

# OCCUPATIONALhealth

SOUTHERN AFRICA

Vol. 26, No. 1 JANUARY/FEBRUARY 2020

ISSN 1024-6274



## Official Journal of SASOM, SAIOH, SASOHN and MMPA

- The South African Society of Occupational Medicine
- Southern African Institute for Occupational Hygiene
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### The South African Society of Occupational Medicine (SASOM)

Jaco Botha

Tel: +27 (0)12 803 7418

Fax: +27 (0)11 507 5085

e-mail: info@sasom.org

website: www.sasom.org



**SAIOH**

### Southern African Institute for Occupational Hygiene (SAIOH)

Kate Smart

Tel: +27 (0)71 672 4916

Fax: +27 (0)86 631 6117

e-mail: info@saioh.co.za

website: www.saioh.co.za



### South African Society of Occupational Health Nursing Practitioners (SASOHN)

Lettie Grantham

Tel: +27 (0)861 SASOHN (727646)

Fax: +27 (0)86 263 8757

e-mail: office@sasohn.co.za

website: www.sasohn.co.za



### Mine Medical Professionals Association (MMPA)

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Tel: +27 (0)11 568 2054

e-mail: mbalenhleb@mpas.org.za

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Michelle Perry and Liz Seed

Tel: +27 (0)31 764 0593

e-mail: michelle@dbn.technews.co.za

#### ADVERTISING

Tracy Wolter, Cell: +27 (0)82 331 2440

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#### SUBSCRIPTION SERVICES

Kevin Beaumont, Cell: +27 (0)82 774 2210

e-mail: kevin@mettamedia.co.za

#### PUBLISHER

Kevin Beaumont, Cell: +27 (0)82 774 2210

PO Box 210, Tulbagh, 6820

e-mail: kevin@mettamedia.co.za



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# From the Editor . . .



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

Welcome to this, our first issue of the new decade. You will notice that we have revised the layout of both the scientific manuscripts and non-scientific articles. We have also added the full citations of the scientific papers, which we hope will assist you when referencing these papers. Please let us know what you think of our new look.

In August last year, six months after publishing a special issue on women in science, medicine and global health, the *Lancet* announced their pledge to improve representation of women in publishing, which encompasses authors, reviewers and editorial advisory boards.<sup>1</sup> Encouragingly, 10 of the *Lancet* group Editors-in-Chief are women. Beyond gender equity, the Group is also committed to increasing ethnic and geographic representation.

Following suit, all first authors of the three papers in this issue of *Occupational Health Southern Africa* are women. We are also pleased to publish our first paper from Rwanda—Mukaruzima and her colleagues measured physical activity levels in government workers and found that, although men exercised more than women, both groups needed to get more active to improve their health. Kulenkampff and her co-authors wrote a paper on students' knowledge and practice of a post exposure prophylactic protocol. It appears that work is needed in this area too; many students did not report needle stick and other injuries, thereby increasing their risk of blood-borne infections. In the third paper, Ntlhakana et al. report on the audiometry data that are collected by a large mining company. Going forward, we will be recording some demographic information about authors, with the intention to present some statistics to you at the beginning of next year.

As we return to work in this early part of the year, I would like to mention two giants in occupational health—Dr Irving Selikoff and Dr Sophie Kisting. Dr Selikoff would have celebrated his birthday on 15 January. Although he passed away in his late 70s in 1992, he has not been forgotten as a pioneer in occupational medicine. He worked tirelessly on tuberculosis and asbestos-related diseases throughout his 50-year career, and many Acts and other legislation are based on his research findings. Dr Kisting, likewise, has spent the last several decades improving the health and lives of workers. In recognition of her work, Dr Kisting added the Leslie Nickels International Health and Safety Award to her growing collection, in November last year.

Look out for the electronic version of the 22nd *South African Health Review* (SAHR), which was released by the Health Systems Trust at the end of January 2020. The SAHR, which was first published in 1995, is one of the most authoritative sources of commentary on the South African health system. For a hard copy of the Review, contact Ms Kemona Pillai, at [Kemona.Pillai@hst.org.za](mailto:Kemona.Pillai@hst.org.za). Another very recent publication of interest is the National Institute for Occupational Health (NIOH) newsletter, *OccuZone*. Please access this via the link on our website to read all the latest news.

There are a number of important conferences this year, including

Occupational Health 2020: Research, Practice and Policy in Edinburgh, Scotland in June, and the 28th International Symposium on Epidemiology in Occupational Health (EPICOH) in Montreal, Canada in August/September. Please check the Calendar page on our website for details, including abstract submission and registration deadlines.

Please visit the website for news, training and courses that are relevant to occupational health. The information is updated regularly; please send me any items that you would like to add. Also look out for the writing courses that we will be offering in 2020.

Finally, I would like to congratulate Dr Ntombizodwa Ndlovu, the Journal's Assistant Editor, who graduated with her PhD in December last year. We are extremely proud of her.

## REFERENCES

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### The South African Society of Occupational Medicine (SASOM) Annual Author Prize

On behalf of *Occupational Health Southern Africa*, SASOM is encouraging researchers working in the field of occupational health in Africa to publish their research findings. SASOM will provide a cash award to a novice author who is first author of the best paper published in *Occupational Health Southern Africa* in a calendar year, as judged by the Editorial Advisory Panel. Therefore, the prize for 2020 will be awarded in January 2021. Eligibility for the prize is limited to researchers who have not previously published a paper in *Occupational Health Southern Africa* or any other accredited academic journal. Membership of SASOM is not a criterion. The prize shall be known as The South African Society of Occupational Medicine (SASOM) Annual Author Prize.

# In Memoriam—Dr Noel John Blott

Tribute, on behalf of Dr Blott's family, friends, colleagues and 'his nurses'

**Annelize Jacobs**, OHNP, Kansai Paint, Port Elizabeth

**Linda Joubert**, OHNP, Bridgestone, Port Elizabeth



Dr Noel John Blott was a Life Member of The South African Society of Occupational Medicine (SASOM)



**Dr Noel John Blott,**  
**27 December 1950–4 April 2019**

Noel was Port Elizabeth-born and -bred, the eldest of two sons. They were bright boys who excelled at school and both chose medicine as their profession. He spoke fondly of his mother, Barbara, and his adoptive dad, Jack, who supported Noel and encouraged him to be hard-working, honest and kind, and to excel in all his endeavours.

As a child, Noel had his own horse, Blaze. He played the guitar, piano and organ. His musical talent came, possibly, from his biological father, Alan, who was a musician. He learnt to fly gliders while in high school and, at the age of 16, received a 50 cc moped. He excelled in water skiing and obtained Eastern Cape Colours in this sport.

Noel attended Grey Boys School where he did well academically and had a keen interest in various sports, including athletics, tennis, squash and pole vaulting. He was small in stature until he was in Standard 8, when he literally grew about 12 inches, became more outgoing and confident, with an excellent sense of humour, and was the leading personality in his class at school.

Noel obtained his medical degree from the University of the Witwatersrand, and used to pop in at home for brief visits during the university holidays, always with a gorgeous new girlfriend. He often related stories of his waiting jobs and played the piano at Café Vienne for pocket money, as university students do. Whilst studying, he became an activist against the apartheid system, as he believed in equal education and opportunities for all.

He started his internship at Livingstone Hospital, which was known to interns as good 'training ground' for hard work and gaining experience in all disciplines of medicine, including surgery. He was particularly accomplished in orthopaedics. The doctors had their meals in the doctors' quarters; it was there that his fellow interns would be entertained by Noel in his eloquent way. It was also around this time that 'Bachelor Boy' Noel acquired a black Jaguar E-type. They all watched in awe as Noel drove through the hospital gates in this majestic vehicle; it can be said that Noel did not mind the admiration. He loved his cars and owned a Ferrari and a Rolls Royce, which he kept in mint condition by getting his hands dirty and servicing the cars himself.

He served humanity with the utmost dedication, irrespective of race, creed or religious beliefs; this fostered a sense of 'being one big happy family' among the medical staff. As a general practitioner, he was well loved and respected. A patient and old friend recounted that he treated all patients with care and professionalism, which made everyone trust his abilities without question. He was a brilliant diagnostician, and there are so many people who would have had very different lives if it were not for Noel.

Noel's occupational medicine career spanned three decades. His

selfless nature saw him introducing other doctors to occupational medicine, as it was an 'unknown entity' at the time.

One of the occupational health nursing practitioners (OHNPs) who worked with him in the late 1980s described Noel as impartial and ethical. He always did what was right, irrespective of whether the decision favoured worker or management. He was able to make the correct call for treatment of his patients and provide advice regarding improved health for the workers. In his workplaces, he guided the processes of occupational health, human resources and labour relations. He had a special way of interacting with management and union members, and gained their utmost respect.

Noel was a valuable member of SASOM who actively participated at the meetings of the Eastern Cape Chapter. In January 2018, he was awarded 'Life membership in recognition of long and valued service to the South African Medical Association'. He was always keen to impart his knowledge and his experience gained through consulting at various companies across different industries, such as battery, paint and tyre manufacturing, automotive parts, bottling, and food.

The OHNPs at the different companies were indeed privileged to have worked with such a respected and knowledgeable occupational medicine practitioner, who stood for excellence and never missed an opportunity to support, teach, and even tease his colleagues.

Noel married late and became a family man; he loved his step-daughter Kim, who later qualified as a psychologist in the UK. He often shared photographs of his two stepsons, James and Mark, and videos of his three granddaughters, whom he loved dearly. In 2017, he was fortunate to be reunited with his childhood sweetheart, Janet, who loved and cared for him until his passing.

Although Noel had his own family, about whom he bragged constantly, as 'his nurses' we felt like his extended family. He would often give us fatherly advice about our relationships, our health, and our children and their education, and lifted our spirits when we needed it.

He would travel often between clinics, yet he still made time to give expert medical advice to friends, family, his nurses and ex-patients, whenever they called him at his factories.

Noel appreciated good food and bragged about making the best carpaccio for his lifelong friends. He entertained them by playing his baby grand piano, singing to their delight and, of course, sharing his sharp wit. He was fondly referred to by his nurses as 'PE's celebrity doc'!

He was a kind and gentle giant, who would often give to the needy; he served humanity with wisdom, love and compassion.

Noel, we are grateful for having known your kindness, generosity and humour; you are tremendously missed. Rest in peace, our special 'Dokkie'.

# Leisure-time physical activity practices and the influencing factors among government office employees in Kigali, Rwanda

L Mukaruzima<sup>1</sup>, DA Adeniyi<sup>2</sup>, JM Frantz<sup>3</sup>

1. Physiotherapy Department, Rwanda Military Hospital, Kigali, Rwanda  
Physiotherapy Department, University of Rwanda, College of Medicine and Health Sciences, Kigali, Rwanda

2. Institute for Social Development (ISD), University of the Western Cape, Cape Town, South Africa

3. Office of the DVC, Research and Innovation, University of the Western Cape, Cape Town, South Africa

**Correspondence:** Dr Lela Mukaruzima, Physiotherapy Department, Rwanda Military Hospital, PO Box 3377, Kigali, Rwanda  
e-mail: leighla09@gmail.com

**Keywords:** physical inactivity, non-communicable diseases, motivation, barriers

## How to cite this article:

Mukaruzima L, Adeniyi DA, Frantz JM. Leisure-time physical activity practices and the influencing factors among government office employees in Kigali, Rwanda. *Occup Health Southern Afr*. 2020; 26(1):3-7

## INTRODUCTION

Physical inactivity is a worldwide public health burden that is linked to the rising incidence of morbidity and mortality, caused by non-communicable diseases (NCDs).<sup>1-3</sup> Globally, the prevalence of physical inactivity in adults, from 2010 to 2011, was estimated to range from 23% to 31%.<sup>4,5</sup> Regionally, the prevalence of physical inactivity was established to be higher in affluent countries, including the United States of America (32%), as well as the eastern Mediterranean regions (31%),

but lower in low-income countries, in regions such as Africa (21%), and south-east Asia (15%). Rwanda's physical inactivity prevalence in 2010 was low, at 15% for adults.<sup>4</sup>

Among the factors that contribute to physical inactivity is urbanisation, which has led to the increased use of machinery, and minimised the physical work load of humans.<sup>5</sup> This contributes to sedentary behaviour that exposes humans to chronic diseases of lifestyle.<sup>3,5</sup> Hallal and colleagues asserted that the invention of machines, such as automobiles,

## ABSTRACT

**Background:** Physical inactivity is one of the major risk factors of non-communicable diseases (NCDs), such as type 2 diabetes, cardiovascular diseases, obesity, certain cancers, and all-cause mortality. Office employees are particularly exposed to such diseases, due to the nature of their work, which mainly involves passive activities that require less energy expenditure.

**Objectives:** The objective of the study was to assess the leisure-time physical activity participation (LTPAP) among government employees in Kigali, Rwanda, as well as to highlight the factors that motivate, or hinder their participation.

**Methods:** A cross-sectional, descriptive quantitative study was conducted with 600 participants. A stratified sampling technique was used to determine the study sample from the Government of Rwanda's Sports Policy stakeholder institutions. Then, a convenience sample of participants was selected from each stratum to form the final study sample. Data were collected using a three-part customised, self-administered questionnaire to capture demographic data, leisure-time physical activity levels (LTPA) using the Godin-Shephard questionnaire, and the factors that influenced participation. Analysis was done using the Statistical Package for the Social Sciences (SPSS). Descriptive and inferential statistics were employed to summarise and draw meaningful associations between different variables.

**Results:** More than half (61.1%) of the participants were not sufficiently active. Physical activity levels declined significantly with advancing age ( $p = 0.004$ ) and increasing working experience ( $p = 0.002$ ); female participants were less active than males. The prevention of diseases and maintenance of good health were the most frequently reported contributors (48.8%) to physical activity participation, while time and tight work schedules were the most frequently reported hindrances (62.2%).

**Conclusion:** The majority of government office employees in Kigali did not engage in sufficient leisure-time physical activity, hence they may be at high risk of developing NCDs. Strategies to increase LTPA among employees should be implemented.

**Table 1. Study population and sample sizes per stratum**

Stakeholder institution	No. employees	Proportion of total study population	Required sample size
Ministry of Defense	850	0.35	210
Rwanda National Police	750	0.31	185
Ministry of Education	439	0.18	109
Ministry of Health	250	0.10	62
MINALOC*	53	0.02	13
MINISPOC~	45	0.02	11
Private Sector Federation/civil society	32	0.01	8
RNOC <sup>†</sup> /national sports bodies	8	0.00	2
Total	2 427	1	600

\*MINALOC: Ministry of Local Government; ~ MINISPOC: Ministry of Sports and Culture; <sup>†</sup>RNOC: Rwanda National Olympic Committee

computers, and telephones, caused people to move less, not only at work places, but also in their day-to-day lifestyles.<sup>5</sup> Consequently, office employees are exposed to health risks related to physical inactivity due to the prolonged time spent sitting.<sup>6,7</sup>

Generally, NCDs are the leading cause of death and disability worldwide.<sup>8</sup> For example, 10% of breast and colon cancer, 7% of type 2 diabetes, and 6% of coronary heart diseases are attributed to physical inactivity.<sup>2</sup> Poor health negatively affects individuals and nations in terms of economic development, mainly due to the high treatment costs.<sup>9</sup> Although strategies to address NCD risk factors, such as limited physical activity, have been recommended and agreed upon by World Health Organization (WHO) member countries, their implementation is a challenge.<sup>8,10</sup> In Rwanda, the incidence of NCDs is on the rise and encroaching on the health system, which is already over-burdened with infectious diseases. The WHO<sup>8</sup> and Alleyne et al.,<sup>11</sup> assert that NCDs account for 35% and 25% of Rwanda's national disease burden, respectively.<sup>8,11</sup>

On a positive note, NCDs and their risk factors can be prevented, or at least their progression can be impeded, by adapting healthy behaviours. Physical inactivity is one of the main unhealthy behaviours that is linked to NCDs. However, it is a modifiable risk factor and can therefore be prevented.<sup>12</sup> This is in line with some of the international health goals that aim to enhance the prevention and management of NCDs, such as a reduction of 25% of premature deaths due to NCDs, as well as a 10% reduction in physical inactivity by the year 2025.<sup>13</sup>

Physical activity levels vary from country to country. Therefore, it is crucial to consider the available infrastructure, as well as the norms and perceptions of the people for whom strategies are developed, if they are to have a positive impact.<sup>1</sup> A large body of literature suggests that interventions geared towards improving public health should first consider factors that motivate, or affect people's lifestyle behaviours, for better outcomes.<sup>1,5</sup> Thus, while setting the most desirable health promotion strategies, individuals should be consulted, and be allowed to participate in decisions that affect them. This positively influences their attitudes towards health, as well as how they choose to live, because they view themselves as stakeholders and, therefore, work together to achieve a common goal.<sup>14,15</sup> Kohl et al. advocated a 'full systems approach' that suggests a wider approach, with high-level political commitment, is required to address the issue of physical inactivity as a public health hazard.<sup>16</sup>

To date, limited research has been done on the prevalence of leisure-time physical activity (LTPA) among Rwandans, generally, as well as factors that facilitate, or limit, participation in physical activity. The objective of this research was to determine the prevalence of LTPA among a group of government office employees in Kigali, and identify factors that contributed to, or limited their participation in, physical activity.

