in the Faculty of Health Sciences at the University

of Johannesburg. Dr Naicker is also an honorary senior lecturer in the School of Public Health at Wits University, and a research associate in the Faculty of Health Sciences at the Nelson Mandela Metropolitan University. She sits on numerous committees, including the International Commission on Occupational Health (ICOH) Scientific Committee on Unemployment, Job Insecurity and Health.



DR ODETTE VOLMINK

Dr Volmink is a medical doctor, an occupational medicine specialist, and one of the lead COVID-19 trainers. She worked in the public hospital setting, both in urban and rural areas in South Africa, before heading to the United Kingdom, where she was first introduced to the field of occupational medicine. Since returning to the country, Dr Volmink joined

the NIOH and has both a clinical and teaching role in occupational medicine. This includes work with different universities as well as delivering training in the registrar programme in occupational health and public health medicine. She also serves in an advisory role on technical committees at the Department of Employment and Labour.



DR MPUME NDABA

Dr Ndaba is an occupational medicine specialist and one of the lead COVID-19 trainers. She is also a fellow of the Public Health College of Medicine in SA and has 15 years of experience in the occupational health environment. At the NIOH, she prepares course material and undertakes public health training programmes at Wits University

and the University of Pretoria. Dr Ndaba is also deeply involved in the NIOH specialist occupational medicine clinic, where she attends to patients who have been referred from a variety of settings, including workplaces. She compiles medical reports, provides expert reviews, clinical advice, and also participates in operational research activities. Dr Ndaba further serves as a member of the Reviewing Committee of the Medical Bureau for Occupational Diseases.



DR SAMANTHA IYALOO

Dr Iyaloo is an occupational medicine specialist, and operates the COVID-19 Workplace Hotline. She previously worked as a medical epidemiologist at the Centre for Healthcare-Associated Infections, Antimicrobial Resistance and Mycoses at the National Institute

for Communicable Diseases (NICD). She assisted in setting up epidemiological surveillance systems, data analyses, disease outbreak investigations and epidemiological research reports. Dr Iyaloo was awarded a Field Epidemiology Fellowship at the NICD, rotating field placements in Enteric Diseases and the Outbreak Response Unit. She assisted with outbreak investigations and worked specifically on situational analyses and surveillance activities during the 2013 Orange African Cup of Nations, hosted in South Africa.



MS ANGEL MZONELI

Ms Mzoneli is the head of Information Services and Training and has over 20 years of experience in her field. She was instrumental in the consolidation of libraries following the merger of Peninsula and Cape Technikon. She serves in various committees, mentors students

and has helped them establish resource centres for non-governmental organisations. Ms Mzoneli's areas of expertise include knowledge and information management, project management, strategy and policy development, change management, and general management.



MS MIRANDA RAAFF

Ms Raaff is a communications specialist, having come from a strong media background as a seasoned journalist and editor. She also served as a deputy director for communications at the Department of Telecommunications and later delved into the world of public relations (PR).

She brings a wealth of experience with regard to media strategy, marketing and content development. In 2018, Ms Raaff was part of a small PR team that scooped several local and international awards for its work on the Siemens Fabric project. Among the accolades were a Platinum Award for Campaign of the Year in Africa at the 2019 EMEA Sabre Awards, gold and silver medals at the Prism Awards, a silver medal at Creative Circle; and a Gold Award at the Loeries. So pioneering and innovative was this communications campaign that it was tweeted by the Presidency, and short-listed for a Cannes Lion 2019 Award.

For more information on the NIOH training, please go to <https://www.nioh.ac.za/>

SASOM international liaison report on OCCUCON 2020: Mumbai, India, 28 January–1 February 2020

Claudina Nogueira, Occupational health consultant/Project manager, University of Pretoria (South Africa)

ICOH vice president: Scientific Committees (2018–2021), WHWB board member, SASOM ExCo member, e-mail: claudinanogueira@hotmail.com

Daan Kocks, SASOM chair and ICOH national secretary for South Africa, e-mail: info@sasom.org

Jaco Botha, Project co-ordinator in the SASOM national office, e-mail: info@sasom.org

The International Conclave on Occupational Health 2020 (OCCUCON 2020) and associated conferences were held in Mumbai, India from 28 January to 1 February 2020, with the overall theme *Healthy Worker: Key to Productivity and Sustainability*. More than 200 delegates participated, representing 25 countries across six continents. The venue was the Nehru Centre, a memorial to Jawaharlal Nehru, an Indian independence activist and, subsequently, the first prime minister of India. The Centre aims to promote the teachings and ideals of Nehru through educational and cultural programmes and has hosted many scientific, cultural and educational activities since its official launch in 1972.

MUMBAI, 'THE CITY OF DREAMS'

The city of Mumbai, previously known as Bombay, is a veritable melting pot of ethnicities, cultures, religions and backgrounds, making it one of the most vibrant cities in the world, and the fourth most populous (close to 22 million in 2020). The most densely populated city in India, it is the capital of the state of Maharashtra and is fast becoming a developed and industrialised hub, with a booming tourism industry and bustling businesses, in contrast to the more traditional activities and occupations of yesteryear, in agriculture and fishing. It is also home to some of India's premier scientific and nuclear institutes. Mumbai is well known for the stark contrast between the rich and poor; while there are several slums, the city also houses the highest number of billionaires and millionaires in the country, making it India's wealthiest city.

The state of Maharashtra is famous for its caves and rock-cut architecture, as in Ajanta Ellora Caves, a United Nations Educational, Scientific and Cultural Organization (UNESCO) world heritage site. Some of the temples in Maharashtra are more than 1 000 years old. The city itself is home to three of the most popular UNESCO world heritage sites – the Elephanta Caves on Elephanta Island, Chhatrapati Shivaji Terminus (or the Victoria Terminus), and the Victorian and Art Deco ensemble of buildings.

The city dwellers, known as 'Mumbaikars', lead a fast-paced life and spend much of their time commuting from place to place, in this bustling and vast metropolis. They are hard-working, passionate and approachable people who move with the times, and are leaving behind the more traditional and entrenched lifestyles dictated by caste, creed and colour.

The culture of this dynamic city is a boisterous blend of cuisines, languages (mainly Marathi, followed by Hindi, Gujarati, English, and other dialects), food, arts and crafts, cinema (the city is the home of the 'Bollywood' film industry) and festivals. The 'Mumbaikars' are zealous about fine arts and the theatre, embracing many different styles of music and folk dancing (e.g. Koli, Powada, Banjara Holi and Lavani). There is a diversity of religions in Mumbai due to the widespread growth of various communities and migrants; the 'Mumbaikars' are mostly a concentrated mix of Hindus, Muslims, Zoroastrians, Christians, Jains and Buddhists.

A city of many contrasts and a few 'firsts' – first train, first public bus service, first airport and first five-star hotel in India – Mumbai



The Chhatrapati Shivaji Terminus, formerly known as Victoria Terminus, is the headquarters of the Central Railway and a UNESCO world heritage site

Source: pixabay.com, image by Sushil Sam



OCCUCON 2020 was held at the Nehru Centre in Mumbai and was attended by more than 200 delegates, representing 25 countries across six continents

Photographs: Courtesy of IAOH and OCCUCON 2020 organisers



can be said to be the financial (stock market centres and the Reserve Bank of India), commercial (global reach) and entertainment (Bollywood) capital of India. A visit to this 'City of Dreams', be it for business, leisure or both, is bound to be a colourful, unforgettable experience, and an assault on the senses, in every respect!

THE INTERNATIONAL CONCLAVE ON OCCUPATIONAL HEALTH 2020

OCCUCON 2020 was divided into two events, viz. 1) the Scientific Programme of the International Commission on Occupational Health (ICOH), and 2) the 70th National Conference of the Indian Association of Occupational Health (IAOH, an affiliate member of ICOH) held jointly with the 68th Annual Conference of IAOH – Mumbai branch. South Africa was represented in the form of presenters and delegates who are members of the South African Society of Occupational Medicine (SASOM, an affiliate member of ICOH) and two of its sister organisations, viz. the South African Society of Occupational Health Nursing Practitioners (SASOHN) and the Mine Medical Professionals Association (MMPA).