## METHODS

A cross-sectional quantitative study was conducted in Kigali, the capital of Rwanda. Participants comprised employees of the stakeholder institutions of the Government's Sports Policy, which included the Ministry of Sports and Culture, the Ministry of Health, the Ministry of Education, the Ministry of Local Government, the Ministry of Defense, the Rwanda National Police, the Rwanda National Olympic Committee, and the national sports bodies, as well as the Private Sector Federation (PSF) and civil society.

The study population comprised 2 427 male and female employees from eight institutions. A stratified sampling technique was used to select the study sample from the Sports Policy stakeholder institutions. Each institution represented a stratum (Table 1). A proportional convenience sample of subjects was selected from each of these strata (Table 1),

based on availability and willingness to participate in the study. The Yamane formula<sup>17</sup> was used to calculate the sample size (344). In order to maximise the validity of the study, questionnaires were sent to 600 potential participants corresponding to the different strata.

A customised self-administered three-part questionnaire, adapted from the Godin-Shephard leisure-time physical activity questionnaire (GSLTPAQ), was used to collect data from April to August 2015. The questionnaire was first piloted on a sample of 32 individuals from other government institutions who were not included in the study population. The questionnaire was translated from English to Kinyarwanda to accommodate Kinyarwanda-speaking respondents and to improve its reliability and validity. The Kinyarwanda version of the questionnaire was back-translated to English to ensure that the translation was valid. Although the questionnaire maintained its original meaning, some sport names could not be directly translated from English to Kinyarwanda, such as tennis, golf, badminton and bowling. Therefore, the researcher and two research assistants were available to explain these words during administration of the questionnaire.

The first part of the questionnaire captured the demographic profiles of the study participants, such as age, sex, marital status, level of education, place of work and working experience. The second part of the questionnaire assessed LTPA levels, for example, the number of times participants engaged in strenuous, moderate and mild leisure-time physical activities, for at least 15 minutes per day, every week.<sup>18</sup> The third part of the questionnaire comprised three open-ended questions which sought to identify factors that affected, or facilitated, their engagement in LTPA. The open-ended questions were developed by the researcher, with reference to relevant literature. The questions allowed the participants

**Table 2. Socio-demographic characteristics of study participants (N = 562)**

Characteristic	n	%
Sex		
Female	171	30.4
Male	391	69.6
Age (years)		
21–30	295	52.5
31–40	181	32.2
> 40	86	15.3
Marital status		
Married	246	43.8
Single/divorced/widowed	315	56.1
Level of education		
Secondary/vocational training	120	21.4
Bachelor's degree	382	67.1
Post-graduate degree	58	10.3
Work experience (years)		
1–9	401	71.4
10–19	115	20.5
≥ 20	39	6.9
Place of work		
MINISPOC	9	1.6
Ministry of Health	53	9.4
Ministry of Defense	222	39.5
Ministry of Education	94	16.7
MINALOC	10	1.8
Rwanda National Police	160	28.5
Private Sector Federation/civil society	7	1.2
RNOC/national sports bodies	1	0.2

to provide their own views or perceptions, without being restricted to predetermined responses.

### Data management and analysis

The GSLTPAQ uses a leisure score index (LSI) classification code to classify individuals as sufficiently active, or insufficiently active.<sup>19</sup> The LSI is aggregated by multiplying the number of times individuals engage in strenuous, moderate and mild LTPA, by nine, five and three metabolic equivalents (METs), respectively.<sup>18,19</sup> However, Godin argues that mild LTPA does not contribute to health benefits effectively, and therefore, suggests that the strenuous and moderate LTPA scores be considered for classifying individuals as sufficiently active or insufficiently active.<sup>18</sup> Consequently, the individuals whose LSI was 24 or more were classified as active, while those whose LSI was 23 or below, were classified as insufficiently active.<sup>20</sup>

The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 23, using both descriptive and inferential statistical tests. Frequencies were used to describe the demographic profiles of participants, their levels of LTPA, and factors that facilitate or limit their participation in LTPA. Data collected from open-ended questions were coded and grouped under meaningful generic themes. These were then quantified and presented in frequency tables. Chi-square tests were used to test for the statistical significance of the association between the demographic variables and the levels of LTPA. Significance was set at 95%.

The study was approved by the Senate Research Ethics Committee of the University of the Western Cape (registration no. 14/7/8). Permission to conduct the study in Rwanda was obtained from the Ministry of Education, (reference no. 0511/12.00/2015) and from the National Health Research Committee of Rwanda (reference no. NHRC/2015/PROT/009).

## RESULTS

### Demographic profile of respondents

Of the 600 questionnaires that were distributed, 562 were completed and returned, yielding a response rate of 80.2%. The demographic profiles are summarised in Table 2. Less than half ( $n = 219$ ; 38.9%) of the respondents were categorised as sufficiently active; the remainder ( $n = 343$ ;

61.1%) were insufficiently active. Younger participants, aged 21–30 years ( $n = 127$ ; 43.1%), were more active than those older than 40 years ( $n = 20$ ; 23.3%).

A higher proportion of males than females was sufficiently active (40.6% and 33.9%, respectively), as shown in Table 3. More participants with fewer years of working experience (1–9 years) had high levels of activity ( $n = 172$ ; 42.9%), than participants with 20 or more years of working experience ( $n = 8$ ; 20.5%).

The most frequently mentioned reasons for engaging in LTPA were to prevent diseases, maintain good health, improve physical appearance, prevent or relieve stress, reduce fatigue, and make friends (Table 4). Lack of time and tight work schedules were the most frequent barriers to LTPA participation, followed by lack of company and motivation, lack of facilities, and limited money for transportation, and/or to pay for gym services (Table 5).

## DISCUSSION

This survey revealed that more than half (61%) of the government office workers in Kigali who participated in the study did not engage in sufficient levels of LTPA. A higher proportion of males than females was sufficiently active. These findings are not unique to the Rwandan population. In a study conducted among a group of Nigerian urban government employees, the majority (80%) were categorised as not physically active, and women were reported to be less physically active than men (26% and 73% were physically active, respectively), with no statistically significant difference.<sup>21</sup> The difference in physical activity participation between the sexes may be attributed to various factors that affect women's participation in physical activities, especially structured activities. These include low social economic status, poor social support, lack of motivation, poor perceived self-efficacy, and cultural norms.<sup>22</sup> The fact that women engage in less physical activity than men increases their vulnerability to NCDs. This calls for specific interventions to increase physical activity among women.

A decrease in physical activity participation was noted among older participants (40 years and older) and in those with more years of working experience (20 years and more); the differences were

**Table 3. Physical activity levels in relation to demographic characteristics**

Characteristic	Sufficiently active		Insufficiently active		p value
	n	%	n	%	
Sex					
Male	160	40.9	230	50.8	0.110
Female	58	33.9	113	66.1	
Marital status					
Married	91	36.9	155	63.1	0.290
Single/without partner	129	40.9	186	59.1	
Age group (years)					
21–30	127	43.1	168	56.9	0.004
31–40	72	39.8	109	60.2	
> 40	20	23.3	66	76.7	
Level of education					
Secondary	52	43.3	68	56.7	0.450
University graduate	141	36.9	241	63.1	
University post-graduate	24	41.4	34	58.6	
Working experience (years)					
1–9	172	42.9	229	57.1	0.002
10–19	35	30.4	80	69.6	
> 20	8	20.5	31	79.5	

statistically significant. Similar findings were reported in an Iranian study conducted among government workers in 2014, where physical activity participation significantly decreased with age and working experience.<sup>23</sup> More years of working has been associated with physiological, psychological and lifestyle changes that negatively affect individuals' physical activity participation.<sup>23</sup>

While the settings and contexts differ, other studies have reported similar findings. For example, an apparent decline in physical activity levels was noted among Serbian elderly men and women aged 60 years and older.<sup>24</sup> Although aging is multifactorial and complex, the decline in physical activity levels among older age groups may also be explained by the associated physiological changes. These are linked to progressive deterioration of neuro-musculo-skeletal and cardiopulmonary functions, which gradually affect functional capacity.<sup>24-26</sup> For example, the human body loses 30–50% of muscle bulk and strength between the ages of 30 and 80 years; this process can be slowed or reversed by physical activity.<sup>24</sup> Since office work predominantly involves prolonged sitting, office workers have low levels of physical activity. As a result, they are at a high risk of developing NCDs, such as type 2 diabetes, cardiovascular diseases, obesity, and certain cancers.<sup>6,27</sup> There is thus a need to increase the LTPA levels of government office workers in Kigali to curtail the risk of developing NCDs.

The most common reasons for engaging in LTPA were linked to improving health and gaining psychosocial benefits, while the most frequently mentioned barriers to LTPAP were lack of time, heavy workloads, tight working schedules, domestic and social responsibilities, as well as fatigue. In a comparable survey conducted among tertiary students in Rwanda, stress relief, better self-esteem, to gain strength and energy, as well as to enhance cardiovascular health, were the most perceived benefits of engaging in LTPA, while not having the right equipment to exercise, not being motivated and having other priorities were the perceived limiting factors for engaging in LTPA.<sup>28</sup> Although the benefits that contribute to physical activity participation are more or less similar in both studies, some are more influential than others. However, this could be attributed to the methods used in extracting data. In this current study, the respondents provided their own responses, through open-ended questions. In the study among students, the respondents had to choose from the predetermined responses. Generally, the findings of both studies reveal that Rwandans appreciate the physical and

psychological benefits of LTPA. However, they also identified factors that limit their participation. These factors should be considered when designing strategies to promote health-enhancing sport, taking into account the different levels of influence.

### Limitations

A limitation of the study was that convenience sampling was used. This can result in selection bias, although we strove to ensure representation of all the stakeholder institutions of the Government of Rwanda's Sports Policy, by selecting respondents from each one. The findings may not be generalisable to all government employees in Rwanda, as the study was restricted to employees of institutions that are stakeholders of the Sports Policy. Another limiting factor was that LTPA levels were assessed using a self-report tool (GSLTPAQ), which may lead to over-estimation of LTPA levels.

Future studies should be conducted on participants who represent all government employees, countrywide, using objective assessment of LTPA, in order to validate LTPA levels.

### CONCLUSION

More than half of the government office workers in this study had insufficient levels of LTPA. Physical activity levels declined significantly with advancing age and increasing years of working experience, and female participants were less active than males. The most frequently mentioned contributor to LTPAP was to gain health benefits, while lack of time, fatigue and workloads were the major obstacles. In light of these findings, government office workers in Kigali are at a risk of developing NCDs that are linked to insufficient levels of physical activity. There is a need for contextualised strategies to increase LTPA among this population group, taking into account not only individual factors, but different levels of influence of LTPA, such as the physical and social environments, as well as public policy.

### LESSONS LEARNED

- Leisure-time physical activity participation is influenced by factors other than demographic characteristics.
- Contexts and characteristics of the social and physical environments need to be considered for policy formulation for LTPA promotion.

**Table 4. Motivating factors to leisure-time physical activity**

Benefits	n	%
Health benefits		
Prevent diseases, long life, good health/wellbeing, breathe well, good blood circulation	274	48.8
Musculoskeletal benefits/physical appearance		
Keep fit and strong, increase endurance		
For flexibility and increased performance	228	40.6
Lose/manage weight, reduce fat, look and feel good		
Psychosocial benefits		
Relieve/prevent stress, relax body and mind, reduce fatigue, improve concentration, cleansing/detox		
Good company/motivation (friends, family, workmates)	250	44.4
Make friends, have fun/enjoyment		
Other		
Medical prescription, reduce risk of injuries		
Convenience (time, facilities at home), motivate my children	99	17.6
Secure neighbourhood, street lights		
Total	851	

Note: The total exceeded the number of questionnaires administered (562) due to multiple responses.

**Table 5. Factors that limit leisure-time physical activity**

Barriers	n	%
Personal factors		
Time, work schedules, fatigue after work, domestic responsibilities, social activities	352	62.6
Environmental and social factors		
Proximity to facilities, cost (gym and transport), lack of company, lack of motivation	74	13.2
Other factors		
No response, old age, sickness, fear of injuries, no sport for old people, don't know what sport to do, not a priority, boring and exhausting	242	43.1
Total	668	

Note: The total exceeded the number of questionnaires administered (562) due to multiple responses.

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## ACKNOWLEDGEMENTS

I am grateful to all the respondents who willingly participated in this study.

## 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: LM, JMF  
 Data acquisition: LM  
 Data analysis: LM, DAA  
 Interpretation of the data: LM, JMF  
 Drafting of the paper: LM  
 Critical revision of the paper: JMF, DAA  
 General supervision of the study: JMF

# Occupational noise-induced hearing loss in platinum miners: what do the data tell us?

L Ntlhakana,<sup>1,2</sup> K Khoza-Shangase,<sup>1</sup> G Nelson<sup>2,3</sup>

1. Department of Speech Pathology and Audiology, School of Human and Community Development, University of the Witwatersrand, Faculty of Humanities, Johannesburg, South Africa

2. Occupational Health Division, School of Public Health, University of the Witwatersrand, Faculty of Health Sciences, Johannesburg, South Africa

3. Research Department of Infection and Population Health, UCL Institute for Global Health, University College London, UK

**Correspondence:** Mrs Liepollo Ntlhakana, Department of Speech Pathology and Audiology, School of Human and Community Development, University of the Witwatersrand, Private Bag 3, Wits 2050, South Africa  
e-mail: liepollo.ntlhakana@wits.ac.za

**Society membership:** G Nelson is a Life Member of MMPA

**Keywords:** miners, occupational noise-induced hearing loss, compensation, electronic data systems

## How to cite this article:

Ntlhakana L, Khoza-Shangase K, Nelson G. Occupational noise-induced hearing loss in platinum miners: what do the data tell us? *Occup Health Southern Afr*. 2020; 26(1):8-14

## ABSTRACT

**Background:** Occupational noise-induced hearing loss (ONIHL) is one of the most common occupational health diseases affecting miners in South Africa. Accurate and appropriate medical data are essential for making valid diagnoses.

**Objectives:** The purpose of this study was to describe the electronic records of a South African platinum mine's audiometry medical surveillance system and their role in early diagnosis of ONIHL. Ear-related conditions of affected miners, occupations, and noise levels were concurrently reviewed, and the characteristics of miners with and without ONIHL were described.

**Methods:** This was an analysis of secondary data from the electronic audiometry and employee occupational records of 305 platinum mine workers for the period 2014 to 2017. Data were analysed using descriptive statistics.

**Results:** Although the audiometry records contained appropriate and relevant data, including annual hearing screening percentage loss of hearing (PLH) shifts, there was evidence of inaccurate and insufficient recording of risk factors for hearing loss in the medical surveillance records. The records indicated that the miners in some occupations were exposed to dangerously high noise levels, exceeding 85 dB(A). Miners as young as 21 years of age were diagnosed with ONIHL.

**Conclusion:** The insufficient and inaccurate data captured in the miners' records has important implications for the mine's efficient implementation of hearing conservation programme (HCP) elements aimed at mitigating ONIHL. The hazardous noise levels recorded call for increased attempts to meet noise level regulations, while the presence of conditions such as pseudohypacusis highlights the need for exploration of more reliable assessment measures.