28 TO 30 JANUARY 2020

The first event was the ICOH Scientific Programme, with the theme *Keys to Sustainable Occupational Safety and Health (OSH): Evidence, Practice and Collaboration*. In an historical first for ICOH, the following eight ICOH Scientific Committees (SCs) collaborated to organise and host a joint conference as part of OCCUCON 2020, in close partnership with the IAOH: Effectiveness in Occupational Health Services; Education and Training in Occupational Health; Rural Health: Agriculture, Pesticides and Organic Dusts; Mining Occupational Safety and Health; Occupational Health in the Construction Industry; Occupational Health and Development; Occupational Health in Small-Scale Enterprises and the Informal Sector; and Occupational Health in the Chemical Industry (MEDICHEM). The ICOH Scientific Programme comprised keynote plenaries, parallel oral sessions, special sessions, poster sessions, workshops, round tables, interactive expert panels and business meetings organised by the eight ICOH SCs and IAOH, both as individual SC tracks and as joint collaborative sessions between two or more SCs. Keynote plenaries were delivered on the following topics:

- Evidence-based guidelines in OSH: What can we share? – Prof. Carel Hulshof (the Netherlands)
- Sustainable development for occupational health professionals: The chemical sector view – Dr Murray Coombs (South Africa), chair of the ICOH SC on Occupational Health in the Chemical Industry (MEDICHEM) and SASOM member
- Keys to agricultural workers' health: Some challenges ahead – Prof. Gert van der Laan (the Netherlands)
- Global and local health effects of mercury exposure in artisanal and small-scale gold mining – Dr Erik Jørs (Denmark), Chair of the ICOH SC on Mining Occupational Safety and Health
- Vision Zero: The global future to prevent accidents and diseases at work – Prof. Karl-Heinz Noetel (Germany)
- How to measure the quality and effectiveness of our education: Theory versus practice – Prof. Lutgart Braeckman (Belgium)
- Integrating basic occupational health services into primary care – Dr Garth Manning (CEO of the World Organization of Family Doctors (WONCA), based in Thailand)



Inaugural function and awards evening – L to R: Dr Ashish Mishra (president of the AIOH Mumbai branch and current ICOH national secretary for India), Dr Shrinivas Shanbhag (Conference chair and past ICOH Board member), Prof. Seong-Kyu Kang (ICOH vice president for National Secretaries and guest of honour at OCCUCON 2020), Ms Claudina Nogueira (SASOM ExCo member and ICOH vice president for Scientific Committees), Dr Ramnik Parekh (OCCUCON 2020 'chief guest' and patron), Dr Sidram Raut (national president of IAOH), and Dr Hitesh Shingala (general secretary of IAOH)

Photograph: Courtesy of IAOH and OCCUCON 2020 organisers

- Experiences on OSH of small and medium enterprises (SMEs) and informal economy workplaces – Dr Tsuyoshi Kawakami (senior specialist in OSH and Labour Inspection in the ILO Decent Work Technical Support Team in New Delhi, India)
- Interventions for betterment of health and safety in SMEs and the informal sector – Prof. Somnath Gangopadhyay (India), secretary of the ICOH SC on Occupational Health in Small-Scale Enterprises and the Informal Sector
- Occupational health through primary or community care: Leading to universal occupational health care (India) – Dr Ramnik Parekh (India), 'chief guest' and patron of OCCUCON 2020, fellow of WONCA, and recipient of Lifetime Achievement Awards from four OSH societies in India, among many other achievements and honours
- Efforts in increasing coverage of occupational health services to the workers community in Indonesia – Dr Astrid Sulistomo (Indonesia)
- Basic occupational health services in Thailand: Current perspectives and future challenges – Dr Somkiat Siriruttanapruk (Thailand)
- The *Sir Ardeshir Dalal Memorial Oration* titled 'Health and wellbeing @ workplace: Key to business growth' was presented by Dr R Rajesh, immediate past president of IAOH and past ICOH national secretary for India

Special sessions, expert panel discussions and round tables covered the following topics:

- Scientific evaluation of education
- Alternative for mercury in small-scale gold mining
- Prevention of silicosis and tuberculosis – with a contribution from South Africa by Dr Khanyile Baloyi (Minerals Council South Africa and MMPA member) who presented 'Prevention of tuberculosis in mining: Practical experiences from South Africa'
- Basic occupational health services – with contributions from South Africa by Dr Muzimkhulu Zungu from the National Institute for Occupational Health (NIOH) and the University of Pretoria (UP) who presented 'Health reforms in South Africa: Are occupational health services going to improve?', and expert panel member Ms Claudina Nogueira (UP, SASOM ExCo member, and ICOH vice president for SCs)

- Educating future OSH professionals and managers and workers in OSH – with a contribution from South Africa by Ms Angie Butkovic (University of the Witwatersrand and SASOHN member) who presented ‘Assembling an inter-professional core curriculum for occupational health practitioners’

The sessions of the ICOH SC on Rural Health were dedicated to global warming and climate change, and a badge inscribed ‘Stop Global Warming’ was handed to delegates who attended these sessions, as a goodwill token. The chair of the ICOH SC on Rural Health, Dr Sashikala Chandrasekar (India), kicked off the first SC session on 29 February with an overview presentation on the causes and impacts of global warming and climate change. Ms Claudina Nogueira (South Africa), ICOH vice president for SCs and SASOM ExCo member, was invited to contribute to the programme, and delivered the second presentation titled ‘The myriad faces of climate change: Lessons for occupational and public health’, which focused on impacts on health and the environment, some examples from developing countries, and suggestions for preventive measures that can be applied to reduce the effects of global warming. A short video on the effects of global warming was screened between the first and second presentations of this session, to create awareness about this hot topic. The screening was appreciated by the delegates, even though it delivered a sombre ‘take-home’ message and sounded many alarm bells in the room. In the second part of this session, members from the SC presented on their topics of expertise and interest, as indicated below:

- Dr Erik Jørs (Denmark), chair of the ICOH SC on Mining Occupational Safety and Health, presented examples on how and why local small-scale OSH interventions in agriculture can suddenly have national impact
- Dr Mahinda Seneviratne (Australia), chair of the ICOH SC on Small-Scale Enterprises and the Informal Sector, presented on health hazard communication
- Prof. Pierluigi Cocco (Italy) presented on lymphoma risk following exposure to organic dusts in agricultural occupations
- Prof. Susan Brumby (Australia) delivered a presentation titled ‘I didn’t think it mattered – Needlestick incidents in the livestock sectors in Victoria, Australia’
- Dr Praveen Vemula (India) presented on prophylactic technologies to prevent pesticide-induced toxicity and mortality
- Dr Sara Arphorn (Thailand) delivered a presentation titled ‘Farmer’s health: Working conditions and behaviour’

The following workshops were offered:

- Chemical exposure: From environment to epidemiology (MEDICHEM)
- Basic occupational hygiene for small enterprises
- Wikipedia for OSH engagement and impact



The sessions of the ICOH SC on Rural Health were dedicated to global warming and climate change, and a badge inscribed ‘Stop Global Warming’ was handed to delegates who attended these sessions, as a goodwill token

Photograph: Dr Sashikala Chandrasekar

- How to find online information on OSH efficiently and effectively
- Ergonomic assessment of construction tasks
- Core values at work
- Orientation to occupational health: Current and future challenges (workshop for safety and engineering professionals)
- IAOH Mumbai branch workshop

29 JANUARY TO 1 FEBRUARY 2020

The second event was the 70th National Conference of the IAOH held jointly with the 68th Annual Conference of the IAOH Mumbai branch, with the same overall theme *Healthy Worker: Key to Productivity and Sustainability*. The inaugural function was held on the evening of 29 January, and included entertainment of traditional music by an ensemble of medical doctors with different specialties from across India, who demonstrated their musical abilities. This vibrant offering was followed by the presentation of the IAOH annual awards (national association and branches) and the inaugural dinner. The first plenary session on 30 January was common to both events. The following orations were presented in plenary sessions over the remaining two days:

- The *Dr KM Bhansali Oration* titled ‘Radiation and Health’ was presented by Dr Hemant Haldavnekar, past president of the IAOH Mumbai branch
- The *Dr CK Ramchander Memorial Oration* titled ‘Vision Zero for zero harm in working women’ was presented by Dr Sashikala Chandrasekar, chair of the ICOH SC on Rural Health
- The *OHSF-IAOH Mumbai Branch Oration* titled ‘Capacity building in occupational health: Challenges and opportunities in India’ was presented by Dr Shyam Pingle, ICOH Board member and past president of IAOH
- The *Dr JC Kothari Memorial Oration* titled ‘Mental stress: Its impact on non-communicable diseases and performance in the workplace’ was presented by Dr S Shivaramakrishnan, past president and general secretary of IAOH and past ICOH national secretary for India
- The *Worksafe India Oration* titled ‘Update on occupational health in South Africa’ was presented by Ms Claudina Nogueira, SASOM ExCo member and ICOH vice president for SCs

Other topics of interest that were covered in semi-plenary sessions included:

- International perspectives on occupational health, presented by Prof. Seong-Kyu Kang (Republic of Korea, ICOH vice president for National Secretaries and guest of honour at OCCUCON 2020) and Prof. Malcolm Sim (Australia, president of the ICOH2021 (now ICOH2022) Congress in Melbourne)
- Case studies on best practices in occupational health
- Chemical burns: International review and recommendations for management
- Use of technology towards cervical cancer elimination
- Artificial intelligence-enabled preventive healthcare
- Combating fatigue and tiredness in the workplace
- Intersection of industrial hygiene, and occupational health and medicine
- Role of occupational health in driving inclusion and diversity
- Mental wellbeing in the workplace
- Technology in occupational health
- Integrated occupational health services across oil refineries in India
- Epidemiology in India: Opportunity of utilisation in occupational health



- The labour code and occupational health
- Clinical tools for workplace ergonomics
- Adult immunisation and release of guidelines developed by IAOH and leading experts in India

The hosts and organisers of OCCUCON 2020 and associated conferences are to be congratulated for a very successful and well attended event that was efficiently run. The scientific content of the presentations across the five days was of a very high standard, and the conclave offered all participants who represented various stakeholders the ideal opportunity to network and update their knowledge in various aspects of occupational health. Selected abstracts from both events have been published as OCCUCON 2020 proceedings in a special issue of the *Indian Journal of Occupational and Environmental Medicine (IJOEM)*, the official publication of IAOH (Vol. 24, Supplement 4, January 2020).

A special word of thanks and appreciation is extended to all members of the various conference committees who made OCCUCON 2020 possible and successful, and, in particular, to the following 'movers and shakers': Dr Sidram K Raut (national president of IAOH); Dr Ramnik Parekh (OCCUCON 2020 'chief guest' and patron); Dr Shrinivas M Shanbhag (conference chair and past ICOH board member); the organising secretaries, Dr Ashish Mishra (president of the AIOH Mumbai branch and current ICOH national secretary for India) and Dr Nikunj Desai (secretary of the AIOH Mumbai branch); Dr S Shivaramakrishnan (conference director, logistics and resource); Dr Thirumalai Rajgopal (chair of the Scientific Committee) and his team of magicians – Dr Suvarna Moti (ICOH scientific convenor), Dr Damodhar Lele (OCCUCON scientific convenor), Dr Shyam Pingle (conference international collaboration advisor and current ICOH board member), and Dr (Maj.) Bishwadeep Paul (conference international collaboration coordinator and current vice president of IAOH); and the leadership of the eight ICOH SCs (chairs and secretaries).

To quote Dr Thirumalai Rajgopal from his editorial in the special issue of the IJOEM, "Good health is indeed good business! Apart from being the profitable thing to do, improving employee health is quite the right and responsible thing to do. OCCUCON 2020 looks set to be a catalyst in strengthening occupational health in the country".

A special word of thanks is extended to IAOH and the OCCUCON 2020 organisers for permission to publish photographs of the event and the use of the IAOH logo.

NEWS FROM THE SASOM NATIONAL OFFICE

The SASOM national office in Pretoria has relocated to new premises in Montana, after being based in Meyerspark for many years. The new contact details are as follows:

- Physical address: Plot 59, Dr van der Merwe Avenue, Montana, Pretoria (new)
- Postal address: PO Box 32, Silverton, 0127 (unchanged)
- Telephone number: +27 (0) 87 288 0893 (new)

The outbreak of the novel coronavirus, resulting in the current COVID-19 global pandemic, has placed additional responsibilities on all who are involved in health services, in general. During these unprecedented and challenging times, the prominence of SASOM has come to the fore, through the escalation in workload by continuously keeping its members abreast of

relevant information pertaining to COVID-19, as well as liaison with national and international stakeholders such as the Department of Employment and Labour's 'Occupational Health Forum', the *Occupational Health Southern Africa* (OHSa) journal, ICOH, and the International Occupational Medicine Society Collaborative (IOMSC). The role of the ICOH national secretary for South Africa, executed through the SASOM national office, has also increased substantially because of COVID-19 and other infectious diseases.

A memorandum of understanding (MoU) was recently signed between SASOM and the Compensation Fund, paving the way for future collaboration between the two institutions in terms of research, teaching and raising their individual profiles.

A second MoU was signed between SASOM and MEDICHEM for secretarial services and support to MEDICHEM through the SASOM national office. Activities under this agreement commenced with effect from 11 March 2020.

The webinars presented by the National Institute for Occupational Health (NIOH) have been well received and found to be invaluable for SASOM members in terms of ongoing updates on various aspects pertaining to the pandemic.

The OHSa journal has been adversely affected by the COVID-19 pandemic and the editorial board was forced to fast track the move of the journal to an electronic platform. SASOM played a pivotal role in engaging all parties to find an amicable solution to ensure the sustainability of the journal during these uncertain times and into the future. SASOM contributed greatly to the process of digitalising the OHSa journal in so far as conceptualising access control is concerned, for members of the occupational health societies. SASOM will, in future, also host the meetings of the editorial board of the journal on its Zoom platform, free of charge.

The aforementioned developments have reiterated the prominent role that SASOM is playing as the leading authority in maintaining good cooperation between societies and other stakeholders in occupational health and medicine in South Africa.

As mentioned in the previous issue of the journal, the SASOM Annual Congress, which was scheduled to take place in Pretoria from 31 July to 1 August 2020, has been postponed indefinitely. Details about the possibility of hosting a one-day conference, followed by the annual general meeting in Pretoria at the end of this year, will be communicated to all members once there is more clarity on the pandemic situation.

In light of the inevitable suspension of face-to-face events for professional development, SASOM has started offering virtual training opportunities to its members. The main objective of the virtual training/education sessions is to enhance medical and clinical decision-making skills for occupational medicine practitioners (OMPs) to better manage COVID-19-infected employees with chronic comorbidities. Clinical decision-making skills, in terms of comorbidities related to the respiratory, cardiovascular, and metabolic systems, were identified by SASOM members as hot topics for the virtual training.

The first free Zoom webinar was hosted by SASOM on 14 July 2020 on the topic 'Standardisation of spirometry: 2020 update'. Eighty-seven members registered for this session, which was presented by Ms Lindsay Zurba, director and training manager at Education for Health Africa.

SASOM webinars are accredited by the South African Medical Association (SAMA) for Continuing Professional Development (CPD points/CEUnits) for all participants. Biweekly virtual training sessions are planned for the remainder of 2020; details will be communicated to members as they become available.



Norman Khoza:
2020 SAIOH
president

SAIOH president's message

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In this newsletter

- Notable national and international days and their link to the COVID-19 situation
- Role of occupational hygiene in COVID-19, and the situation in South Africa
- Media releases and SAIOH position papers
- PCC and Council changes
- From the PCC

SAIOH: SERVING OUR MEMBERS

- With a database of close to 900 members, SAIOH's communication channel is the perfect platform on which to advertise occupational hygiene and related jobs, workshops, symposia, and other events, as well as to share relevant information.
- SAIOH is planning its 1st Virtual Annual Conference later this year, to continue to provide a platform for learning, information sharing, networking, and development.
- Improvements and digitalisation are rapidly moving ahead within the PCC space, with regard to oral assessment methodology changes and online assessments.
- SAIOH continues to market the profession, most recently through preparing position papers on COVID-19 aspects, and subsequent media releases and a radio interview.