## INTRODUCTION

Noise-induced hearing loss (NIHL) is defined as a sensorineural type of hearing loss that occurs gradually over time due to overexposure to noise that causes permanent damage to the organ of Corti, affecting both ears.<sup>1</sup> A person with NIHL will have an audiogram that indicates sensorineural hearing loss in the high frequency region of 3 000 to 6 000 Hz. Noise sources that cause occupational NIHL (ONIHL) are continuous or intermittent. Exposed individuals experience a rapid increase in hearing loss during the first 10 to 15 years of exposure, and a gradually progressive hearing loss thereafter.<sup>1</sup> Continuous, excessive noise exposure is defined as a noise level  $\geq 85$  dB(A), averaged over an 8-hour period.<sup>1</sup> This causes an initial temporary threshold shift (TTS) that lasts for 16–48 hours, and is a risk factor for a permanent threshold shift (PTS). The relationship between TTS and PTS is dependent on the extent of damage to the outer hair cells (OHCs). This damage is irreversible but preventable.<sup>1</sup>

In South Africa, employees in the mining and construction industries are exposed to very high noise levels.<sup>2</sup> Occupational NIHL (ONIHL) is highly prevalent among South African miners<sup>3,4</sup> but can be prevented if adequate noise-control measures are practised.<sup>5</sup>

The Compensation for Occupational Injuries and Diseases Act, 1993 (Act No. 130 of 1993) (COIDA) gazetted Circular Instruction 171,<sup>6</sup> stipulates that an employee exposed to occupational noise at or above the 85 dB(A) noise rating limit (8-hours) time weighted average (TWA), and who has been diagnosed with ONIHL, should be compensated.<sup>6</sup> However, the South African National Standard (SANS 10083:2013) rather promotes the prevention of ONIHL, and stipulate that prevention measures must be instituted by companies for hearing conservation purposes.<sup>7</sup> Diseases in the mining industry, including pulmonary tuberculosis and human immunodeficiency virus (HIV), have been well documented.<sup>5,8,9</sup> However, there is little information available on the synergistic effects of these diseases, and their treatments with noise exposure, on the auditory system, or their potential as determinants for ONIHL risks. Such evidence is important as it can assist in developing disease control policies for the mines and health service planning.<sup>9</sup>

High prevalence rates of ONIHL have been reported. A 2017 report by the (now) Department of Mineral Resources and Energy showed an increase from 966 in 2016 to 1 141 cases in 2017 for their member mines.<sup>10</sup> Although these increases were in both the gold and platinum sectors, there was a 54% increase in the number of ONIHL cases

reported by the platinum mines, from 2016 to 2017.<sup>10</sup> A total of 2 107 cases of ONIHL was reported by all mines that submitted audit reports in 2016/2017.<sup>10</sup> However, more recent reports by the individual mines reflect a different picture, i.e. that there is a decline in ONIHL cases reported from 2014 to 2018. For these years, AngloGold Ashanti mine reported a decrease in ONIHL cases from 35 to 30,<sup>11</sup> and Anglo American plc, from 90 to 30.<sup>12</sup> It has been suggested that, in general, reported rates of ONIHL are neither reliable nor valid due to partial reporting within the mine's hearing conservation programme (HCP), inaccurate or inadequate recording of noise levels, and inefficient capturing of audiometric data.<sup>3,4,13-15</sup>

In the study reported in this paper, we explored the use of an electronic information management system used by the mine to report on the miners' audiometry records, including noise exposure levels, the use of hearing protection devices (HPDs), medical surveillance, and audiometric test results.<sup>16,17</sup> The mine uses Microsoft Excel to record data for miners at risk of developing ONIHL, those who are diagnosed with ONIHL, and the processing of ONIHL compensation claims.<sup>18</sup> An attempt by Begley to create an audiometry database for the South African mining industry was trialled in 2005,<sup>18</sup> to pave the way for a national audiometry repository and to track ONIHL claims. Unfortunately, this was unsuccessful.<sup>18</sup> Reasons for failure included that baseline audiometry data were duplicated, noise exposure levels were not provided by the mines, and screening audiometry data provided by the mines were erroneous.<sup>18</sup>

The aim of the study was to describe the electronic records of a South African platinum mine's audiometry medical surveillance system, and its role in the early diagnosis of ONIHL. In addition, ear-related conditions of the miners examined by the occupational medical practitioner (OMP), and the occupations and related noise levels, were investigated, and the characteristics of miners with and without ONIHL were described.

## METHODS

This cross-sectional study was an analysis of secondary data containing the miners' medical surveillance and audiometry records (N = 305) accessed from the OMPs' electronic records from a platinum mine in

Limpopo province, South Africa, from 2014 to 2017. According to the SANS 10083:2013, medical surveillance records for employees at risk of developing ONIHL must be reviewed by the OMP for hearing loss prevention and reporting of ONIHL compensation claims. Therefore, in order to describe the mine's medical surveillance electronic record-keeping, and its role in the early diagnosis of ONIHL, we obtained the OMP's electronic records from the mine. The OMP recorded miners' audiometry examination data in three different datasets (Figure 1). The first comprised data from screening audiometry examinations conducted by the occupational health nurse OHN (N = 480). The second dataset comprised diagnostic audiometry data for those who were referred by the OHN to the OMP because their percentage loss of hearing (PLH) scores were > 2.5%; the OMP's examination included ear-related conditions. All miners with ear conditions and/or PLH > 2.5% were then referred to the audiologist for diagnostic audiology examinations (N = 470). The third dataset contained both screening and diagnostic audiometry data for only those miners who had been compensated for ONIHL (N = 76).

Variables included in the analysis were age at examination, occupation, duration of employment (calculated from year of first medical examination date to 2017), reason for referral to the OMP, date of OMP referral to the audiologist, baseline PLH score, noise exposure levels (area noise measurements in sound pressure in dBA(LAeq,8h), and age at ONIHL diagnosis.

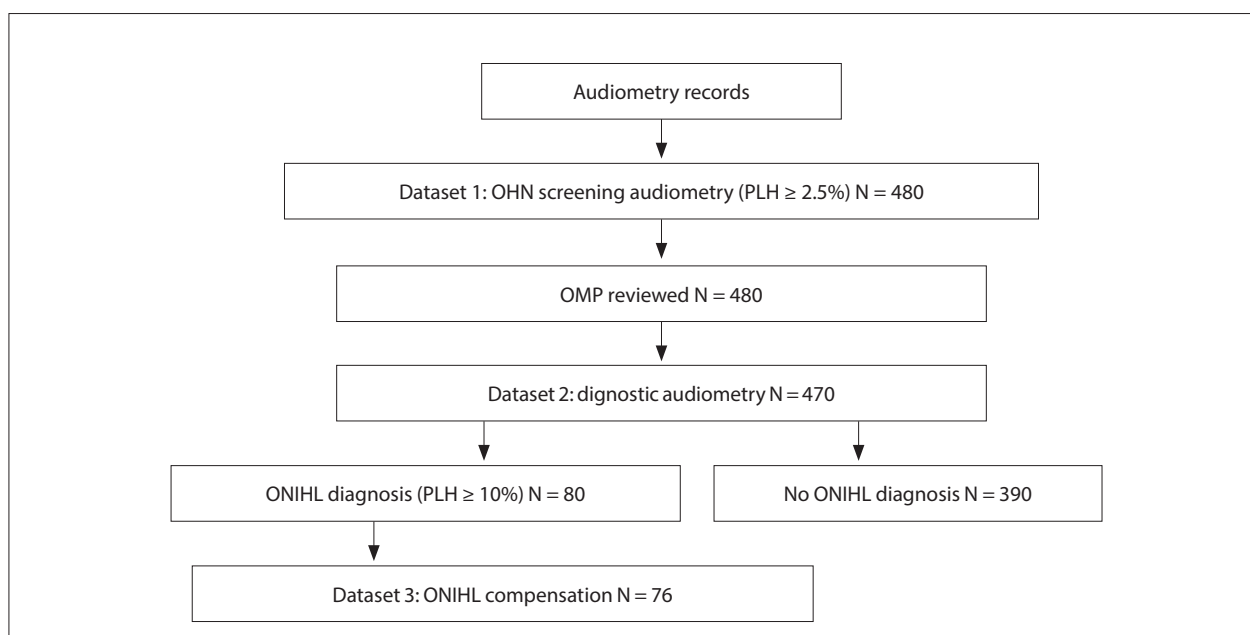
The three datasets that were provided by the mine in Microsoft Excel format were merged, and then imported into and analysed using Stata 15.1. Continuous data were presented as means and standard deviations and categorical data were described as frequencies and percentages.

Ethical clearance was obtained from the University of the Witwatersrand's Human Research Ethics Committee (clearance certificate no. M180273).

## RESULTS

### Demographic characteristics

The 480 audiometry records reviewed contained data for 305 male underground miners (some miners had



**Figure 1. Audiometry datasets reviewed**

duplicate audiometry records). The mean age of the miners was 47.7 ± 8.5 years (range 21 to 63 years), and the mean years of work experience was 10 ± 8 years (range one to 18 years). Eighty miners were diagnosed with ONIHL, of whom 76 were compensated (Figure 1).

**Electronic records of the mine’s medical surveillance programme**

All miners had undergone annual screening examinations by the OHN, and miners at risk for ONIHL were referred to the OMP. The miners’ annual hearing screening results were not consistently and regularly recorded, year-on-year, from 2014 to 2017. Of the 76 miners diagnosed with ONIHL, most 69 (98.8%) had only one annual screening audiometry record for the period 2014 to 2017 (Table 1).

The PLH scores recorded in the screening and diagnostic audiometry datasets (datasets 1 and 2, respectively) were inconsistent (Figure 2). For example, in 2016, 114 of 170 miners (67.1%) in the screening audiology dataset were recorded as having a PLH of ≤ 10%, but 146 of 163 of these miners (89.6%) had PLH scores of ≤ 10% recorded on the diagnostic audiometry dataset. In 2017, 72 miners were recorded as having a PLH ≥ 10% in the screening audiometry dataset, but only 17 of the 72 (23.6%) had a PLH of ≥ 10% recorded in the diagnostic audiometry dataset.

Although miners were referred to the OMP for examination, records in the diagnostic audiology dataset did not include any ear-related conditions or details regarding common ear-related signs and symptoms such as tinnitus, vertigo, otalgia and impacted cerumen. Ear-related conditions were recorded in the OMP medical surveillance notes, but only for the 76 miners who were compensated for ONIHL, although no information was recorded for 2014 (Table 2). In addition, chronic medical conditions, such as tuberculosis (TB) and HIV, and their respective treatment regimens, which are known to be associated with hearing loss, were not recorded in any of the datasets.

**Table 1. Number of miners’ screening audiometry records (N = 76)**

Screening audiometry records (n)	Miners	
	n	%
1	69	90.8
2	6	7.9
3	1	1.3

Other information that was recorded only for the miners who received compensation for ONIHL (N = 76) was the baseline PLH score.

**Mine workers’ occupations and noise exposure levels**

According to the medical surveillance data (notes made by the OMP in the diagnostic audiometry dataset), all miners were provided with HPDs. Eighty of the 305 (Figure 2) miners were diagnosed with ONIHL by the audiologist (PLH > 10 in the diagnostic audiometry database) and 76 (26.2%) were compensated.

Noise exposure levels (Table 3) were recorded as 8-hour time-weighted average (TWA) (LAeq,8h) area noise measurements. Sixty-five of the 76 compensated miners (85.5%) worked in occupations that exceeded the legislated (≥ 85 dBA) noise exposure. For these 65 miners, the recorded noise exposure levels in the work areas ranged from 87 to 103 dB(A). The only occupations for which noise levels were below 85 dBA were winch transport operator assistant and supervisor, underground fitter, underground mine overseer, shaft bell operator, pump team supervisor, and shaft timber worker.

**Characteristics of miners with and without ONIHL**

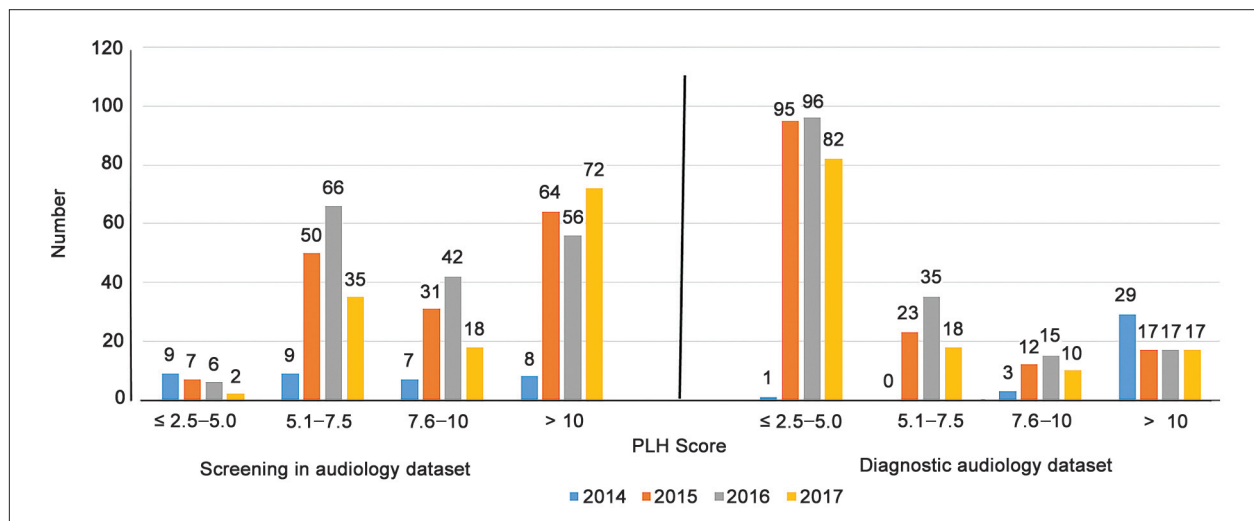
The baseline PLH scores, age at ONIHL diagnosis, duration of employment and noise exposure levels were reviewed for all miners, i.e. both those who were diagnosed with ONIHL (n = 76), and those who were not (n = 229). Only the miners with ONIHL had baseline PLH scores and age at ONIHL diagnosis recorded (Table 4).

Eighteen (23.3%) of the miners diagnosed with ONIHL were younger than 41 years. Among those with ONIHL, similar proportions of miners had worked for 0–5 and 6–10 years. More than half of the miners diagnosed with ONIHL had baseline PLH scores of 0 to 5 (n = 43; 56.6%). Many miners who had worked for more than 10 years (n = 108; 47.6%) did not have ONIHL. In both groups, most of the miners (around 95%) had high recorded noise exposure levels (≥ 85 dBA).

**DISCUSSION**

**Annual hearing screening examinations**

We reviewed miners’ electronic records to describe the platinum mine’s hearing conservation programme, and its role in early diagnosis of ONIHL. All miners had undergone annual screening examinations by the OHN and/or the OMP. However, annual hearing screening, by the OHN, was not conducted systematically.<sup>19,20</sup> Individual miners’



**Figure 2. PLH scores in the screening and diagnostic audiometry datasets, 2014 to 2017**

audiometry screening records were not available for every year of the study period, which prevented consistent tracking of the miners' hearing function. Incomplete individual screening audiometry data could prevent early identification of hearing loss, which is important for hearing conservation purposes.

### Referral of miners for audiometry

Miners with recorded PLHs  $\geq 2.5\%$  were referred to the OMP for management and to the audiologist for ONIHL diagnosis, as an early intervention for the prevention and diagnosis of hearing loss. However, reasons related to hearing loss and follow-up interventions were not included in the miners' electronic audiometry records. It is possible that this information is provided in written records but was not available in the electronic files provided. Although referring miners with a 2.5% PLH to the OMP is the correct procedure to follow,<sup>21,22</sup> excluding factors such as medical conditions and occupational exposures associated with hearing loss in the miners' screening audiometry records for any reason, may contravene the Compensation for Occupational Injuries and Diseases Act (Act No. 130 of 1993) (COIDA) gazetted Circular Instruction 171, Section<sup>8,6</sup> and delay the diagnosis of hearing loss.

### Missing information

Although baseline PLH scores can be used to predict a miner's pre-existing risk for hearing loss not related to occupational noise exposure, only miners with ONIHL had baseline PLH data recorded in the audiometry database. The procedure is a requirement for ONIHL compensation (Instruction 171),<sup>6</sup> and also allows for tracking of a miner's hearing function. However, exclusion of baseline PLH scores for other miners not diagnosed with ONIHL from the audiometry records prevents the calculation of the miner's PLH shift from baseline and the tracking of the miner's hearing function. Therefore, all miners, regardless of whether or not they have been diagnosed with ONIHL, should have their baseline PLH noted in all electronic audiometry records.

### Ear-related conditions and interventions

Some of the 76 miners with compensated ONIHL presented with auditory pathologies that were identified during hearing screening, and subsequently diagnosed by the OMP. Although all miners with ear-related conditions identified during hearing screening were, in theory, referred to the OMP and the audiologist for further intervention and diagnostic audiometry, respectively, the data regarding ear-related conditions were only recorded in the dataset of the 76 miners who were compensated for ONIHL. They were not recorded for those miners who had not been diagnosed/compensated for

ONIHL. Inadequate recording of ear-related conditions prevents early identification of hearing loss initiatives, which are recommended by Franz and Phillips (2001).<sup>23</sup> Therefore, all ear-related conditions identified during hearing screening and related interventions should be noted in the individual miners' audiometry screening records, as evidence for risk-based medical surveillance implementation.

### Signs and symptoms associated with hearing loss

Common ear-related signs and symptoms associated with hearing loss, such as tinnitus, vertigo, otalgia and impacted cerumen<sup>15,24</sup> were not recorded in the electronic diagnostic audiometry database by the mine's OMP. This limits efforts to prevent other types of hearing loss (other than ONIHL), e.g. conductive hearing loss. In addition, there was no information in the miners' audiometry records about chronic conditions that are known to adversely affect hearing function, including TB and HIV, and treatment for these diseases. Synergies between these diseases and hearing loss, as well as between treatments for the diseases and hearing loss, have been observed in clinical settings, and some researchers have reported hearing preservation as a benefit derived from hearing monitoring programmes for miners on TB and HIV treatment.<sup>25,26</sup>

### Use of hearing protection devices

The use of hearing protection devices (HPDs) is important but is a last resort to prevent ONIHL when engineering controls and other efforts to reduce personal noise exposure have failed.<sup>27,28</sup> Although the mine reportedly provided all the miners with HPDs, it is unlikely that there was 100% compliance of HPD use. Several studies have shown that miners prefer to not use HPDs for various reasons, e.g. discomfort, incorrect fit, interference with hearing abilities, etc.<sup>15,34</sup> No information about the use of HPDs was recorded in the databases. If this information is not in the miners' audiometry records, it is difficult to design individualised interventions, such as awareness training, HPD fit, etc.<sup>28</sup>

### Poor record-keeping

Otitis media and dull tympanic membrane, and hearing loss not ascribed to ONIHL, were reported as ear-related conditions in the group of 76 compensated miners. Previous studies<sup>15,24</sup> have reported similar findings in gold and platinum miners in South Africa. There were fewer ear-related conditions recorded for the 76 miners with ONIHL than expected. Previous studies have cited poor record-keeping with regard to ear-related conditions in the mines' medical surveillance records as one of the reasons for not being able to review ear-related conditions and/or interventions.<sup>18,24</sup> This poor record-keeping with regard to the miners' ear-related conditions and intervention strategies inhibits efforts to diagnose hearing loss early, and to prevent it.

**Table 2. Number of miners and types of ear-related conditions recorded by the OMP**

Condition	Year of screening test				Total N
	2014 n	2015 n	2016 n	2017 n	
Rapid deterioration of hearing*		0	1	1	2
Dull tympanic membrane and possible otitis media	No medical comments recorded	1	2	3	6
Hearing loss not ascribed to ONIHL		2	1	4	7
History of surgery: middle ear surgery		2	0	0	2
Pseudohypacusis**		6	3	3	12
Total	0	11	7	11	29

\* unexplained sudden hearing loss

\*\* a condition in which hearing loss is exhibited in the absence of any organic disease, usually due to malingering

### Misdiagnosis, using audiometry protocol

The diagnosis of pseudohypacusis (malingering) in some of the miners, also reported by De Koker in South African gold miners in 2004,<sup>17</sup> might be due to the potential for financial compensation for ONIHL.<sup>17,29,30</sup> De Koker recommended the inclusion of auditory steady-state response (ASSR) in the diagnostic audiometry protocol, while the Health and Safety Executive (HSE)<sup>30</sup> has recommended distortion-product oto-acoustic emissions (DPOAE) as a sensitive test for the early detection of outer hair cell damage.<sup>30</sup>

### Inaccurate and misleading noise exposure data

Excessive area noise exposure levels have been identified as the leading cause of ONIHL in the mines.<sup>2</sup> It was therefore not surprising that most miners diagnosed with ONIHL had recorded noise measurements  $\geq 85$  dB(A). However, noise measurements in the mines are recorded as 8-hour time-weighted average (TWA) (LAeq,8h) area noise measurements. This is misleading as high noise levels are effectively hidden.<sup>31</sup> Although the highest recorded noise level in the database of the 76 platinum miners with ONIHL was 103 dB(A), this might obscure (average out) excessively high exposures. The ONIHL risk is increased for miners exposed to excessive noise levels, but the risk might not be accurately identified if only average noise measurements are recorded.<sup>32</sup> In addition, Edwards et al. (2011) recommended using a dosimeter for more accurate noise measurements in order to include measures of noise for all work-related activities in a full work shift, closer to the miner's ear (personal measurements rather than area measurements).<sup>33</sup>

### No data about exposure to non-occupational noise are recorded in the database

While studies have reported that older age (presbycusis) is associated with ONIHL in the mining industry,<sup>13,34</sup> miners as young as 21 years were diagnosed with ONIHL and accordingly compensated. Strauss et al. (2014) also reported that gold miners younger than 31 years were at risk of NIHL.<sup>34</sup> This might be explained by a pre-existing hearing loss due to exposure to non-occupational noise, such as loud music. In a study on the use of personal listening devices (PLD) by young adults (14–31 years old), it was concluded that hearing loss was a result of exposure to loud music.<sup>35</sup> Strauss et al. (2012) demonstrated that the high prevalence of NIHL in South African gold miners was related to the miner's age.<sup>3</sup> Our findings and those of Strauss et al. (2014) suggest that young miners could have joined the mines with pre-existing non-occupational noise-related hearing loss. Therefore, investigations into the miners' hobbies (related to noise exposure), and duration thereof, may assist researchers in understanding the early onset of ONIHL in younger miners.

### Limitations

These findings may not be generalisable to the HCPs of all the South African mines. The electronic records that were reviewed were from one platinum mine in Limpopo province. The sizes of the two groups (those with ONIHL and without ONIHL) were relatively small. The fact that the miners' medical surveillance audiometry records were recorded in different databases made it difficult to analyse the data as some records were duplicated and some had missing data, which effectively reduced the sample size. Not all the miners had baseline records that could be used as valid reference points; some miners had PLH scores higher than 10% (indicating pre-existing hearing loss) with no previous evidence of a hearing loss diagnosis.

**Table 3. Occupations and noise exposure levels for mine workers diagnosed with ONIHL (N = 76)**

Occupation	Mean noise level (dBA)*	n	%
Scraper winch operator	103.8	4	5.3
Pipes, tracks and ventilation (PTV) worker	95.6	3	3.9
Developing machine operator	94.8	7	9.2
Lightweight machine operator	94.5	22	28.9
Cheesa**	92.4	10	13.2
Mining team supervisor	91.3	6	7.8
Shift supervisor mining	91.3	3	3.9
Stope timber miner	89.5	6	7.8
Processor	87.9	1	1.3
Haulage construction aid	87.0	2	2.6
Haulage construction supervisor	87.0	1	1.3
Winch transport operator assistant	84.5	2	2.6
Winch transport operator supervisor	84.5	1	1.3
Underground fitter	84.2	2	2.6
Underground mine overseer	84.1	1	1.3
Incline shaft bell operator	82.9	3	3.9
Pump team supervisor	82.9	1	1.3
Shaft timber worker	82.9	1	1.3

\*8-hour time-weighted average (TWA)

\*\*responsible for placing explosives

## Recommendations

Sufficient and accurate miners' audiometry records should be recorded annually and kept in a single database. The mine can enhance or adopt several strategies to improve electronic recording of miners' audiology data at the mine, which would assist in monitoring and preventing ONIHL. Every miner should be screened annually, and checks should be put in place to ensure that the findings are captured and accurately recorded in the electronic database. If any miner has a PLH of 2.5 or more, the OMP should investigate reasons for this, in addition to exposure to high noise levels, and record relevant notes in the miner's audiometry record.

Baseline PLH scores should be included in the electronic audiometry records for all the miners so that PLH shifts can be identified and acted upon, using appropriate interventions. All ear-related conditions and any other relevant medical information, such as TB and HIV treatment and co-exposures that are associated with hearing loss (e.g. chemicals and dust), should also be included in the electronic database.

Detailed information about the provision and usage of HPDs and any other interventions to prevent hearing loss should also be recorded in order to implement miner-specific HPD interventions. Audiologists should routinely use DPOAE and ASSR in diagnostic audiometry in order to rule out pseudohypacusis. It is imperative that the mines rethink their policies/guidelines for reporting noise levels which are currently reported as averaged measurements. Last, information about non-occupational exposure to noise should be collected and recorded for every miner. Complete, accurate and integrated recording of the miners' audiometry records will provide a holistic view of the miners' hearing function, which is critical for the mines' HCPs.

## CONCLUSION

The findings from our study indicate the need for a single, comprehensive electronic audiometry database for the mines. The databases should include all relevant medical and occupational and non-occupational exposure information. The data should be captured regularly and checked to ensure that annual records are available for all miners. In addition to eliminating excessive noise exposure levels, early diagnosis and prevention of associated risks, such as ear-related conditions, could potentially improve the mine's medical surveillance and audiometry, and reduce hearing loss. Hearing conservation practitioners should continue to focus on early detection in order to prevent hearing loss, in addition to prevention of exposure.

## LESSONS LEARNED

- Recording the miners' audiometry and medical surveillance data in multiple databases can result in inconsistencies and hamper HCP efforts to diagnose hearing loss early.
- The monitoring of PLH shifts should be used for early diagnosis and prevention of hearing loss.
- Accurate and comprehensive electronic recording of audiometry information will enable efficient evaluation of HCPs.

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**Table 4. Characteristics of miners with and without ONIHL**

Characteristic	ONIHL			
	Yes n = 76		No n = 229	
	n	%	n	%
Age at ONIHL diagnosis (years)				
20–40	18	23.7	no data	
41–50	22	28.9		
51–65	36	47.4		
> 65	0	0		
Duration of employment (years)				
0–5	29	38.2	16	7.0
6–10	23	30.3	105	45.8
11–15	6	7.9	103	44.9
> 15	18	23.7	5	2.2
Baseline PLH score				
0–2.5	23	30.5		
2.6– 5.0	20	26.3		
5.1–7.5	7	9.2	no data	
7.6–10	9	11.8		
>10	17	22.4		
Noise exposure level (dBA)				
83.1–84.9	4	5.3	12	5.2
≥ 85	72	94.7	217	94.8

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## ACKNOWLEDGEMENTS

The authors would like to thank the participating mine for providing permission to use their data in this study, and for the hearing conservation medical practitioners' technical guidance.

## 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: LN, KK-S, GN

Data acquisition: LN

Data analysis: LN

Interpretation of the data: LN, KK-S, GN

Drafting of the paper: LN

Critical revision of the paper: LN, KK-S, GN

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# Post-exposure prophylaxis protocol for exposure to blood-borne pathogens: an intervention to improve knowledge and practice among medical students in a South African hospital

C Kulenkampff<sup>1</sup>, E Archer<sup>2</sup>, WAJ Meintjes<sup>3</sup>

1. Cecilia Makiwane Hospital, Mdantsane, East London, South Africa
2. Simulation and Clinical Skills Unit, Centre for Health Professions Education, Stellenbosch University, Stellenbosch, South Africa
3. Global Health Department, Stellenbosch University, Stellenbosch, South Africa

**Correspondence:** Dr Chane Kulenkampff, 5 Villa Road, Nahoon, East London, 5241, South Africa  
e-mail: chanekul@gmail.com

**Keywords:** needlestick injuries, healthcare workers, education, HIV

## How to cite this article:

Kulenkampff C, Archer E, Meintjes WAJ. Post-exposure prophylaxis protocol for exposure to blood-borne pathogens: an intervention to improve knowledge and practice among medical students in a South African hospital. *Occup Health Southern Afr.* 2020; 26(1):15:20

## ABSTRACT

**Background:** Globally, approximately three million healthcare workers experience a percutaneous injury each year. Medical students are at a particularly high risk of exposure to blood-borne pathogens. Despite this, the rate of non-reporting is still high.

**Objectives:** The objectives of this study were to describe and improve the knowledge and practice of the post-exposure prophylaxis (PEP) protocol among medical students, through the implementation of quality-improvement interventions, with a view to improving the protocol.

**Methods:** This was an intervention study conducted among third- to fifth-year students, in 2015 and 2016. The quality-improvement interventions took place over 11 months and included the issuing of laminated protocols, posters and lectures. Data from survey questionnaires were used to quantify the impact of these interventions. Student practice was measured by the number of correct steps of the protocol completed. McNemar and Wilcoxon signed-rank tests were used to test differences in the paired categorical data.

**Results:** Of approximately 750 students who participated in the study intervention, 407 returned the initial questionnaire and 148 returned the post-intervention survey questionnaire. Eighty-six students (21.1%) completed both questionnaires. The blood-borne pathogen exposure rate prior to the intervention period was 28.0%. In the paired group, reporting of exposures increased from 12.2% in 2015 to 31.3% in 2016. Knowledge of the PEP protocol increased significantly in the paired group, from 17.4% to 40.2% ( $p < 0.001$ ). Prior to the intervention, 91.7% completed fewer than half of the steps of the PEP protocol. This decreased significantly to 69.4% in the paired group, post-intervention ( $p = 0.03$ ).

**Conclusion:** Practice of the PEP protocol significantly improved after the intervention was implemented. In addition, there was a significant improvement in the knowledge of students about post-exposure management. However, many exposures were still unreported post-intervention, indicating that more work is needed to improve reporting behaviour.

## INTRODUCTION

Throughout undergraduate training, medical students are expected to perform minor invasive clinical procedures, such as drawing blood and inserting intravenous cannulas. These procedures carry the risk of sharps-related injuries. Students at Stellenbosch University are trained in these procedural skills in simulated teaching sessions prior to performing them on patients. However, there is a lack of formal training in the post-exposure prophylaxis (PEP) protocol following a sharps injury. Students also do not have an easy-to-follow protocol at hand in the event of an exposure incident. Thus, exposure events are often poorly managed, placing healthcare workers (HCWs) at risk of contracting serious illnesses.

Globally, it has been estimated that more than three million HCWs experience a percutaneous injury each year, and that, as a result of such occupational exposure, in the year 2000 it was estimated that there were 16 000, 66 000 and 1 000 hepatitis C, hepatitis B and HIV infections among HCWs, respectively,<sup>1</sup> with equivalent proportions of 39%, 37%, and 4.4%, respectively.<sup>1</sup>

Medical students are at a particularly high risk of exposure to bodily fluids due to the many invasive procedures performed daily, and the students' relative inexperience in executing them. In studies conducted in Toronto<sup>2</sup> and Oxford,<sup>3</sup> as many as 48% and 44% of students, respectively, had sustained a sharps injury at the time of inquiry. It should, however, be noted that most published reports probably underestimate the actual risk due to the large number of exposures that are not reported. In a 2014 study on medical students in Berlin, Germany, it was reported that the most frequent activities associated with exposures, from most to least common, were disposal of needles and sharps, assistance in theatre, venepuncture, suturing, and recapping needles.<sup>4</sup>

Reporting of blood-borne pathogen-exposure incidents is of therapeutic, medico-legal and statistical importance. Failure to report incidents equates to missed opportunities for acquiring PEP, and receiving appropriate post-exposure counselling.

The rate of non-reporting behaviour among medical students is alarmingly high.<sup>5</sup> A study conducted in 2002 at the University of

Florida on third-year students found that only 17% of students reported incidents.<sup>6</sup> A number of studies indicate that this lack of reporting behaviour among medical students may be, in part, due to the fact that they are unaware of relevant policies for reporting such exposures.<sup>7,8</sup> Other common reasons for not reporting exposures were that the exposures were considered low risk, and that the students were too embarrassed to ask for assistance.<sup>9</sup>

The estimated risks of infection following a needlestick injury are 0.3%, 1.8% and 6–30% for HIV, hepatitis C and hepatitis B, respectively.<sup>1</sup> Despite these risks, several studies<sup>10–12</sup> have emphasised that knowledge and practice among medical students, regarding post-exposure management, remains inadequate. An analysis of first-year residents at five university-affiliated hospitals in 1992 found that 26% had not been educated on appropriate post-exposure management during their medical school training.<sup>12</sup>

Multiple international studies investigating the impact of improved teaching and awareness of the PEP protocol showed promising results.<sup>13–14</sup> A study, conducted at Yale University in 1999, asked graduating students about their experiences after implementing improvement strategies that included teaching sessions and the issuing of laminated cards summarising post-exposure management information. Of the students who had experienced exposures, only 57.0% had reported the event.<sup>9</sup>

The World Health Organization (WHO) suggests that, for an adequate response to occupational exposure, guidelines need to be developed and disseminated among HCWs. In addition, there should be adequate information, education and counselling about the post-exposure protocol, and reported cases should be reviewed.<sup>15</sup>

The health of HCWs is of vital importance, and it is essential that regular evaluation and analysis of the knowledge and practice of the PEP protocol is undertaken, and that any need for further education is identified. Medical students should be placed at the forefront of these programmes as they are in settings where the correct education and training can significantly improve reporting practices.

By conducting this quality-improvement study, we aimed both to describe and improve the knowledge and practice of the PEP protocol among medical students at Stellenbosch University, through the implementation of quality-improvement interventions, with a view to improving the existing protocol. As a secondary objective, we described the prevalence and nature of exposure events, as well as barriers to reporting them.

## METHODS

This study took place from February 2015 to January 2016. The study population comprised approximately 750 third-, fourth- and fifth-year students at Tygerberg Campus, Stellenbosch University, South Africa.

During the PEP protocol lecture, the students were invited to complete a self-developed questionnaire prior to the implementation of the quality-improvement strategies. Questions focused on the prevalence and nature of exposures, as well as the knowledge and practice of the PEP protocol. All participants were asked to complete the demographic and knowledge sections of the questionnaire. Those who had experienced any form of bodily fluid exposure while working in the hospital were asked to complete the practice section of the questionnaire.