This is an unprecedented year indeed. We have come to recognise that the current 'new normal', as it is called, comes with many burdens. We have learned a few lessons about the adversities imposed on ordinary workers. The question is, what do we mean when we say work from home? Have we thought about schoolwork, data, and power supply (especially on the African continent)? People might be working from home, but it looks like people are working longer hours compared to previous working schedules. In this newsletter, we explore aspects of COVID-19, as well as the role of occupational hygiene in these trying times.

CELEBRATED NATIONAL AND INTERNATIONAL DAYS AND THEIR LINK TO THE CURRENT GLOBAL CRISIS

This year's World Youth Skills Day was celebrated on 15 July 2020 under the theme *Skills for a Resilient Youth in the Era of COVID-19 and Beyond*. We must acknowledge that, this year, the celebration proceeded under particularly challenging circumstances. The COVID-19 pandemic and lockdown measures had resulted in the closure of educational institutions. The World Bank, United Nations Educational, Scientific and Cultural Organization (UNESCO), and International Labour Organization (ILO) estimate that about 70% of the world's learners are currently affected by the school closures, and the majority might not catch-up. The question is, what can the southern African professional bodies do to accelerate skills development in Africa?

On 12 August 2020, the world celebrated International Youth Day under the theme *Youth Engagement for Global Action*. There is a need to highlight the importance of engaging young people at local, national, regional, and global levels to enrich multilateral institutions. The theme of the Day resonated well with that of

International Nelson Mandela Day on 18 July 2020, which was *Take Action, Inspire Change and Make Everyday a Mandela Day*. On 9 August, South Africa celebrated National Women's Day in commemoration of the approximately 20 000 woman of 1956 who submitted a petition against the pass laws. Interestingly, all the above events resonate with the important UN international day, World Humanitarian Day (19 August), that pays tribute to aid workers who risk their lives in humanitarian service and support people affected by crises around the world.

We are in the midst of a catastrophic crisis. It's visible in the high rate of gender-based violence (GBV) in South Africa, the world grappling with the scourge of COVID-19, people losing their jobs, Ebola and bubonic plague outbreaks, the Black Lives Matter movement, the increasing number of farm murders in South Africa, crumbling economies, and psychosocial issues. If I put myself in the shoes of someone who is categorised as COVID-19 high-risk – being 60 years or older and/or living with one or more chronic condition/s – it is a frightening thought. What does work from home mean? What if my job does not allow me to work from home? The biggest crises I have ever come across are workplace inequalities and prejudices, and the current crises add to this.

THE ROLE OF OCCUPATIONAL HYGIENISTS DURING THE COVID-19 PANDEMIC AND OTHER PUBLIC HEALTH EMERGENCIES

What is the role of an occupational hygienist in COVID-19 and other public emergencies, such as Ebola and tuberculosis? Workplace hazards may include pathogen exposure, long working hours, psychological stress, ergonomic hazards, fatigue, burnout, stigma, and physical and psychological violence and harassment.¹ Occupational

hygiene is a discipline of anticipation, recognition, evaluation and control.² The first and foremost responsibility of the occupational hygiene professional is the prevention by means of exposure control, through a comprehensive understanding of occupational hazards, whether biological, physical, chemical, ergonomic or psychosocial, and the link between health and safety. Occupational hygiene professionals are trained to identify and understand hazards in the workplace, and to institute efficient and cost-effective control measures. A comprehensive understanding is needed of the causes of occupational hazards, sources and exposure paths, modes of transmission, routes of exposure or entry into the human body, doses, target organs, and the means and ways of breaking the chain that results in worker exposure. The first points of departure are the health risk assessment, workplace monitoring or analysis, and institution of sector- and activity-specific control measures.

In the case of SARS-CoV-2, occupational hygiene professionals carefully consider the conventional hierarchy of controls, i.e. containment/isolation of the risk factor, use of engineering measures that promote proper ventilation of rooms, characterisation of the procedures and organisational measures, and the use of suitable personal protective equipment (PPE).^{3,4} Appropriate selection of efficient and cost-effective controls is the art and science of the profession. This process includes a comprehensive understanding of the workplace processes, the workforce and its limitations, the raw materials used and the by-products, respirator fit testing, and hazard limitations. The SARS-CoV-2 virus can remain viable on surfaces for up to 72 hours; therefore, there is no need to disinfect a work area that has been locked for an extended period. Occupational hygienists can assist workplaces to select proper respirators with correctly assigned protection factors (APFs), using scientifically based methodology to calculate the correct APF of the respirator.

THE COVID-19 SITUATION IN SOUTH AFRICA

What can we learn from COVID-19 cases and deaths in South Africa? Approximately 79% of those who died with COVID-19, as of 29 June 2020, were older than 60 years.⁵ We use the word 'with' due to the nature of the available statistics. Globally, statistics indicate that people older than 60 years are at an increased risk of dying from COVID-19. About 24% of those who have succumbed to the infection are aged 50–59 years; this group should also take extra precautionary measures. About 56% of those who have died with COVID-19 were suffering from comorbidities (mainly diabetes and hypertension).⁶ This is not surprising, considering that the World Health Organization (WHO) reported that 9.8% of all deaths in South Africa in 2016 were attributed to diabetes (7.7% of males and 11.8% of females).⁷ More recent studies have reported a prevalence of diabetes of 12.7% in South Africa.⁸ The problem is that there are many people who are not aware that they have diabetes. Approximately 52.5% of those who have died with COVID-19 were male, females accounted for about 47.4%.⁵ There is no statistically significant difference in the proportion of deaths between males and females; we are all in this 'war' together.

There is a need to think about the exposome, which is a measure of exposures in an individual's lifetime, and how it relates to health.⁹ Exposure begins before birth and continues for a lifetime. No country wants a situation where future generations will

be denied work due to diseases or conditions that could have been prevented and/or eradicated. The occupational hygiene profession must influence work policies to respond to current challenges. What does it mean when workplace policies state that workers older than 60 years or those with chronic diseases should work from home? What about those who are unable to work from home? The best strategy is collective safety management to ensure that everyone is safe in and outside of the work environment.

PROFESSIONAL CERTIFICATION COMMITTEE (PCC) AND COUNCIL CHANGES

We extend a warm welcome and congratulations to Mr Andrew Dickson, the new PCC vice-chair. Andrew graduated from Wits University with a Bachelor of Science degree (Natural Sciences) in 1991 and completed his national service training before spending a year overseas. Following his return in 1995, he joined Geozone Environmental (then Hindoc) as an intern/assistant and was bitten by the occupational hygiene bug. From 1997 to 1999, he completed the British Occupational Hygiene Board Exam, and was awarded a Diploma on Professional Competence in Occupational Hygiene (cum laude) from the British Institute of Occupational Hygienists (BIOH) in November 2000. He is a registered occupational hygienist (ROH) with SAIOH and has been working for Geozone Environmental Pty (Ltd) for more than 20 years, as an occupational hygiene consultant, gradually moving up to his current position as technical manager: occupational hygiene. Andrew was always keen to find a way to give something back to the profession and joined the Professional Certification Committee (PCC) in the early 2000s. He has served as a member and lead assessor, and member of the PCC and the Examination Committee, ever since.



Andrew Dickson
Photograph: SAIOH



Naadiya Mundy and her husband, Calvin Mundy
Photograph: SAIOH

We congratulate Ms Naadiya Mundy (previously Nadasen) on her marriage. The wedding took place on 4 July 2020. Naadiya was elected on to the SAIOH National Council during last year's AGM, which took place at the African Pride Mount Grace Resort. Naadiya commented that she and her husband had a relaxed and good day celebrating with only their families. She wore her mother's wedding dress which is now 47 years old. We wish Naadiya and her husband a long and happy life together, full of joy and happiness.