Once the first set of questionnaires had been returned, the following quality-improvement strategies were implemented (see Figure 1):

- Laminated cards with the details of the protocol were issued to participants
- Posters, demonstrating the protocol, were displayed in the University Hospital, where most of the students were working at the time
- The PEP protocol was presented to the study participants as a lecture

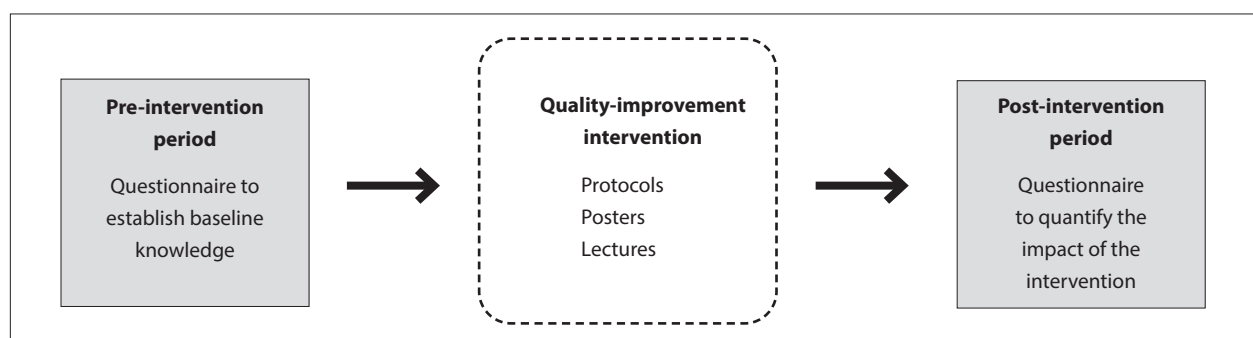
After implementation of quality-improvement strategies for 11 months, a second questionnaire, requesting the same information, was e-mailed to the same group of medical students. Questions again assessed the students' knowledge and practice of the PEP protocol. The students who completed the second questionnaire were asked to comment only on exposure incidents that they had experienced in the last 11 months, following the initiation of the quality-improvement intervention. Each student was asked a series of 11 knowledge questions. As before, only students who had been exposed completed the practice section of the questionnaire. Questions addressing the number and nature of the exposures, in addition to the management of the exposures, were asked. Student numbers were provided on the questionnaires to allow for paired analysis (for those who answered both questionnaires).

Students were also requested to provide qualitative feedback which was taken into consideration in the evaluation of the intervention.

## Data management

Data from both sets of questionnaires were captured, coded, and entered into a Microsoft Excel spreadsheet. The total marks for the 11 knowledge questions were assessed as percentages of the total number of potentially correct answers.

Students were divided into three exposure groups, depending on how many of the seven major steps of the protocol they had completed (Table 1). Students' practice of the protocol was categorised as follows: < 50%: less than four of the seven steps followed; 50–99%: four to six of the seven steps followed; and 100%: seven of the seven steps followed. The exposures were classified as low, medium and high risk, based on the HIV/AIDS Policy Guideline published by the Department of Health, South Africa, in 2000<sup>16</sup> (Table 2).



**Figure 1. Schematic representation of the intervention study design**

### Statistical analysis

Categorical data were described as frequencies and proportions; and numerical data, as means and standard deviations. McNemar and Wilcoxon signed-rank tests were used to test differences in paired categorical data. The level of significance was set at 95%.

The study was approved by the Health Research Ethics Committee at Stellenbosch University (reference S14/10/258).

### RESULTS

Of the 750 students, 407 responded to the first survey and 148 to the second, giving response rates of 54% and 20%, respectively. Of the 407 study participants 37.8% (n = 154) were third-year students, 38.8% (n = 158) were fourth-year students, and 23.4% (n = 95) were fifth-year students. Students were categorised into paired and unpaired data groups. The paired group comprised 86 students (21.1%) who completed both the pre- and post-intervention questionnaires. The unpaired group comprised all respondents.

The most common exposures were from needlestick injuries (both hollow-bore and solid needles), splashes in eyes, and blood on both compromised and intact skin. The procedures during which these exposures occurred included suturing, venepuncture and assisting in delivering of babies, amongst others.

Prior to the intervention, 114 (28.0%) students had at least one exposure incident. The exposure incidence over the 11 months after the intervention took place was slightly increased to 37.8% (n = 59) (Table 3). Regarding reporting behaviour in the paired data group, 12.2% (six of 49) of exposures were reported in 2015 prior to the interventions; whereas 31.3% (20 of 64) of exposure incidents were reported in 2016 post-intervention. This resulted in a 19,1% increase in the proportion of exposures reported. Additionally, there was a 26% increase in the number of students who reported exposure incidents in the paired group.

The students cited the following reasons for not reporting, in order of decreasing frequency: belief that the exposure risk was low, inadequate knowledge of the protocol, work-related pressure, and fear of the outcome of testing.

With regard to knowledge of the PEP protocol, both the unpaired and paired groups performed significantly better post-intervention. Table 4 summarises the knowledge scores obtained by participants in the pre- and post-intervention phases of the study. Post-intervention, the overall scores increased significantly, by 22.7% and 22.8% in the unpaired and paired groups, respectively ( $p < 0.001$ ). Knowledge increased mainly for site-specific practical aspects of the reporting process, including collecting the correct number of patient stickers needed to open a file, and knowing where to go after an exposure incident.

Table 5 summarises student practice of the protocol by looking at the level of risk of the incident as well as the number of correct steps of the protocol completed post-exposure. Exposed students were asked to grade their most recent incident. The responses indicated that most exposures prior to the interventions were low risk (n = 34; 63.0%), in contrast with the mainly high-risk exposures that were experienced in the 11-month period post-intervention (n = 10; 41.7%). In terms of student practice of the PEP protocol, the proportion of students that followed 50% or more of the steps increased from 8.3% pre-intervention to 30.6% post-intervention for the 86 students who returned both questionnaires ( $p = 0.03$ ). However, there was no change in the total unpaired group (36.1% and 36.2%, pre- and post-intervention, respectively).

From the qualitative written feedback, students appeared to have responded well to the interventions, and rated the usefulness of these strategies as 'high': "This is extremely important information that all students NEED to hear."

Most participants agreed that changes needed to be made to the medical curriculum in order to accommodate lectures on the PEP protocols in the third-year clinical skills workshops. For example, it was recommended that students should "have the protocol at the back of (their) clinical skills module books (as) (t)his will make it easy for students to refer to the protocol immediately if ever faced with an accidental exposure". Other students recommended that protocol cards be made available electronically.

Many students believed that practice of the PEP protocol could

**Table 1. The seven major steps of the PEP protocol to be completed by students**

1. First-aid administered
a. Wash the exposed area with soap and water
b. Use alcohol/surgical spirits on the exposed site
2. Appropriately evaluated the situation
a. Inform a supervisor: doctor/ sister of the injury
b. Perform a risk assessment
3. Correctly obtained consent
a. Counsel the patient about HIV and hepatitis testing before and after taking blood
b. Ask the patient to sign a written consent form
4. Took appropriate blood tests
a. Take the appropriate blood samples for testing (from both the patient and student)
b. Do a rapid HIV test on the source patient
5. Appropriately reported the incident
a. Report the incident and open a folder
b. Take the source patient's stickers with them to open the folder
6. Took appropriate medication
a. Take the first dose of post-exposure prophylaxis (PEP)
b. Fetch the 28-day supply of PEP
7. Followed up appropriately
a. Return for follow-up test results within 10 weeks of the exposure

be assessed: "This part of our education should be more formalised and added to the early clinical skills programme as material that is examinable."

Approximately one third agreed that the working environment in the hospital did not encourage appropriate reporting and healthcare seeking: "Students feel ashamed of their exposure and, therefore, isolate themselves. Effort should be made to change this stigma."

## DISCUSSION

Our data showed that a lower proportion of students experienced exposures to bodily fluids overall (28%) when compared to findings from studies in the UK and Canada (44% and 48%, respectively).<sup>2-3</sup> This difference might be attributed to the fact that we did not include final-year medical students who are at a higher risk of exposure as they perform most of the clinical procedures. Nevertheless, this high exposure rate indicates that further investigation into the cause of non-reporting is necessary to identify and design appropriate approaches for prevention.

We focused primarily on the prevalence of unreported exposures.

Prior to the intervention, the proportion of incidents reported was 12.2% in the paired group and 29.7% in the unpaired group. This low reporting behaviour correlated with that observed in another study, conducted in 2002 at the University of Florida, where only 17% of students reported an exposure incident.<sup>6</sup>

The most common reasons for under-reporting among students were a belief that the incident constituted a low-risk exposure, inadequate knowledge of the protocol, work-related pressures which prevented reporting, and fear of the outcome of testing. Similar findings have been reported in other studies investigating reporting behaviour in medical students.<sup>7-9</sup> Our quantitative data also indicated that a perception of stigma towards reporting may have played a role in low reporting.

Although there was an increase in reporting of incidents after the intervention, rates were still low (31.3–43.0%). This is consistent with previous studies, where under-reporting rates were higher than 50%.<sup>18-20</sup> More work, in terms of student education on the procedure for reporting, and the importance thereof, is required. A study, published in 2010 at the Medical University of Graz, Austria, concluded that

**Table 2. Levels of risk of exposure for different incidents**

Low risk – PEP not recommended
• Unbroken healthy skin
• Compromised skin + small volume of fluid + brief contact on skin
• HIV positive/symptomatic HIV/clinical AIDS/high viral load + unbroken healthy skin + small volume of fluid + brief contact on skin
• HIV negative on recent Elisa test/HIV negative on Rapid test
Medium risk – consider PEP
• Solid needle + superficial injury
• Unknown HIV status
• HIV positive/symptomatic HIV/clinical AIDS/high viral load + compromised skin + small volume of fluid + brief contact on skin
High risk – PEP recommended
• Mucous membrane contact/eye contact
• Compromised skin + large volume of fluid + prolonged contact on skin
• HIV positive/symptomatic HIV/clinical AIDS/high viral load + skin puncture
• Skin puncture includes:
i. Hollow-bore needle +/- deep intra-muscular injury +/- the device had visible blood on it +/- the device was used in an artery or vein +/- injection of blood into body
ii. Solid needle + deep intra-muscular injury

**Table 3. Exposure incidents, and reporting thereof, by students, pre- and post-intervention**

Unpaired group	Pre-intervention N = 407		Post-intervention N = 148	
	n	%	n	%
Total incidents	192	-	107	-
Incidents reported	57	29.7	46	43.0
Students exposed	114	28.0	59	37.8
Students who reported incidents	49	43.0	40	67.8
Students who took PEP	23	20.2	21	35.6
Paired group	N = 86		N = 86	
	n	%	n	%
Total incidents	49	-	64	-
Incidents reported	6	12.2	20	31.3
Students exposed	25	29.1	36	41.9
Students who reported incidents	6	24.0	18	50.0
Students who took PEP	2	8.0	13	36.1

a multifactor approach is essential to improve reporting compliance.<sup>13</sup> In addition, Phillips et al. (2006) further demonstrated that introducing a mandatory learning programme was an effective tool to increase reporting behaviour.<sup>14</sup>

Although the student education intervention significantly improved student knowledge about post-exposure management, knowledge scores remained low. In addition, there were many exposures that still went unreported after our intervention. Numerous studies have identified that lack of knowledge about the PEP protocol is a key reason for the low rate of reporting of exposures.<sup>7-9</sup> There is, thus, an urgent need to improve student knowledge and awareness. Many students suggested that adding the protocol to their log books and the student online platform would improve student knowledge. We support this suggestion and recommend that these suggestions be taken up by the occupational health department.

The improvement in student practice, measured by the number of steps of the protocol followed in the paired group, does not imply that there was a causal relationship between the interventions and this improvement. One reason for the increase in the number of steps followed by the 2016 respondents could have been because of the increase in the number of high-risk exposures overall.

#### LIMITATIONS

Since a quality-improvement intervention took place between the two surveys, some association between exposure and outcome can be assumed. However, causality cannot be inferred from the findings because knowledge about the post-exposure protocol gained by the students might not have been as a result of the interventions alone. Confounders such as age, and number of previous exposures, may have influenced knowledge and practice of the PEP protocol. The number of students who responded to both questionnaires was small (n = 86), which prevented us from conducting multivariable regression analysis to identify other factors potentially associated with knowledge

and practice. The response to the first survey was relatively low: of the approximately 750 students, 407 responded, representing a low response rate of 54%. In addition, very few students completed the post-intervention questionnaire (n = 148 (20%)), which could have affected the validity of the results.

The study participants did not necessarily represent all students who had exposure incidents. In addition, identification of exposure cases relied on student recall, and students might have been more likely to participate in the surveys if they had previously experienced an exposure incident. These factors could have resulted in under- or over-reporting of incidents, respectively.

#### RECOMMENDATIONS

Further measures are needed to improve knowledge and minimise non-reporting behaviour among medical students. One strategy is to include a PEP protocol in student log books and to make it available on electronic learning platforms. In addition, lectures on the PEP protocol should be offered to all medical students at the beginning of their third year of study. Standardised testing on PEP knowledge could contribute to improved PEP protocol practice among students. Finally, the PEP protocol should be discussed with members of staff to promote an environment where appropriate reporting and care seeking are regarded, by the current and the next generations of physicians, as the necessary steps to be taken after an exposure.

#### CONCLUSION

The intervention, which comprised quality-improvement strategies, was an effective means of familiarising students with the PEP protocol, although there were many exposures that still went unreported after the intervention. Practice of PEP, measured by the number of steps of the protocol that were completed, significantly improved post-intervention. In addition, there was a significant improvement in the knowledge of students about post-exposure management.

**Table 4. Responses from all students — PEP protocol knowledge**

	Unpaired group				Paired group			
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
No. of participants	407		148		86		86	
Total possible score	4 477		1 628		946		946	
Score achieved	716		630		165		380	
% achieved	16.0		38.7		17.4		40.2	
<b>Element of PEP questionnaire answered correctly</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Knowledge about how to perform a risk assessment	32	7.9	54	36.5	2	2.3	25	29.1
Knowledge about how to counsel a patient before HIV testing	83	20.4	69	46.7	18	20.9	40	46.5
Knowledge about the types of blood tubes needed for accurate testing	15	3.7	26	17.6	2	2.3	17	19.8
Knowledge about the amount of blood needed for accurate testing	24	5.9	40	27.0	3	3.5	22	25.6
Knowledge about the need to register post bodily fluid exposure	241	59.2	120	26.9	58	67.4	74	86.0
Knowledge about the number of source patient's stickers that are needed	24	5.9	67	81.1	8	9.3	42	47.6
Knowledge of which hospital ward to go to post-exposure	32	7.9	70	47.3	8	9.6	41	47.7
Knowledge of risk of contracting HIV from a needlestick injury	81	19.9	37	25.0	19	22.1	23	26.7
Knowledge of which occupational HIV exposures should be reported	23	5.7	6	4.1	3	3.5	5	5.8
Knowledge of when PEP is indicated	139	34.2	93	62.8	39	45.3	60	69.8
Knowledge of when an exposed student should follow up	22	2.7	48	32.4	5	5.8	31	36.0

**Table 5. Practise of the PEP protocol in exposed students**

	Unpaired data				Paired data			
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
<b>Level of risk of incident</b>	<b>n = 54</b>		<b>n = 36</b>		<b>n = 8</b>		<b>n = 24</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Low risk	34	63.0	13	36.1	6	75.0	9	37.5
Medium risk	8	14.8	9	25.0	2	25.0	5	20.8
High risk	12	22.2	14	38.9	0	-	10	41.7
<b>Steps followed (%)</b>	<b>n = 61</b>		<b>n = 47</b>		<b>n = 24</b>		<b>n = 36</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
< 50	39	63.9	30	63.8	22	91.7	25	69.4
50–99	22	36.1	15	31.9	2	8.3	11	30.6
100	0	-	2	4.3	0	-	0	-

Note: not all students responded to these questions.

### LESSONS LEARNED

- It is important to identify, analyse and rectify system inadequacies in medical practice.
- Response rates can be improved when study participants are asked to respond verbally rather than via e-mail.
- Education on important topics is best received if offered on multiple platforms, e.g. verbal lectures, paper-based protocols and posters in areas where they can be viewed daily.
- The need for self-care, and the detrimental impact of stigma on medical practice, are often under-recognised by medical practitioners.

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### ACKNOWLEDGEMENTS

I would like to thank my supervisors and co-authors, Dr Archer and Dr Meintjes, for their encouragement over the last two years; the Division of Epidemiology and Biostatistics at Tygerberg Hospital campus for their never-ending availability; and my fellow student colleagues who took part in this study. The implementation of the quality-improvement interventions was funded by the Simulation and Clinical Skills Unit at Stellenbosch University.

### 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: CK, EA, WAJM  
 Data acquisition: CK  
 Data analysis: CK  
 Interpretation of the data: CK, EA, WAJM  
 Drafting of the paper: CK  
 Critical revision of the paper: CK, EA, WAJM

# SATBHSS Project: 2019 key achievements on occupational health and safety and an invitation to occupational health and safety experts to be registered on the AUDA-NEPAD database

**Norman Khoza**, SAIOH Member; African Union Development Agency (AUDA-NEPAD), e-mail: normank@nepad.org

**Chimwemwe Chamdimba**, African Union Development Agency (AUDA-NEPAD), e-mail: chimwemwec@nepad.org

**Dr Fwasa Singogo**, SATBHSS, Zambia; Ministry of Health, Zambia, e-mail: Fwasa.Singogo@MOH.gov.zm

**Dr Mohamed A Mohamed**, East Central and Southern Africa Health Community (ECSA-HC), e-mail: mmohamed@ecsahc.org

**Dr Dingani Moyo**, Baines Occupational Medicine Centre, Zimbabwe, University of the Witwatersrand, South Africa, Midlands State University, Zimbabwe, e-mail: moyod@iwayafrica.co.zw

The Southern Africa Tuberculosis and Health Systems Support (SATBHSS) Project is a regional initiative aimed at improving coverage and quality of tuberculosis (TB) control and occupational lung disease services and strengthening regional capacity to manage these diseases. The Project is supported by the World Bank, in partnership with the Governments of Lesotho, Malawi, Mozambique and Zambia. The African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) and the East, Central and Southern Africa Health Community (ECSA-HC) are the regional technical implementation entities. During the course of 2019, key milestones that were achieved included the opening of the first-ever occupational hygiene laboratory in Mozambique, completion of the strategy planning session for the Centre of Excellence in Zambia, capacity development in the four countries, and occupational health and safety (OHS) advocacy at the OSHAfrica Conference in South Africa and the 50th Union World Conference on Lung Health in India.