MEDIA RELEASE AND POSITION PAPERS

Mr Deon Swanepoel, the SAIOH Council member responsible for the Technical Portfolio, had an informative interview with Radio Sonder Grense (*Spektrum*), a South African Broadcasting Corporation (SABC) Afrikaans radio station, on the topic of SARS-CoV-2 aerosol transmission. A big thank you to our general manager, Deon Jansen van Vuuren, who organised the interview, and Deon Swanepoel for drafting the position paper used in the interview. This was the second position paper released in less than a month. The first one was on disinfectant tunnels. These two position papers were preceded by a media release on the role of the occupational hygiene practitioner during the COVID-19 pandemic and during return to work. We give special thanks to Prof. Cas Badenhorst and Mr Sean Chester who came up with the initial idea, and especially to Sean for drafting the media release statement. We encourage our members to read these informative documents, which can be found at <https://www.saioh.co.za/page/Resources> on the SAIOH website.

To listen to the interview, please visit the SAIOH website. The media release and position papers were circulated by Mailchimp to all SAIOH members and stakeholders and are also available on the SAIOH website. Many thanks to the SAIOH administrative team

for a job well done in placing the occupational hygiene profession and SAIOH on the map.

PCC UPDATES

The SAIOH PCC written assessments took place nationally, on Friday 26 June 2020, with candidates writing their assessments at nominated venues. This method posed numerous challenges to the candidates and the PCC administrative team. We would like to thank candidates and their invigilators for ensuring fair procedures and maintaining integrity.

The SAIOH PCC team has again met with the information and communication technology company that is developing our assessments electronically. We wish to notify all future candidates that, starting from 11 September 2020, all assessments will be electronic.

HAVE YOUR SAY

The SAIOH Council invites your feedback on how this communication is helping you as a SAIOH member and how we can improve. If you have any suggestions, inputs, or contributions, please e-mail them to our president at president@saioh.co.za for consideration.

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Learning more from the hearing conservation programme's medical surveillance data

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INTRODUCTION

Globally, noise-induced hearing loss (NIHL) is a very common self-reported occupational illness or injury, despite decades of study, workplace interventions and regulations.¹ An even worse reality is facing mining-intensive countries. The Minerals Council South Africa indicates that more than 73% of miners in the country are exposed to excessive noise despite the intensive implementation of hearing conservation programmes (HCPs).²

Hearing conservation programmes (also referred to as hearing loss prevention programmes (HLPPs)) are interventions regarded as the most holistic approaches to the prevention of NIHL, through primary and secondary controls. Primary controls entail activities that are aimed at eliminating or reducing exposure levels to hazardous noise, while secondary controls focus mainly on the use of personal protective equipment (PPE) and employee education and training about the necessary precautions that must be taken in order to reduce noise exposure.³ Also central to the HCP are medical surveillance and thorough record keeping that allow for monitoring and identification of individuals or groups affected by high noise levels.⁴

Regardless of the intensive implementation of HCPs throughout the mining industry, the number of NIHL cases continues to increase.⁵ According to Rand Mutual Assurance (RMA), although acceptance of liability has decreased in recent years, NIHL cases still comprise up to 90% of compensation claims.⁵ Considering that repeated systematic reviews conducted to evaluate the effectiveness and efficacy of HCPs have yielded inconclusive evidence,⁶⁻⁸ it is unsurprising that, worldwide, 16% of disabling hearing loss in adults is attributed to occupational noise.⁹ This poses a serious challenge to the industry to reconsider efforts aimed at NIHL prevention.

Among the list of cited reasons for the failures of HCPs, unclear definitions of HCP activities,⁸ inconsistencies in practices,⁶ inconsistencies in implementation and over-reliance on medical surveillance as a preventive tool,⁷ poor monitoring characterised by limited use of audiometric surveillance data, and over-emphasis on legal compliance were most often mentioned.^{6-8,10}

DATA ANALYSIS BEYOND LEGAL COMPLIANCE

The enactment of the Mine Health and Safety Act (MHSA) of 1996 introduced regulations that led to the formalisation of HCPs in South Africa.¹⁰ Earlier legislation was mainly concerned with regulating compensation, particularly lung diseases (Occupational Diseases in Mines and Works Act (ODMWA), 1973) and general workplace injuries or diseases (Compensation for Occupational Injuries and Diseases Act (COIDA), 1993), with little focus on structured and consistent NIHL prevention efforts.^{11,12} The newly enacted MHSA made significant inroads to improving general safety in mining; however, high levels of noise remained unabated and, as a result, mine workers continue to be at higher risk of developing NIHL than workers in other industries.^{13,14} Serious questions remained unanswered about the success of HCPs in post-apartheid South Africa.

The 2003 and 2014 Mine Health and Safety summits aimed to address some of these concerns regarding the increasing number of NIHL cases. Labour, the regulator/government and employer gathered at the 2003

summit to discuss strategies for the future. Under the theme *The Road to Zero Harm*, leaders agreed on some milestones that needed to be achieved in 10-year periods to reduce the number of compensable NIHL cases.

The first 10 years were a dismal failure. At the subsequent 2014 summit, poor capacity and support, including low levels of buy-in, were identified as key factors in the industry-wide failure to curb the increasing number of NIHL cases, leading to the revision of the milestones.⁶ The second summit had a marked ideological shift, emphasising standard threshold shifts (STS) over traditional percentage loss of hearing (PLH) used in the COIDA of 1993. The targets were that, by December 2016, an employee's STS will not exceed 25 dB from baseline when averaged at 2 000, 3 000 and 4 000 Hz in one or both ears and, by December 2024, the total operational noise emitted by any equipment must not exceed a milestone sound pressure level of 107 dB(A)¹⁴ (down from the target of 110 dB(A) in the 2003 milestones).

The justification for using STS instead of PLH was that STS methodology was more sensitive to minute changes in audiometric thresholds, allowing for a proactive approach to NIHL prevention,¹⁵ as opposed to managing 10% PLH shifts as recommended in the COIDA of 1993. It is unclear how employers intend to achieve the second target when they failed to reach the initial 110 dB(A) target. While it is accepted that audiometry is the gold standard surveillance tool in HCPs, it is also important to note that the second summit was a missed opportunity by the mining industry to be innovative, and to consider using other tools to improve the quality of medical surveillance data that can be used beyond determining grounds for compensation.

Both summits allowed for a concerted focus on the effectiveness of HCPs; however, the 'Road to Zero Harm' approach remains narrow and over-simplified. The chief concern is the limited mono-causal and mono-outcome approach to data management and interpretation in HCPs.^{6-8,10} For example, the first milestone suggests that loss of hearing sensitivity is of no consequence to the employee until it reaches the specified level (STS/PLH shifts)⁷, and only noise exposure can cause a threshold shift.¹⁶ Evidence suggests otherwise. There are other environmental factors that can adversely affect hearing, and effects of noise exposure go beyond hearing loss to include tinnitus, fatigue, stress and anxiety, which may occur before any noticeable change in audiometric thresholds.^{3,8,17} It is, therefore, erroneous to limit the success of HCPs to current medical surveillance systems, specifically, collection and interpretation of audiograms. The goal of collecting medical surveillance data for hearing conservation should go beyond the interpretation of pure-tone results, to understanding the effects of other activities that contribute to the success of HCPs.

Occupational health contexts have always been multifactorial with multi-outcome challenges.¹ As a result, HCPs are complex interventions that require a solid basis in public health theory, with broader preventive aims than legal or medical interventions.^{7,17} Therefore, to allow for proactive interventions, medical surveillance should also be linked to other HCP activities such as noise elimination, noise control, prevention, and education/training,¹⁶ including employee (individual

or group) behaviour change.³ The reduced role of medical surveillance in current HCPs renders them ineffective in combatting the high number of NIHL cases because they do not encourage proactive interventions. On the contrary, evidence indicates that mining companies continue to use HCPs to manage compensation and improve legal compliance instead of prevention, education and behaviour change, regarding noise exposure beyond the workplace.^{6-7,18-20}

There are several reasons for this lack of innovation. The main explanations relate to costs associated with implementation and lack of managerial will.^{2,7,16} Some researchers contend that the issue is more complex. It is not only about the poor engagement with public health theory, as discussed above, it is also about historical legal and political influences that have led to HCPs operating within a particular model. Particularly, this relates to legal controversies that plagued the early days of the development of HCPs, leading to the current cadre of professionals and stakeholders involved in the implementation of HCPs. Hearing conservation programmes were conceived by employers when employee representatives started winning legal claims from their employers' insurance funds for their loss of hearing in the late 1940s and 1950s.²¹ The influence of these legal battles was far-reaching. As a result, current HCPs operate with predefined inputs and outputs that exclude certain issues and govern the way that noise exposure is addressed. According to Hetu,²¹ the HCP is a "black box that serves to define and address the problem of excessive noise exposure in a particular way, with problematic underlying hypotheses".