## HIGHLIGHTS OF 2019

### 1. Occupational hygiene laboratory in Mozambique

A landmark stride was taken in Mozambique, following the inaugural opening of the first-ever occupational hygiene laboratory in Maputo by the Honourable Minister of Labour, Employment and Social Security (MITTESS), Victoria Dias Diogo. The laboratory is equipped with state-of-the-art occupational hygiene monitoring and evaluation equipment that was acquired through the SATBHSS Project and funded by the World Bank Group. The equipment includes sound level meters (SLMs), personal noise meters; environmental dust pollution real-time monitors; vibration, indoor air quality monitors; illumination monitors; multi-gas detector instruments; and water quality monitors. The opening of the laboratory is a significant achievement that will revolutionise occupational health practice in Mozambique through the adoption of risk-based medical surveillance systems. The laboratory will be central to the optimisation of capacity development activities in

**Table 1. SATBHSS presentations at the OSHAfrica 2019 Conference**

Speaker	Presentation type	Topic
Honourable Mr Richard Musukwa, Minister of Mines, Zambia	Keynote address	OSHAfrica 2019 Conference opening keynote address
Chimwemwe Chamdimba, AUDA-NEPAD Principal Programme Officer	Keynote address	The African Union position on occupational health and safety and TB: advancing the agenda 2063
Norman Khoza, AUDA-NEPAD and OHS specialist	Oral	Regional occupational hygiene strategy and progress
	Oral	Identification and selection of efficient sub-micron silica dust monitoring and control measures for the mining industry in southern Africa
	Poster	Occupational health and safety (OHS) training collaborations to strengthen the fight against the scourge of occupational lung diseases in southern Africa
Teboho Mafooa, Senior Inspector, Ministry of Labour and Employment, Lesotho	Oral	Improving health and safety in the informal sector
Mphatso Kapokosa, Inspector of Mines, Department of Mines, Malawi	Oral	Cost-effective methods for improving the safety of artisanal and small-scale miners
Dr Kruger Kaswaswa, Ministry of Health, Malawi	Oral	Providing sustainable occupational health capacity training: a cross-sectional review in Malawi
Kobus Dekker, OHS consultant, RSA	Oral	Mine workers' exposure to crystalline silica dust levels in southern Africa
Dr Gerlinde Reiprich, policy consultant, Germany	Oral	The state of mine health regulation and occupational safety and health (OSH) service in southern Africa: desktop review
Malfred Moolala, Senior Inspector of Mines, Zambia	Oral	The inter-institutional approach to ensure OSH in the mining industry in Zambia
Dr Fwasa Singogo, SATBHSS Coordinator, Zambia	Poster	A multi-stakeholder approach to the management and control of tuberculosis as an occupational lung disease: a case of the Southern Africa Tuberculosis and Health Systems Support (SATBHSS) Project approach in Zambia
Chimwemwe Chamdimba: AUDA-NEPAD Principal Programme Officer	Panel discussant	Solutions for protecting and promoting the safety and health of workers in the informal sector
Chimwemwe Chamdimba: AUDA-NEPAD Principal Programme Officer	Panel discussant	Occupational Health and the TB Epidemic: AUDA-NEPAD—the African response
Dr Connard Mwansa: Director of Occupational Health and Safety Institute (OHSI), Zambia	Panel discussant	World Bank and Global Fund and TB epidemic—the Zambian chapter, Zambia (Global Fund and World Bank initiatives on TB)
Dr Mohamed A Mohamed	Panel discussant	Occupational health, safety and security of health workers

the fight against occupational lung diseases (OLD) and TB in the working environment. Furthermore, the laboratory will support the Mozambican Government to assist industries to comply with minimum OHS standards.

## 2. A strategy planning workshop for the Centre of Excellence in Zambia

As per the recommendation of the 3rd Community of Practice meeting on OHS held in Johannesburg, South Africa, 21–22 September 2019, AUDA-NEPAD assisted the Government of Zambia in facilitating a strategy planning workshop for the regional Centre of Excellence (COE) in OHS. The strategy session was held in Ndola, Zambia, from 14 to 16 October 2019. The strategy planning workshop was attended by officials from the Ministries of Mines, Health and Labour, the Compensation Board, industry, unions, the Occupational Health and Safety Institute (OHSI), and Copperbelt University. The vision of the CoE is “A world-class Centre of Excellence in the provision of occupational health and safety services.” It is envisaged this will be achieved through providing quality and sustainable occupational health, safety, environmental and research services for the benefit of workers and the community at large. The COE’s key strategic objectives include: (i) to prevent and reduce the number of occupational accidents and diseases; (ii) to promote and undertake OHS research; (iii) to undertake evidence-based occupational medical surveillance; (iv) to provide compensation, rehabilitative and return-to-work services for workers in respect of occupational accidents and diseases; (v) to develop and manage an integrated OHS management system to enhance productivity, organisation performance and sustainability; and (vi) to build national and regional capacity for OHS.

## 3. Capacity development and improvement in the Project countries

The Project contributed immensely to capacity-building in the field of OHS in the four participating countries. Inspectors, doctors, nurses and occupational hygiene professionals were trained. AUDA-NEPAD played a key role in this initiative that saw nine inspectors being trained in the use of respirable airborne gravimetric sampling equipment. A further 60 inspectors were trained in an in-country OHS inspectors’ training programme in Mozambique and Malawi. They acquired skills regarding the basic principles of inspections and risk assessment.

Twenty-two occupational hygiene professionals were trained on the measurement of hazardous chemical substances, including risk assessment. After the training, participants sat for an international exam administered by the British Occupational Hygiene Society (BOHS) under the International Occupational Hygiene Association (IOHA); 60% of participants passed the exam. Portuguese-speaking participants had challenges with the exam, which was administered in English. Thus, preparations are underway to translate and offer the examination in Portuguese in 2020.

Twenty-four medical doctors and occupational health nurses were trained on basic occupational health principles, with a focus on medical surveillance and compensation. The training was organised to facilitate capacity development in occupational health skills in medical surveillance and compensation principles for miners and ex-miners in the country. The training was done in collaboration with the Compensation Commissioner for Occupational Diseases (CCOD), under the South African Medical Bureau for Occupational Diseases (MBOD).

## 4. Knowledge dissemination and Project advocacy

### OSHAfrica Conference and the 50th Union World Conference on Lung Health

Twelve delegates were supported fully to attend the OSHAfrica 2019 Conference, held from 18 to 20 September 2019 at Emperors Palace in

Johannesburg, South Africa. The Conference attracted over 1 200 delegates from more than 57 countries. There were 16 presentations about the SATBHSS project, including two keynote addresses (one by the Honourable Minister of Mines of Zambia, Richard Musukwa), eight oral presentations, four panel discussions, and two poster presentations. Dr Fwasa Singogo from Zambia won the best poster presentation award. Table 1 depicts the breakdown of the presentations at the Conference.

The Project results were also shared at the 50th Union World Conference on Lung Health in Hyderabad, India. A Project workshop was held on 30 October 2019, where Norman Khoza presented a paper on “Control of TB and occupational lung diseases and private sector engagement in TB management in the mining sector for the SATBHSS countries”, and Dr Mohamed A Mohamed spoke about “Cost-benefit analysis and health impact of investing in TB control programmes”.

### Advocacy

The implementation progress of the Project was presented at the Southern Africa Development Community (SADC) ministers of health and ministers responsible for HIV/AIDS meeting in November 2019. The Project outcome was presented at the AIDS Watch Africa (AWA) meeting, a statutory entity of the African Union mandated to lead advocacy, accountability and resource mobilisation efforts to end AIDS, TB and malaria by 2030. In addition, the Project results were shared at the communities of practice with 10 African countries, the SADC secretariat and the World Health Organization.

### 2020 WORK PLAN

The key areas of focus in 2020 will be the training of occupational health nurses and doctors and occupational hygiene professionals towards their international certifications and recognition; OHS inspectors on risk management and use of occupational hygiene instruments; and attachments and twinning of OHS professionals to enhance knowledge exchange and mentorship. Through an agreement with *Occupational Health Southern Africa Journal*, 16 OHS professionals will be trained on scientific writing. We invite other professionals with international expertise to take part in the SATBHSS Project activities. Should you be interested in this project, please complete the information template below, then sign, date and submit it with the Declaration to Norman Khoza at normank@nepad.org and Nthabiseng Moiloa at nthabisengm@nepad.org. Please note that the purpose of the template is to have an occupational health and safety expert database.

#### Expert group submission template

1. First name 2. Surname 3. Short biography (max. 350 words) 4. Professional registration 5. Contact details (mobile phone, e-mail, skype etc.) 6. Summary of key publications

**Declaration:** *I hereby declare that all the information provided is true to the best of my knowledge. I am fully aware that any incorrect information submitted will automatically disqualify me or my organisation from participating in any activities performed, or to be performed, in AUDA-NEPAD, its member states and its Project partners (facilitated by AUDA-NEPAD).*

#### Resources for updates on Project activities

Website: <http://www.satbhss.org/>

Twitter: [https://twitter.com/SATBHSS\\_Project](https://twitter.com/SATBHSS_Project)

Facebook: <https://www.facebook.com/SATBHSS/>

YouTube: <https://www.youtube.com/channel/UCpfa6BVEg8WhTDIgYDLwfAg>

# OSHAfrica 2019 Conference

**Dr Ntombizodwa Ndlovu**, Chief Rapporteur, OSHAfrica 2019 Conference, e-mail: zodwa.ndlovu@wits.ac.za

This report presents highlights from the OSHAfrica 2019 Conference Organising Committee Report.

## BACKGROUND AND CONFERENCE OVERVIEW

The idea for OSHAfrica to host a conference was born at a meeting of African occupational safety and health (OSH) professionals held during the ICOH2018 Conference in Dublin, Ireland. Subsequently, this nascent group of African OSH professionals chose South Africa as the host country for the first OSHAfrica Conference. Drs Thuthula Balfour and Claire Deacon, Conference Co-chairs, convened an Organising Committee of occupational health professionals. They worked tirelessly to organise the first-ever pan-African occupational health conference, which was successfully held at Emperors Palace Conference Centre, Johannesburg, from 18 to 20 September 2019.

The Conference Organising Committee members were:

- Dr Thuthula Balfour (Conference Co-chair), Minerals Council South Africa
- Dr Claire Deacon (Conference Co-chair), Nelson Mandela University
- Dr Dingani Moyo, Baines Occupational Medicine Centre, Zimbabwe, University of the Witwatersrand, Midlands State University, Zimbabwe
- Leigh McMaster, Minerals Council South Africa
- Dr Cas Badenhorst, Anglo American plc
- Leighton Bennett, Benrisk Consulting
- Wellington Mudenha, Synthecon Sutures Manufacturing SA
- Norman Khoza, African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD)
- Ehi Iden, OSHAfrica
- Simphiwe Mabhele, International Labour Organization (ILO)
- Dr Muzimkhulu Zungu, National Institute for Occupational Health (NIOH), National Health Laboratory Service
- Peneyambeko Alina Munkawa, International Labour Organization (ILO)
- Bulelwa Huna, Department of Employment and Labour, South Africa
- Debbie Myer, National Safety
- Mzwakhe Nhlapo, National Union of Mineworkers (NUM)

Thirty-one countries across six continents were represented at the



**Some of the OSHAfrica Conference Organising Committee members and the Honorable Minister of Health at the Closing Ceremony (L-R): Dr Claire Deacon (Conference Co-chair), Dr Dingani Moyo, Norman Khoza, Leighton Bennett, Dr Thuthula Balfour (Conference Co-chair), the Honorable Dr Zweli Mkhize (Minister of Health, South Africa), Simphiwe Mabhele, Debbie Myer, Ehi Iden and Wellington Mudenha**

Photograph: Siphon Nkabinde, FPD

Conference. Of the 94 presenters, 40 were from South Africa, and 54 from other countries. Over 1 200 delegates attended the Conference, including 791 who were sponsored to attend.

In addition to the Welcome and Closing Ceremonies, the Conference programme included three plenary sessions, seven panel discussions and 18 parallel sessions. Presentations on topical issues were presented by academics and professionals working in OSH. There were 18 posters, covering a variety of topics, on display in the exhibition area for the duration of the Conference.

## OPENING ADDRESS

The Conference was opened by the Honourable Minister of Mines and Mineral Development for Zambia, Mr Richard Musukwa. In his keynote opening address, he highlighted the staggering numbers of people in Africa who die from work-related accidents and diseases. Of approximately 2.78 million work-related deaths per year, some 1.6 million are due to work-related illnesses. The work-related disease and accident burden in Africa might be under-estimated, due to the unavailability of OSH policies, poor enforcement of these policies, inadequate detection of occupational diseases and poor reporting of the accidents and diseases.

Occupational accidents and diseases have far-reaching effects, which go beyond individuals to communities and contribute to poverty. Women, children, people with disabilities, migrant workers and ethnic minorities are particularly vulnerable. Artisanal and small-scale mining and informal economies are growing on the African continent. There is a growing awareness of the importance of OSH by governments, employers and workers, and realisation that safer and healthier workplaces result in improved productivity.

The Zambian Government is working diligently to provide a favourable policy environment and regulatory framework for OSH in the mining sector, which is a major contributor to the economy. Zambia is working with the Governments of Lesotho, Malawi and Mozambique in the Southern Africa Tuberculosis and Health Systems Support (SATABHSS) Project, a multi-sectorial project that aims to strengthen OSH in the participating countries. Zambia is also working in ten Southern African Development Community (SADC) member states on the Tuberculosis in Mining Societies (TIMS) project, a regional response to tuberculosis (TB) in miners. Governments, employers and workers should join hands in a renewed commitment to improve OSH on the continent.

## THE STATUS QUO OF OCCUPATIONAL SAFETY AND HEALTH IN AFRICA

In the first plenary session of the Conference, Franklin Muchiri (International Labour Organization (ILO)) highlighted the need for African countries to collect OSH data. This is key for determining OSH trends and the development of evidence-based strategies to protect the occupational safety and health of workers.

Dr Ivan Ivanov (World Health Organization (WHO)) focused on the challenges and opportunities for sustainable development with regard to health and labour in Africa. He noted that sub-Saharan Africa has 11% of the world's population, 25% of the global burden of disease, 3% of the world's health workers and < 1% of global health expenditure. A

number of WHO and ILO initiatives are underway to address the challenges on the continent.

Peter-John Jacobs (International Occupational Hygiene Association (IOHA)) advocated for the training of more occupational hygienists in Africa. He also encouraged occupational hygienists from all over the continent to join the IOHA.

## TAKING LEADERSHIP IN OCCUPATIONAL SAFETY AND HEALTH IN AFRICA

Presentations were delivered by Alan Stevens (Institution of Occupational Safety and Health (IOSH)), Joaquim Pintado Nunes (ILO), Prof. Andrew Curran (Health and Safety Executive (HSE)), Ulrich Meesmann (International Social Security Association (ISSA) Mining), and Themba Mkwana (CEO, Zero Harm).

The five key messages from these presentations were:

1. Global investors are now taking OSH seriously and subscribe to the principles of responsible investment (PRI). PRI has the potential to impact the profitability of organisations in Africa in future.
2. The ILO recognises that OSH is fundamental to the future of work and has resolved that it must be included in the fundamental principles and rights at work.
3. African countries must begin to collect OSH data to allow regulatory bodies to know the OSH problems in their jurisdictions, and to implement safety principles that in turn promote innovation among employers.
4. Zero Harm is an essential tool for protecting the health and safety of workers globally.
5. The Zero Harm forum promotes heartfelt leadership through a common belief system and shared values. Only people-centred leadership can reduce occupational fatalities and injuries in the mining sector in South Africa and beyond.

## THE FOURTH INDUSTRIAL REVOLUTION AND THE FUTURE OF WORK

In this plenary session, presenters provided insights into the future of work, OSH significance in the African economy, and the sustainable future of work. The fourth industrial revolution (4IR) will bring exponential change with implications for worker health and safety in the future.

Commissioner Mthunzi Ledwaba (ILO, SA) spoke about the future of work and highlighted that the way we work and the way we do business is changing. In order to keep pace with the digital transformation we need innovative, creative and adaptable policy responses that are flexible. There are no one-size-fits-all rules or procedures. Maximum benefits will be achieved by changing our attitudes and approach to the future of work.

There are many benefits of digitalisation, including decreased accidents, and workers no longer having to do dangerous or physically intense tasks (e.g. robots can be used to remove asbestos and allow workers to improve their work-life balance). Work can focus on tasks where human input is essential (i.e. critical decision making, emotional intelligence and value judgement).

Will robots cause job destruction? There is a fear that sustained unemployment will threaten people's mental health and wellbeing. It is unlikely that entire occupations or jobs will be automated but there will be a need for the replacement and adaptation of specific tasks, and reskilling of workers. We cannot predict exactly what type of technology will exist in the future and what the OSH implications will be. Innovative, modern policy frameworks will be required. Trust and respect between workers and employers is paramount.

In her talk, Advocate Hanlie van Vuuren, Solidarity, focused on future opportunities and challenges for workers. She emphasised that the 4IR is here and that it is the speed of change that distinguishes it from previous industrial revolutions. This revolution uses computerisation to digitise more areas of life, and integration of artificial intelligence in production and consumption. It focuses on higher productivity, efficiency and profit rather than labour consolidation or growth.

## Challenges

- Trade unionism or collective bargaining may consequently be threatened, yet organised labour appears silent on the subject.
- Companies are already laying off workers and shops are closing to be replaced by online shopping.
- New technologies may bring new occupational diseases (e.g. nanotechnology, which is associated with occupational lung disease).
- New technologies threaten to amplify current inequalities, both within and between countries.

## Opportunities

- Humans cannot be completely replaced by robots. The Henn na Hotel in Japan opened in 2015 and was mainly run by robots. By January 2019, half of the 243 robots had been decommissioned because they could not replace many tasks done by humans.
- Technological advances in renewable energy, fuel efficiency and energy storage make business sense and help mitigate climate change.
- Continuous extraction methods of natural resources (e.g. minerals and the associated OSH risks) may become redundant, as materials are recirculated and not wasted;
- Labour unions need to be vigilant and to work in tripartite structures with governments and business to protect workers.

To address OSH challenges on the African continent, Ehi Iden (Occupational Health and Safety Managers) suggested the following steps be taken:

1. Development of a single African OSH Act which could begin with a review of all signed OSH conventions for domestication;
2. Introduction of basic OSH modules into the curricula of all undergraduate programmes in African universities; and
3. Introduction of health and safety management training and internship programmes for the informal sector.

Looking at the future of work on the continent, he called for:

1. "Displacement and replacement" by transition from old economy jobs to newer economy jobs through access and use of digital technologies;
2. Investment in scholarship schemes that incentivise African students to return home after completing their studies abroad;
3. "Reducing informality of work through reskilling" to move more African people into the formal sector, which fits the future of work; and
4. Africa to be placed at the heart of all OSH discussions.

"If we cannot do all these, the Africa of OUR DREAM may never be realised and posterity will ask us questions," he said.

## CLOSING ADDRESS

The South African Minister of Health, the Honorable Dr Zweli Mkhize, opened his speech by congratulating the organisers for successfully hosting the first pan-African occupational safety and health conference.

He noted a number of OSH-related initiatives and challenges currently facing the continent. Much research was done in the 1950s and 1960s on the effects of working under conditions of

extreme heat on mine workers in South Africa. The current increasing global temperatures bring new challenges, not only for mines, but also for many other workplaces. It is projected that temperatures may increase by 2–4 °C during the hottest months over the next decades, changing the occupational heat situation from low to moderate or high in much of the continent.

South Africa is on a journey toward universal health coverage through the national health insurance (NHI) funding model. Built into the NHI is a chapter on funding mechanisms for the healthcare of workers with occupational injuries and diseases.

African leaders committed to employment promotion, social protection and poverty alleviation by signing the 2004 Ouagadougou Declaration that recognised OSH as a driver for poverty. The Minister noted that this Conference would provide impetus to action the provisions of the Declaration. Other areas that need to be addressed with respect to OSH are the informal sector; youth, migrant, rural and contract workers; small-scale and artisanal mine workers; and workers in small, micro and medium enterprises. The social determinants of health should also be considered when designing OSH interventions.

Other challenges include 'leap-frogging' into the fourth industrial revolution. Many countries still have no, or weak and fragmented, OSH policy and legislative frameworks. There are also variable occupational exposure limits among countries. Do workers differ in physiology by country? Comprehensive occupational health services to diagnose and manage occupational injuries and diseases, and surveillance systems to monitor trends, are key. More suitably qualified and knowledgeable OSH professionals are required to address and improve OSH in Africa.

Although the two landmark international silica dust conferences were held Johannesburg in 1930 and 1959, the deliberations were not followed by meaningful actions and this resulted in many mine workers contracting other occupational lung diseases. The South African Department of Health is collaborating with The Minerals Council of South Africa, trade unions, ex-mine worker associations in neighbouring countries, and other stakeholders to assess and compensate ex-mine workers with occupational lung diseases. In addition, a landmark class action settlement on TB and silicosis in gold mine workers will administer four billion rands in compensation claims across the region. Similar class actions will be pursued against mining companies for coal workers' pneumoconiosis in South Africa and lead poisoning in Zambia. Although compensation is commendable, it is the last resort. Prevention is the core principle of OSH.

The Minister ended with a call for action from Conference delegates: "You are the agents of change, implement and implement and implement!"

## **OSHAFRICA 2019 CONFERENCE RECOMMENDATIONS**

The recommendations were presented by Dr Ntombizodwa Ndlovu (University of the Witwatersrand). The development of these recommendations was a team effort, which used rapporteurs' reports on Conference presentations and the expertise of team members to identify recurring and topical issues. Rather than attempt to summarise the many excellent presentations, cross-cutting issues were identified and framed around the seven golden rules of Vision Zero:

### **VISION**

**Africa without harmful occupational exposures, fatalities, injuries and diseases: wellbeing for all workers and communities**

#### **1. Take leadership—demonstrate commitment "Safety performance is a reflection of leadership"**

This requires:

- Heartfelt leadership through common belief systems and a common set of values;
- Meaningful involvement of communities through a participatory approach;
- Visible action from leadership for all employees to see; and
- Investigation of 'near misses' as indicators of potential risks and opportunities for learning.

#### **2. Identify hazards—control risks**

This requires:

- Risk-based thinking in every activity;
- Risk assessments that are both gender sensitive and gender responsive, taking into account biological, intra-job variability, social context, etc.; and
- Vigilance and tripartite efforts to address the changes in the workplace as a result of rapid digitalization and new technologies that create new occupational hazards and risks.

#### **3. Define targets—develop programmes**

This requires:

- Setting of OSH targets that are evidence-based (i.e. based on data and research);
- Developing new, or reviewing existing, legislation that recognises there is a dearth of legislation in Africa;
- Ensuring policy implementation, enforcement, and monitoring and evaluation;
- Developing occupational disease and hazard surveillance systems and using the data to inform prevention and control measures; and
- Collecting OSH data at all levels of industry and feeding it into national and global statistics.

#### **4. Ensure a safe, healthy and well-organised system**

This calls for:

- Eliminating child labour; OSH is for adults — there is no need for OSH policies for children as children should not be in the workplace;
- Understanding human interactions within the work environment in order to minimise risks (e.g. through ergonomics); and
- Interventions to address fatigue and work-life balance (e.g. forward rotation instead of backward rotation to prevent disruption of circadian rhythms and associated adverse outcomes).

#### **5. Ensure safety and health in machines, equipment and workplaces**

This calls for:

- A recognition that the avoidance of hazards using technical measures makes prevention obsolete;
- The use of safe technology to protect human capital; and
- Healthy workplaces as a prerequisite for motivated workers.

## Every worker must return home safe and healthy every day

### 6. Improve qualifications–develop competence

- Instil a culture of prevention.
- Introduce life-long OSH learning from pre-school (four years).
- Promote prevention through the use of pictures. There are existing resources that can be used or adapted (see [http://www.ilo.org/safework/info/publications/WCMS\\_383797/lang-en/index.htm](http://www.ilo.org/safework/info/publications/WCMS_383797/lang-en/index.htm)).
- Improve appropriate competence of OSH practitioners.

### 7. Invest in people–motivate by participation

- “A happy employee is a safe employee”–know employees by enhancing soft skills, dialogue and social interactions.

- Promote a culture of respect between and among employers and employees–say thank you, greet, and know employees by name.
- “Nothing about workers without them”–change the employees’ role in OSH from passive to active. Compliance with prevention programmes will improve if employees are part of defining them.

The key is to keep it simple: there is no need to implement all these recommendations at the same time. Choose low-lying fruit. It is not necessary to reinvent the wheel. Existing technologies or materials can be used as they are, or adapted to suit the needs.

Delegates were encouraged to operationalise these recommendations, which will be reviewed at the OSHAfrica 2022 Conference in Kenya.

All presentations are available from <http://www.oshafrica2019.com/PRESENTATIONS>

Contributors to the Conference recommendations:

Wellington Mudenha, Dr Thuthula Balfour, Simphiwe Mabhele, Dr Ntombizodwa Ndlovu, Norman Khoza, Dr Khanyile Baloyi, Ehi Iden, Dr Dingani Moyo, Bulelwa Huna

## The OSHAfrica 2022 Conference

At the Closing Ceremony, the baton was handed over by Dr Thuthula Balfour to Sanjay Gandhi, the Chair of the OSHAfrica 2022 Conference Organising Committee.

Sanjay made the following remarks:

“Our heartiest congratulations to the Organising Committee for hosting the inaugural OSHAfrica 2019 Conference in Johannesburg from 18 to 20 September 2019! The Conference was a huge success and sets a benchmark for other OSHAfrica host countries to maintain the same, if not better, standard.

Among other things, the success of the event is attributed to (i) precise event organisation; (ii) excellent quality of speakers and their presentations; (iii) OSH-related exhibitors; and (iv) the Conference delegates. Everyone related positively to the event and, more importantly, took away learnings which can be applied in their respective countries for improving occupational safety and health (OSH) practices and performance.

Kenya is privileged to have been voted to host the OSHAfrica 2022 Conference and is grateful for the confidence bestowed upon us to deliver a successful event in the third quarter of 2022. Given its strategic geographic location, Nairobi is a vibrant,



### Hub of east Africa, Nairobi will host the OSHAfrica 2022 Conference

safe, secure and cosmopolitan city that welcomes delegates from around the world to experience the warm hospitality, culture and ethnic cuisine. The national carrier, Kenya Airways, will provide delegates with excellent connectivity, while the fast, reliable and cost-effective Internet connections will keep them in touch with

their home countries. The Organising Committee in Kenya will shortly be rolling out a communications plan (including a website) to keep delegates up to date on this prestigious event.”

Contact Sanjay Gandhi at [sgandhi@kurrent.co.ke](mailto:sgandhi@kurrent.co.ke) for information about the OSHAfrica 2022 Conference.

# IOHA sponsors North-West University Student Top Achiever Award

**Johan du Plessis**, North-West University, e-mail: Johan.DuPlessis@nwu.ac.za

**Dr Thomas Fuller**, IOHA President-Elect, e-mail: tpfuller1@gmail.com

Education and research in the field of occupational hygiene at the North-West University (NWU) in South Africa dates back to the 1970s. Initially, a post-graduate Honours degree was offered but this was later followed by a Master's degree. In 2013, the need for a specialised Bachelor's degree was identified; the degree was approved within the South African higher education framework in 2015.

The objective of the four-year professional Bachelor of Health Sciences (BHSc) degree in Occupational Hygiene, the only one of its kind in Africa, is scientifically to educate and equip students with the necessary knowledge and specialised skills (including problem solving and relevant competencies) required to become occupational hygienists. This involves training them to be able to anticipate, recognise, evaluate and control health hazards in the working environment, with the objective of protecting workers' health and wellbeing, and safeguarding the community at large. The first cohort of students registered for the BHSc in 2016 and will graduate in early 2020. At present, exactly 100 students are registered for this degree (in any of the four years); at least five are from Namibia and Zimbabwe. If one considers that there were 893 individuals registered as members of the Southern African Institute for Occupational Hygiene (SAIOH) at the end of 2018, the addition of 100 graduates in the near future will make a significant human resource contribution to the field, which is responsible for rendering occupational hygiene services to a formal workforce of approximately 16 million workers in southern Africa.

The International Occupational Hygiene Association (IOHA) has generously sponsored the BHSc Top Achiever Award, which is awarded to the final-year student who achieves the highest overall marks for all the occupational hygiene modules in this degree, over the four-year period. For 2019, this was awarded to Ms Carol-Mari Schulz. The award of US\$300 was presented to Carol-Mari at a ceremony held on 24 October 2019 on the Potchefstroom Campus of the NWU. In addition to the IOHA award she received the Fritz Eloff-Petrus Laubscher floating trophy. This trophy carries the names of two NWU academics who were historically responsible for establishing and developing occupational hygiene as a subject field at the university. The trophy itself is a concrete test block from the Occupational Hygiene facility that was built on campus in 2018. Carol-Mari's immediate future plan is to enroll for a Master's degree in Occupational Hygiene at the NWU in 2020.

Prof. Fritz Eloff, Ms Carol-Mari Schulz and Mr Petrus Laubscher issued a joint statement of appreciation: "We sincerely thank IOHA for the sponsorship of this award. As a university, we share the vision of IOHA in promoting occupational hygiene as a profession.

We are of the opinion that this degree will make a significant contribution to the advancement of occupational hygiene in South Africa and Africa."

## IOHA board members' travels and presentations

In October Mr Rene Leblanc, IOHA President, travelled to Medellin, Columbia to attend the Columbian Association of Occupational Hygiene (ACHO) 18th Columbian Congress of Ergonomics. He gave a presentation about future IOHA objectives and strategies, and met with representatives from a variety of organisations to discuss collaborations and projects.

Mr Leblanc also travelled to the 37<sup>th</sup> Annual Conference and Exhibition of the Australian Institute of Occupational Hygienists (AIOH) in Perth, Australia, from 30 November to 4 December 2019. He gave a presentation on IOHA activities and international collaboration. With some persuasion, Rene was also allowed to give an additional presentation to make a case for why IOHA is needed, and what the Association's strategic plans and most important projects will be in the next five years.

In November 2019, Dr Tom Fuller, the IOHA President-Elect, travelled to Buenos Aires, Argentina to meet with the Association of Occupational and Environmental Hygienists of the Republic of Argentina (AHRA). The Association has approximately 80 members



**At the BHSc Top Achiever Award ceremony (L-R): Prof. Fritz Eloff, Ms Carol-Mari Schulz and Mr Petrus Laubscher**

*Photograph: Johan du Plessis*

and has been in existence for several years. The meeting began with an overview of AHRA programmes and activities, both conducted and planned. Dr Fuller had an opportunity to provide information about IOHA and current projects regarding consensus building for curriculum development. Argentina offers both Bachelor's and Master's degree programmes in occupational hygiene. The development of an occupational hygiene exam in Spanish was also discussed, including the steps needed for it to be accepted into the National Accreditation Recognition programme.

During this meeting Dr Fuller also spoke about the Occupational Hygiene Training Association (OHTA) and its programmes. He described the various training modules that are available and encouraged AHRA to consider becoming approved trainers so that the OHTA courses can be offered in Argentina.

In a separate meeting, Dr Fuller also met with a new occupational hygiene professional group, the Argentine Society of Occupational Hygiene (SAHIO). This group has approximately 30 members and applied for IOHA membership during 2019. Recently, SAHIO received final approval by the Board and is now a full member of IOHA. Congratulations and welcome to IOHA!

## Creating a Spanish-language national accreditation recognition certification body

After recent meetings and conversations with Spanish-speaking organisations in IOHA (AHRA, ACHO, AMHI and AEHI), Dr Fuller has created a group with the intent of establishing a Spanish-language National Accreditation Recognition (NAR) certification body, which will offer examinations in Spanish. The project will proceed in two parallel paths. The objective of the first is to create a governing body that meets the IOHA NAR requirements, including policies, programmes and procedures. The second major activity will involve the development of a large bank of exam questions. Dr Fuller is in the process of identifying a group of volunteers to assist in this project and is aiming for completion within two years. Anyone with insight or recommendations for the group is encouraged to contact Dr Fuller directly at the e-mail address: [tpfuller1@gmail.com](mailto:tpfuller1@gmail.com)



**AHRA meeting attendees in Buenos Aires, Argentina**

*Photograph: unknown*



**SAHIO meeting attendees in Pilar, Argentina**

*Photograph: Amanda Mastrovincenzo*

## GLOBAL EXPOSURE MANAGER

# New Zealand Whakaari volcano eruption and occupational hygiene responses

**Philippa Gibson**, CIH COH, WorkSafe New Zealand, e-mail: Philippa.Gibson@worksafe.govt.nz

A unique adventure tourism experience offered in New Zealand was a visit to an active volcanic island—Whakaari (White Island). Visitors could walk on the uninhabited live volcano, located a short boat ride from the coast of New Zealand. On 9 December 2019, about 100 people were on or near the island when it erupted without warning. Steam, rock and ash shot 3.6 km into the air. Sadly, 20 people died and 25 are still in hospital, some in critical condition. The victims suffered severe burns from super-heated geothermal fluids and highly corrosive ash. Skin banks from around the world have contributed millions of square centimetres of skin for the multiple skin grafts needed for the survivors, many of whom will require months of surgery and rehabilitation.