Already discussed above are the assumptions relating to the effects of noise exposure on the employee. Another persistent assumption is the permanence of noise in the workplace. This is evident in the second target of 'The Road to Zero Harm' milestones which states that noise must be reduced to 107 dB(A) by 2024, which is still excessively high. Basically, hearing conservation must happen despite the presence of excessive noise. Not only is this a contradiction of terms,⁶ but the concept of noise elimination and control is also reduced to a mere probability, with more emphasis on noise management.²¹

It is common knowledge that noise-control engineering has grown as a science and technology over the years. However, the Mining Industry Occupational Safety and Health (MOSH) noise team's attempts to implement the industry-wide Buy and Maintain Quiet Initiative (IBMQI) were met with resistance at best, or apathy at worst, from the employers.²² 'Achievability', 'practicability', and 'economic viability' were argued against any suggestions relating to investments in equipment that does not emit excessive noise. The issue of weighing the value of workers' health, safety and lives against economic demands is in itself abhorrent, as shown by the High Court approval of a R5 billion (\$353 million) class action settlement between gold mining companies and law firms representing thousands of miners who contracted the fatal lung diseases, silicosis and tuberculosis.²³ This case is testament to the fact that mere medical surveillance, legal compliance and promise of compensation is not enough. It is a challenge for employers to make more efforts to preserve the health and the safety of their most valuable asset, the workers.

CONCLUSION

This paper provides a brief discussion of issues about the poor performance of HCPs in the mining industry. While the discussion is not exhaustive, it highlights that practices that characterise the implementation of HCPs continue to be ineffective because of limited use of medical surveillance data and the insistence of adhering to old, traditional legal assumptions and influences. This is demonstrated to be unsustainable by relating the discussion to the current 'Zero Harm' milestones. New evidence and shifts in legal systems pose a challenge for employers to consider reprioritising HCP implementation through investment in innovation.

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Message from the SASOHN president on Women's Day 2020

Denise Minnie, SASOHN president, e-mail: denise.minnie@randwater.co.za

This has been one of the busiest, different and uncertain years. Despite that, one should not lose focus but rather look ahead and remain positive amidst all the uncertainty. Together, we need to take a stand to be bold, courageous and remain determined to achieve what's best for us as women.

The year 2020 is a milestone moment to accelerate the implementation of the global commitments to gender equality and women's rights. It's a year to achieve transformation and be empowered. Most importantly, it's a turning point for gender equality. We need more women and young girls to start preparing, participating and taking leadership roles in the science, technology, engineering and mathematics fields, in order to flourish in the fourth industrial revolution and have more women at the forefront. Let's start implementing innovative solutions and driving social change.

Gender equality not only aims to transform the lives of women and girls but to assist in the social, economic and environmental sectors. Our voices must be heard so that we can achieve more. As stated by the United Nations secretary-general, António Guterres, "It is time to stop trying to change women and start changing the systems that prevent them from achieving their potential. Our power structures have evolved gradually over thousands of years and further

evolution is long overdue. The 21st century must be the century of women's equality."

This Women's Day let's celebrate under the theme *Generation Equality: Realising Women's Rights for an Equal Future*. The concept of 'generation equality' is an international theme and campaign that links South Africa to the global efforts to achieve gender equality by the year 2030. During the month of August, let's pay special tribute to all the women who fought, marched, protested, and played pivotal roles in the earlier years when they demanded certain rights for women. Let's also not forget our young girls who have dreams, hopes and aspirations for a better future filled with many opportunities. Here, let's look ahead to a brighter future, one where we are recognised and well represented in leadership positions at our workplace or in the community.

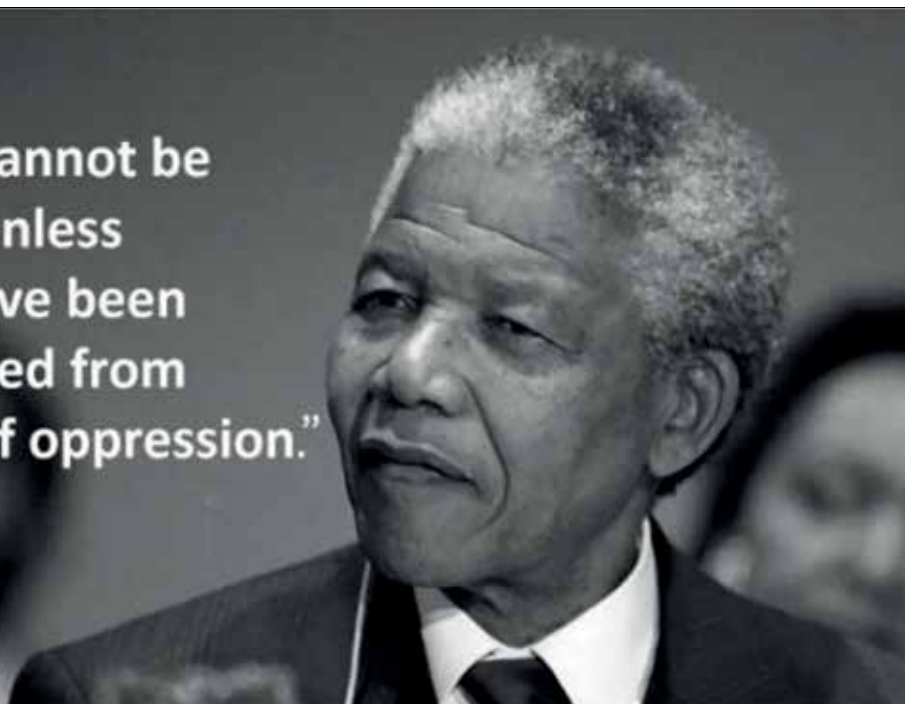
For us to create a truly equal world, we need to shift the social norms and gender stereotypes that limit opportunities for women and girls. Let's create partnerships and widen our minds and scope for knowledge on how to improve and tackle gender and women empowerment issues. Women have the ability to change lives, their communities and the world we live in.

Happy Women's Day to all SASOHN members!

“

Freedom cannot be achieved unless women have been emancipated from all forms of oppression.”

—
Nelson Mandela



Update from the Australian Institute of Occupational Hygienists (AIOH)

Andrew Orfanos, e-mail: President@aioh.org.au

The Australian Institute of Occupational Hygienists (AIOH) ended 2019 with a highly successful conference in Perth, Australia. The conference committee, ably chaired by Candace Absalom, delivered another high-quality event. In so doing, they provided a perfect illustration of the conference theme, *The Power of Many*.

The AIOH had an unusual start to the year, mainly due to the extreme weather conditions which IOHA members in other countries will have seen in the news. In response to the bushfires, the AIOH published a media release, highlighting the risks to the health of firefighters and first responders from smoke hazards. The AIOH president, Andrew Orfanos, gave a studio interview for Australia's main broadcaster, the ABC (<https://www.youtube.com/watch?v=P9A2TY5upo&feature=youtu.be>).

Also related to the bushfires, the AIOH would like to draw attention to a tremendous gesture from the American Industrial Hygiene Association (AIHA), which very generously donated 5 000 AUD to the Red Cross. The AIOH thanks the AIHA president, Kathleen Murphy, and chief executive officer (CEO), Larry Sloan, for their very thoughtful support for Australians in need.

Members of IOHA may also be aware of the emergence of accelerated silicosis in individuals working on engineered stone.^{1,2} In Australia, there has been an alarmingly high number of young men diagnosed with severe progressive silicosis from cutting artificial stone benchtops. In response, government occupational hygienists, particularly in the state of Queensland, have been active in visiting workplaces where engineered stone is fabricated.³ The Queensland government has produced an excellent code of practice, 'Managing respirable crystalline silica dust exposure in the stone benchtop industry (2019)', which the AIOH recommends to IOHA members.⁴

As a member of a consortium of concerned bodies, the AIOH lobbied the Australian federal government to look into the epidemic of silicosis. The Commonwealth health minister responded, in July 2019, by allocating 5 million AUD to the establishment of the National Dust Diseases Taskforce. The AIOH has been active in providing evidence to the taskforce. The AIOH is also meeting with the federal minister for vocational training and apprentices, as we consider that one of the main contributory factors is a lack of awareness in stonemasons and other workers in the construction industry. We hope that improved training material delivered to apprentices and construction workers will correct this.

With regard to training material, the British Occupational Hygiene Society (BOHS) has kindly allowed the AIOH to use its 'Breathe Freely' material in Australia. The AIOH has adapted the BOHS material to suit Australian workplaces, and rebadged it as 'Breathe Freely Australia' (<https://www.breathefreelyaustralia.org.au/>). Several road-shows have been delivered around the country to >1 000 tradespeople from



the construction sector. Through Breathe Freely Australia, the AIOH has also entered into partnerships with state governments, industry associations, and unions.

If IOHA members google images associated with silicosis in Australia, they will notice one striking feature: stonemasons are often shown wearing totally inadequate respirators – such as surgeon's masks – or they are bearded or have some facial hair. In response, the AIOH is developing a national respirator fit testing and accreditation scheme (RESP-FIT) to promote best practice respirator fit testing in Australia through:

- A standardised training syllabus to improve respirator fit tester knowledge, and
- Demonstration of competence through the accreditation assessment.

The RESP-FIT programme will also provide information and tools for workplaces to make informed decisions on respiratory protection equipment (RPE) fit testing that is appropriate and suitable for the work environment.

LAUNCH OF A NEW RESOURCE TO HELP PROTECT WORKER HEALTH

Australia has experienced an increase in demand for disposable respiratory protection driven, initially, by the extensive bushfires and, more immediately, by SARS-CoV-2. This has resulted in non-compliant disposable respiratory protection entering our supply chain, which has been highlighted by several regulatory bodies, including SafeWork NSW (<https://www.safework.nsw.gov.au/safety-alerts/safety-alerts/supply-of-fake-face-masks>) and WorkSafe New Zealand (<https://worksafe.govt.nz/about-us/news-and-media/non-compliant-respiratory-protective-equipment-on-the-market/>).

Identifying non-compliant products presents challenges for local businesses purchasing respirators for their workers, as the processes and checkpoints that provide compliance in our existing framework are complex. To address this, the AIOH collaborated with the Australian Institute of Health and Safety, the Indoor Air Quality Association, and the New Zealand Occupational Hygiene Society, to deliver a much-needed guide on this topic.

The final product, *A Guide to Buying P2, or Equivalent, Respiratory Protection for Use in the Australian & New Zealand Work Environment* is targeted towards those who buy disposable respiratory protection, and will help them make sure that it meets

suitable standards. The *Guide* takes readers through a series of processes to help potential purchasers understand relevant national and international standards, what to look for, information about the different products available, and resources to help identify non-compliant products.

The *Guide* has received immense support, including from the Australian Council of Trade Unions, the Health and Safety Association of New Zealand, and four Australian state and territory health and safety regulators. Hopefully, it is also of

use to a wider international audience that is likely experiencing similar issues.

FUTURE AIOH CONFERENCES

Finally, due to the COVID-19 pandemic, the AIOH will not be delivering its flagship annual conference. Instead, it will be celebrating its 40th anniversary with a special virtual symposium from 30 November to 3 December 2020. Find more information and a calendar of events at <https://www.aioh.org.au/virtual-symposium>.

Nurturing future IH leaders with iGROW

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In an effort to nurture future industrial hygiene leaders, the Malaysian Industrial Hygiene Association (MIHA) has initiated iGROW, our mentoring programme. The programme was successfully launched during the 18th MIHA annual general meeting on 5 June 2020. An introductory video about the programme can be seen at <https://www.facebook.com/watch/?v=255028758926867>.

We believe that nurturing talent within an organisation will have a positive impact on culture, growth and commercial successes. Hence, this programme aims to provide guidance in personal development, through a structured process, for experienced MIHA members (mentors) to share skills, knowledge and experience, while MIHA new members (mentees) explore the skills they need to succeed at their current jobs, as well as for career advancement.

To support the professional development of both parties, the MIHA has selected 10 mentors and 20 privileged mentees from various industry backgrounds to be part of this one-year partnership



programme. During the kick-off session on 27 June 2020, two of our mentors, who were the founding members and past presidents of the MIHA, shared their industrial hygiene journey. Zainal Mubarak Zainuddin, our first president, shared his almost 40 years' experience, and Sabrina Wan Mohamad, our second president, shared her close to 30 years' experience. We are grateful to all 10 coaches for their continuous support, passion and commitment to shape industrial hygiene in the country and the region. We look forward to the success of iGROW!

COVID-19 – The first new occupational disease of the 21st Century

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The COVID-19 pandemic is forcing civil society to recognise the importance of expanding legal requirements to prevent and address occupational exposure to infectious diseases. Healthcare workers exposed to HIV, for example, may have a recognised occupational exposure to infectious disease upon direct contact with a sick AIDS patient's blood. If the worker contracts the virus and succumbs to AIDS, both the exposure and the resulting illness may be considered to be work-related. Yet, healthcare worker exposures to other bloodborne pathogens, such as hepatitis, often go unnoticed or unreported. Consequently, many illnesses, and even deaths, are not correlated to past workplace exposures, especially when the illness

manifests years after exposure. Additionally, many infectious agents that exist in the workplace also exist in the community, and it is often difficult to determine that the exposure occurred at work and not elsewhere. Therefore, it is often hotly debated whether illness or fatality from an infectious agent found in the workplace is necessarily an occupational exposure.

Typical of pandemics, but unusual compared to workplace infectious disease exposures, COVID-19 has been addressed by a wide range of emergency orders, requiring non-essential workers to stay home. As Kevin Bampton (CEO of the BOHS) noted, during lockdown, non-essential workers are home but essential

workers are implicitly exposed to SARS-CoV-2 when they perform their work. While more than a billion people were mandated or recommended to stay home under lockdown, essential workers were exposed to the infectious coronavirus in order to perform their jobs that save lives, and to maintain medical and social systems. Without heroes on the frontlines, there would be even more disease and death. Someone must do those jobs to protect the greater society. During the early months of the USA pandemic in 2020, approximately 20% of the deaths due to COVID-19 were of healthcare workers.⁵ Similar statistics were reported for healthcare providers in other countries. This suggests that COVID-19 should be considered an occupational illness or occupational fatality among frontline essential workers.

In addition to healthcare personnel, exposure to the SARS-CoV-2 virus is inherent in other frontline occupations such as first responders, law enforcement officers, prison guards, and public health workers. In the United Kingdom, the determination of whether COVID-19 is an occupational disease is based on the exposure context, following a reportable incident involving a biological emergency.⁶

Guidelines also describe what constitutes a work-related COVID-19 diagnosis and/or death. This approach is realistic; essential tasks must be performed by someone for the greater good of society. Thus, any question of individual choice or right to refuse hazardous work is removed from risk equations. Equity therefore dictates protection of people whose work requires exposure to SARS-CoV-2, including worker compensation and medical services.

Examining the context of occupational exposures spotlights how a narrow view of protecting the right to health, expressed in legislative line drawing, outlining occupational disease protections and compensation in the 20th century, has been systematically drawn too tightly. One consequence of inaccurate narrow line drawing is that occupational health and safety are undervalued in the long term. It is not possible to quantify any reduced costs due to improved workplace safety and health protection when key costs are hidden and uncounted from the start.

Workers' compensation for occupational exposure to SARS-CoV-2 as an occupational disease varies by jurisdiction. In any nation with a unified national health system, the distinction between occupational disease and falling ill with a lethal disease may be of little practical consequence, beyond keeping tidy records for contact tracing and accurate workplace health statistics. In some nations, however, workers' health insurance is the sole source of health insurance for entire dependent families. In those places where a person might lose his or her job if unable to perform work due to COVID-19, workers' compensation fills an important void that pays the worker's health bills and also provides health insurance for his or her dependents while the worker remains employed.

In the USA, one theory erroneously claims that exposure to coronavirus in the workplace ought not to be considered an occupational disease for reporting and workers' compensation. It is based on a deceptively simple workers' compensation text in law from the Commonwealth of Virginia, which precludes workers' compensation for 'ordinary disease of life'. However, the reality that COVID-19 is plentiful everywhere does not mean it is an 'ordinary disease of life' under law. Historically, so-called ordinary diseases of life were interpreted as fitting well-established concepts of non-occupational illness such as pregnancy or genetic conditions. Nothing about the COVID-19 pandemic is ordinary. The situation presented by this pandemic is extraordinary in that emergency laws have grounded airlines, stopped the Olympic Games, and delayed elections. The legal term of art is not 'ordinary' but 'force majeure'. Therefore, it would be unjust to use external exposure to SARS-CoV-2 as a benchmark to rule out causation from exposure in the workplace.

CONCLUSION

In conclusion, functional analysis of how and why healthcare workers and frontline workers who, by their job descriptions, are compelled to confront SARS-CoV-2 as a global threat to health everywhere, suggests that the definition of occupational disease should embrace workplace exposure to the coronavirus.

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Role of healthcare providers in workers' compensation

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Annually, thousands of workers in South Africa experience the onset of long-lasting or permanent conditions that challenge their ability to work. Irrespective of these conditions having occupational or non-occupational causes, many of these workers are at risk of exiting the labour force, particularly in the absence of timely and effective healthcare provision. This article provides essential information about medical care aspects of the Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993 (COIDA).¹ The Act provides compensation for occupational injuries and diseases sustained or contracted by employees, arising out of and in the course of their employment in South Africa.

Workers' compensation is a medically-driven system intended to render injured workers with medical treatment, income protection, permanent loss of function, or organ and fatality benefits. The term 'medically-driven' implies that medical information is used to guide fundamental decisions in the system, including acceptance into the system. Healthcare providers (HCPs) play a major role in treating workers who have sustained an injury or developed a disease; simultaneously, they are obliged to submit medical reports. Medical reports are intended to provide the information needed for claims management and treatment coordination, and can be uploaded on the Rand Mutual Assurance (RMA) online medical portal, minimising the administrative burden on HCPs. It is crucial for medical reports to be complete, accurate, conclusive, and well-written, with conclusions that are consistent with the entire report. A comprehensive occupational health history must include information about all the occupations the worker has held, as well as the duration, specific job tasks, time taken to complete different tasks, hazards to which he or she was exposed, and type of protective equipment that was used.

FIRST MEDICAL REPORT

Any work-related accident or incident must be reported to RMA, regardless of the severity. This includes first-aid treated injuries that may need follow-up visits for the purpose of observation, but do not normally need medical care. A doctor or registered professional nurse who rendered first aid treatment must submit the injury as a treat-and-return claim. The HCP attending an injured worker must submit the 'First Medical Report' within 24 hours of the initial examination. The HCP must document the nature of the injury, the way it happened, the body parts that were injured, subjective complaints, objective findings, treatment provided, and diagnosis. The worker's relevant medical history, including pre-existing injuries or disabilities, must be included and, if applicable, the estimated return-to-work date for regular work. The report is used to determine the extent of liability based on documented findings and other factors, triggering and managing the provision of appropriate and timely medical and income protection benefits as prescribed by legislation. Medical reports are critical for determining whether to authorise treatment requests and timely implementation of appropriate case management. This is to ensure that the treatment rendered is reasonable, necessary and justified.

PROGRESS MEDICAL REPORT

When ongoing treatment is provided, a 'Progress Medical Report' is required to update and record the patient's progress regarding the

subjective complaints, initial treating HCP's examination findings, functional status, response to treatment provided to date, diagnoses, treatment plan, and the patient's work status. Progress reports must be submitted at reasonable intervals – at least monthly, and as soon as possible after the initial examination.

TREATMENT AUTHORISATION REQUEST

Prior authorisation is required from RMA before considered treatment can start, especially non-emergency treatment. RMA will not pay for treatment that is experimental, not evidence-based, unreasonable, or unnecessary, and that would not assist the injured worker in recovery and contribute to the objective of improving the worker's impairment. The treating HCP is required to submit an online 'Treatment Authorisation Request' on the RMA medical portal, which guarantees payment if approved and if the submitted invoice perfectly matches the authorisation. The treating HCP must indicate the treatment requested, which must be substantiated by the injured worker's diagnosis, including the ICD-10 code, procedure code, and the frequency, quantity and duration of the requested treatment. The treating HCP must provide a reason for each component of the treatment plan and motivation for any exceptional or protracted course of treatment. Treatment rendered must be consistent with the treatment plan that has been submitted. Treatment plan updates or revisions may be indicated in progress reports, which are regularly required.

FINAL MEDICAL REPORT

When the patient's condition has reached maximum medical improvement (the point at which the worker's medical condition has stabilised and further improvement is unlikely), the 'Final Medical Report' must be submitted as soon as possible after the examination date by the treating HCP. It must document findings regarding the existence and extent of permanent impairment and limitations, and any need for continuing or future medical care resulting from the injury. The range of motion of the normal opposite or contralateral joint/s must be provided for comparison, where relevant.

It is critical for the treating HCP to understand these complex roles, and how examinations, information and reports can affect the lives of injured workers. The treating HCP must work together with RMA personnel, by completing paperwork on time and supplying information in a timely manner. Delayed benefits to injured workers can cause considerable hardships; many injured workers rely on compensation disability benefits as they have no alternative source of income.

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10 steps to checking your spirometry result

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The 10-step process ensures that best practices for data validation, interpretation and record keeping are adhered to in the assessment of every spirometry test. This 10-step series briefly outlines each step, one by one (Figure 1).

STEP 10 – STORAGE AND RECORD KEEPING

Meticulous record keeping is a critical component of a good spirometry programme. Records allow links to be made between exposure and health effects. The Occupational Health and Safety Act No. 85 of 1993 states that all employee medical surveillance records should be retained for 40 years after employment has ceased. All records, despite their retention period, must be easily accessible and kept in a secure environment. After any retention period, all documents or records should be destroyed and disposed of in a responsible, environmentally friendly way, recycling where possible.

In spirometry, there are three main record-keeping components: 1) spirometry test reports, 2) equipment maintenance records, and 3) personnel training and evaluation records.

1. Spirometry test results

Spirometry test results are to be maintained for at least 40 years following the end of employment. To protect worker confidentiality, providers must not disclose individual worker's personal health information to employers without the employee's consent.¹

2. Equipment maintenance records

Since equipment maintenance records support the accuracy of the spirometry test results in the medical record, saving the equipment calibration check log and information about the spirometer is recommended.¹ Availability of such records permits later troubleshooting of problematic spirometry test results, which is particularly important when conducting periodic spirometry testing.

3. Personnel training and evaluation records

Personnel qualifications should be documented and available for review. Records should include technician continuing medical education, certificates from completed spirometry training courses, and results of evaluation and feedback to technicians.¹

Occupational physicians and the businesses for which they work should ensure that they have explicit policies on data retention that are provided to employees when their records are created. This should, ideally, also include record management if the employer changes its occupational health provider. Occupational physicians should make arrangements to ensure compliance regarding records that they have

10 steps to checking your spirometry

- Step 1 Calibration and patient data
- Step 2 Reference values and ethnicity
- Step 3 Acceptability and usability
- Step 4 Repeatability
- Step 5 Lower levels of normal/Z-scores
- Step 6 Best test/Best curve
- Step 7 Interpretation
- Step 8 Grading
- Step 9 Recording and reporting
- Step 10 Storage and record keeping

Figure 1. The recommended 10-step process to ensure your spirometry result derives from best practices for data validation, interpretation, and record keeping

generated, after they leave employment, or if the employer ceases to trade. Record storage methods should be updated as technology changes to assure access to records in the future.²

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