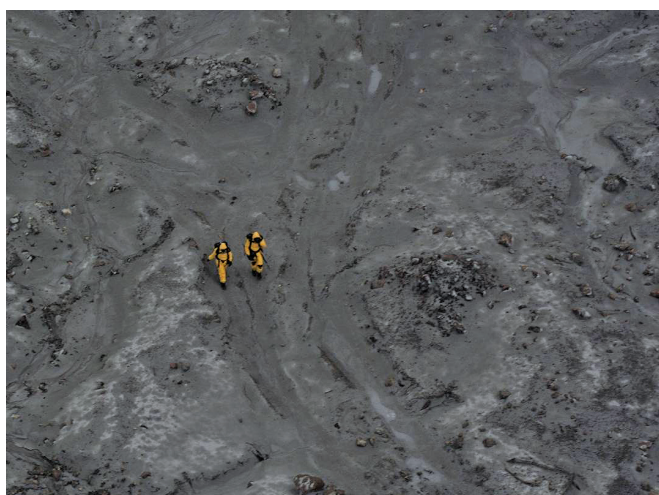
Immediately following the eruption, tour boat operators and local helicopter pilots ferried injured people back to the mainland. One civilian helicopter that was on the island during the eruption was so badly damaged by ash it could not be flown. After the initial evacuation, the island and nearby water were closed due to the high risk of further eruptions and the unknown atmosphere and ground conditions. Drones were deployed to identify any remaining people; sadly, the images showed that it was unlikely anyone on the island survived the initial eruption.

### IDENTIFIED HEALTH RISKS

In addition to projectiles and super-heated fluids, gases likely to have been present at high levels at the time of the eruption were carbon dioxide, sulphur dioxide, hydrogen sulphide and halides of hydrogen (hydrogen chloride, hydrogen fluoride and hydrogen bromide). The halides produced acidic liquids and resulting ash was high in fluorides. In addition, heavy metals such as mercury, lead and arsenic were released during the eruption of the volcano.

Although the island's volcanic activity had been monitored for many decades by volcanologists, and in-situ monitoring equipment was still functioning, the equipment was located in areas remote from where the recovery team had to venture, and was designed for assessing volcanic activity, not assessing health risk. People had been visiting the island for decades, usually without respiratory protection, and the atmospheric concentrations of hazardous aerosols following the eruption were unknown. Eyewitness reports indicated that gas and airborne particulate exposure caused health effects during and immediately after the eruption. To provide additional information before going onto the island, air monitoring equipment with remote sensing was deployed using drones.

Risks to first responders, ambulance staff, hospital staff and post-mortem workers included exposure to hazardous chemicals through cross contamination of ash and hydrothermal fluids on patients. Early responders attempting to recover bodies from the island were at risk of an additional eruption and exposure to unknown hazardous particulates, gases and hot acidic fluids. In addition, the ground was covered in ash and difficult to walk over, and was also hot and shaking with tremors.



**Rescuers working in testing conditions on Whakaari Island after the volcano eruption** Source: NZDF. <https://www.stuff.co.nz/national/118185646/whakaariwhite-island-nzdf-shows-absolute-courage-in-an-unpredictable-environment>

### RISK MANAGEMENT

To recover the deceased safely, and minimise the risk of further loss of life or health, a multi-disciplinary team, led by the New Zealand Police, gathered to pool knowledge and resources to develop a plan. This involved various scientists (occupational hygienists, volcanologists), medical specialists, search-and-rescue specialists, victim-identification specialists, and the New Zealand military.

The risk management plan depended not only on the right timing, personal protective equipment (PPE), gas monitors, health surveillance and decontamination, but—most critically—the operation had to be carried out by the right people. Given the high heat load from wearing impervious chemical suits (to prevent contact with corrosive gas, liquid or particulate matter), rebreather closed-circuit breathing apparatus (in case of toxic gases), and the heat from the volcano itself, heat stress was a critical risk. The people selected for this operation had been highly trained in the assessment of their own physiological state at the extremes of physical effort, and could hold their nerves under very testing conditions. These people comprised the New Zealand Defence Force specialist bomb disposal team.

Fortunately, recovery operations were successful and no additional injuries occurred. Travel to the island has been discontinued as the Whakaari volcano remains active. The newly created National Emergency Management Agency was responsible for coordinating more than 20 government and support agencies. WorkSafe New Zealand, for which this author works, will continue to be involved and work to investigate worker exposures and outcomes.

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# SAIOH President's message

**Norman Khoza**, SAIOH President (2020), e-mail: nkhoza@saioh.co.za

**Celia Keet**, SAIOH Immediate Past President, e-mail: julie@satservices.co.za

**Nico Potgieter**, SAIOH Marketing and Liaison, e-mail: n.potgieter@dundeeprecious.com

**Julie Hills**, SAIOH Academy and Ethics, e-mail: julie@satservices.co.za

**Kate Smart**, SAIOH Chief Admin Officer, e-mail: info@saioh.co.za



**2020 SAIOH President,  
Norman Khoza**

Photograph: Norman Khoza

A warm welcome to 2020; I hope you have had a relaxing and refreshing festive season. As the incoming President for 2020, let me begin by welcoming all members of this glorious and noble professional organisation, the Southern African Institute for Occupational Hygiene (SAIOH). I would like to express my gratitude to my wise yet humble predecessor, Mrs Celia Keet. I watched her steering the ship in 2019, with some trepidation, but here I am, wearing the Presidential Medallion and looking forward to serving you.

I thank my mentors and the previous Presidents who have all helped to make SAIOH the strong organisation that it is today. During the past few years, we have built SAIOH into a globally recognised entity, governed by a strong quality management system (QMS) and an exciting strategic business plan.

As we enter the new year, we appreciate that we have new challenges ahead of us. I am positive that we will continue to have a strong contingent of volunteer Council members who will work hard to deliver on their portfolio responsibilities, both for SAIOH and in their normal daily roles. We know that SAIOH and its members will continue to protect workers by delivering quality occupational hygiene services. We remind members that, in early 2020, we should be prepared for the introduction of the much-debated ergonomics regulations, recently passed into law.

SAIOH Exco, with the approval of National Council, has taken the decision to implement a 10% increase in the annual membership fees. This decision was not taken lightly, with robust discussions on the impact on all our members, levels of membership, and member types. The conclusion was that this increase is needed to ensure the effective management of our strategic growth, to bolster our ethics and legal processes to protect our members further, and to manage branches and discussion groups better. We plan to provide more opportunities and benefits to our members as part of these strategies. Some of the proposed benefits are listed below:

- In partnership with Nanozen and Hans Thore Smedbold, SAIOH will offer sponsorship to two members to attend the IOHA 2020 Scientific Conference in South Korea. These members will be selected via a competition, the rules of which will be communicated early this year.
- The SAIOH 2020 Annual Conference will be held in Cape Town, and already promises to have excellent international speakers and professional development courses (PDCs).
- The SAIOH Annual Awards will be expanded to include the Branch or Discussion Group of the year.
- A proposal to take occupational hygiene and issues of health and

safety into primary and high schools in the coming years, to increase awareness, is in development. Our youth are introduced to accounting, science, mathematics and business at primary school level, but not to occupational health and safety, yet we expect CEOs to make OHS a priority in their business's strategic plans. We thank Deon Jansen van Vuuren for his vision and leadership of this initiative.

On my wish list is to see increased reciprocity of occupational hygiene activities on the African continent, the involvement of governments in SAIOH activities, the involvement of the SAIOH veterans in a new Technical Committee, as well as to enhance regional structures, and the involvement of young blood in branch activities, such as meetings and workshops.

There are two key events in 2020 that you should not miss, namely the IOHA Scientific Conference in South Korea (16–22 October 2020) and the SAIOH Annual Conference in Cape Town (3–6 November 2020). We look forward to seeing you there.

## LOCAL ACTIVITIES

The last quarter of 2019 was a busy one for our members. A key activity was the SAIOH Annual Conference held at the African Pride Mount Grace Country House and Spa in Magaliesburg from 15–18 October 2019 under the theme *Occupational Hygiene and the 4th Industrial Revolution*. A report on the Conference appears below.

## REGIONAL ACTIVITIES

North-West University (NWU) hosted a regional occupational hygiene training course (OHTA W501), where 22 occupational hygiene professionals were trained in risk assessment methods and the measurements of hazardous chemical substances. The training was done in collaboration with the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) and Workplace Health Without Borders, led by Mr Peter-John Jacobs (IOHA 2019 President and SAIOH Member), who was assisted by Dr Stefan Linde



**Dr Stefan Linde with delegates at the NWU-hosted regional occupational hygiene training course**

Photograph: Norman Khoza

(SAIOH North-West Branch Chair and Senior Lecturer, NWU) and Ms Claudina Nogueira (ICOH Vice-President), as a Portuguese technical expert. The training took place from 23–27 September 2019, at the Occupational Hygiene and Health Research Initiative (OHHRI), NWU.

Mrs Goitseman Keretsetse (University of the Witwatersrand and SAIOH Member) and Norman Khoza (SAIOH Vice-President), together with Mrs Chimwemwe Chamdimba (AUDA-NEPAD policy specialist) and Dr Dingani Moyo (OSHAfrica Chair of the Education and Training Committee), were involved in a regional occupational health and safety Centre of Excellence strategy development session. The meeting was held in Ndola, Zambia, with officials from the Ministries of Mines, Health and Labour, and officials from the Compensation Board, industry, unions, and the Occupational Health and Safety Institute (OHSI).

Dr Daniel Masekamani (University of the Witwatersrand, and SAIOH Gauteng Branch Chair) and Norman Khoza were involved in the Lesotho Occupational Health and Safety Technical Assistance Mission (TA), held in Maseru, Lesotho, from 4–8 November 2019. The TA was provided to the country to develop the occupational health and safety (OHS) inspectors' compliance tools and action plan template, and to train the inspectors on the basic use of occupational hygiene equipment. A collaborative meeting with the National University of Lesotho to discuss the development of an OHS short course also took place. Present at the meeting were Dr Dingani Moyo and Prof. Sunny Aiyuk, Dean of the Faculty of Health Sciences, National University of Lesotho.

Mrs Julie Hills (SAIOH Immediate Past President), Mr Moses Mokone (SAIOH Member and NIOH) and Mr Norman Khoza, accompanied by Dr Dingani Moyo and Ms Carol Mthethwa (OSHAfrica, OHS

specialist), conducted an OHS inspectors training course at Mponela, Malawi, from 11–15 November 2019. The training included the basic principles of risk assessment, occupational hygiene legislation, and techniques on how to use occupational hygiene instrumentation. The delegates completed a practical risk assessment and used the equipment on a field visit to a quarry.

Mrs Jeanneth Manganyi (National Institute for Occupational Health and SAIOH Member) was invited to provide technical assistance to the Government of Mozambique's newly-launched Occupational Hygiene Laboratory. The aims were to provide mentorship and to assess requirements to provide continuous support and training to the staff of the Ministry of Labour and Social Security (MITESS). The instruments installed at the laboratory were procured by the World Bank-supported Southern Africa TB and Health Systems Support (SATBHSS) Project.

### INTERNATIONAL ACTIVITIES

Prof. Cas Badenhorst (Anglo American) and Mrs Celia Keet (SAIOH President, 2019) were invited to attend the 37th Australian Institute for Occupational Hygiene (AIOH) Annual Conference and Exhibition, held in Perth, Australia from 30 November to 4 December 2019, under the theme *The Power of Many*, recognising that united we can harness our collective power to achieve better worker health outcomes.

As a final word, I would like to thank Celia Keet, Deon Jansen van Vuuren, Lee Doolan and Sean Chester who, despite being faced with serious personal or family illness challenges, continued to serve members of SAIOH. I pray that the Almighty God will reward your hard labour – for you and your generations to come.



**Technical Assistance meeting in Lesotho, concerning OHS inspection and compliance**

Photograph: Dr Dingani Moyo



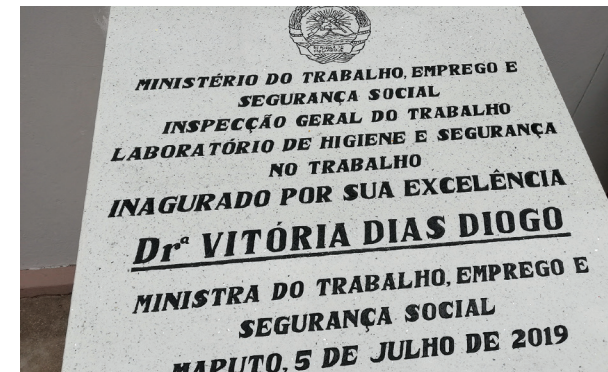
**Julie Hills, Dr Dingani Moyo, Caro Mthethwa, Norman Khoza and Moses Mokone with OHS inspectors in Mponela, Malawi**

Photograph: Moses Mokone



**OH laboratory equipment supplied to Mozambique's new Occupational Hygiene Laboratory by the SATBHSS Project**

Photograph: Norman Khoza



**Official Opening Stone of the Occupational Hygiene Laboratory in Mozambique**

Photographs: Norman Khoza

# SAIOH hosts a successful 2019 Annual Conference and AGM

**Kate Smart**, SAIOH Chief Administration Officer, e-mail: info@saioh.co.za

**Nico Potgieter**, SAIOH Marketing and Liaison, e-mail: n.potgieter@dundeeoprecious.com

This year's Southern African Institute for Occupational Hygiene (SAIOH) Annual Conference was held at the beautiful African Pride Mount Grace Country House & Spa, in Magaliesburg, 15–18 October, under the theme *Occupational Hygiene and the 4th Industrial Revolution*. The Conference was a big success, meeting the expectations set by the past few Conferences.

The Conference was attended by more than 165 delegates and graced by several international guest speakers. The high attendance may be attributed to the excellent programme developed by the Conference Scientific Committee. The programme included, amongst others, five Professional Development Courses (PDCs), six keynote presentations and a combined professional certification committee (PCC) workshop and mining forum.

## KEYNOTE PRESENTATIONS

Keynote presenters addressed the following topics:

1. Prof. Babusina Paul – University of Johannesburg (UJ): “Fourth Industrial Revolution”;
2. Dr Emmanuele Cauda – National Institute for Occupational Safety and Health (NIOSH), USA: “Real time monitoring”;
3. Ms Constance Kekana – Department of Mineral Resources: “Mining and legal framework in the fourth Industrial Revolution”;
4. Ms Bulelwa Huna – Department of Employment and Labour (DEL): “Occupational health and safety in the informal economy”;
5. Dr Barry Kistnasamy – Compensation Commissioner for Occupational Diseases (CCOD): “Occupational health and workers’ compensation: changing legal framework”; and
6. Prof. Johan du Plessis – North-West University (NWU): “New diseases in a changing workplace”.

## PROFESSIONAL DEVELOPMENT COURSES

The following PDCs were offered:

- PDC 1: Laboratory sample analysis workshop – Ms Cecilia Pretorius, CSIR Mining Cluster;
- PDC 2: Respirator and hearing protection fitment testing – Mr Jaco Combrinck, 3M;
- PDC 3: Control designs and control management – Mr Hans Thore Smedbold, Proactima, Norway;
- PDC 4: Data analytics and statistical analysis – Prof. Derk Bouwer, University of the Witwatersrand; and
- PDC 5: Real-time sampling – Dr Emmanuele Cauda, National Institute for Occupational Safety and Health (NIOSH), USA.

Let us not forget the incredible exhibitors and sponsors without whom the Conference would not have been possible. To them, we say a big thank you!

## EXHIBITORS AND SPONSORS

- AMS Haden – exhibitor
- Anglo Operations – sponsor
- Apex Environmental – exhibitor
- Aquaticoh – exhibitor
- Aspirata Auditing, Testing and Certification – exhibitor
- BEE Laboratory (Pty) Ltd – exhibitor
- Biograde – exhibitor and sponsor of awards and speaker gifts
- Envirocon – exhibitor and sponsor of the Hygienist of the Year award
- HASS Industrial – exhibitor
- Nanozens and Hans Thore Smedbold – sponsors of a competition where the two winners will attend the IOHA Conference in South Korea (Oct 2020)
- Health and Welfare Sector Education and Training Authority – exhibitor



**The African Pride Mount Grace Country House & Spa in Magaliesburg**

Source: Hotel

- Mine Health and Safety Council – exhibitor
- Nanozen – sponsor of delegate bags
- Noise Clipper – exhibitor
- North-West University – exhibitor
- Schauenburg – exhibitor
- Shea Safety – exhibitor and sponsor of the keynote speaker gifts
- Sedulitas – exhibitor
- SKC Safety, Health and Environment SA – exhibitor
- Uvex Safety South Africa – exhibitor and sponsor of delegate gifts

### GALA DINNER AND ANNUAL AWARDS EVENING

The prestigious Gala Dinner/Annual Awards evening held on 17 October was an extra special event, as we had the rare privilege of recognising three outstanding members of SAIOH, by awarding them Fellowship status. The Fellow Award is the highest and most prestigious award made by SAIOH, in recognition of a lifetime of exceptional professional conduct and significant contributions to the field of occupational hygiene. The honour is awarded to registered occupational hygienists who have been with SAIOH for a minimum

Name	Award
Sonette du Preez	Article of the Year Award: 2018
Deon Swanepoel	Occupational Hygienist of the Year: 2018
Thabo Machaba	Personality of the Year: 2018
Oscar Rikhotso	Student of the Year – Tertiary Institution: 2018
Michell Chamberlain	Student of the Year – Vocational Education and Training: 2018
Christiaan E Schutte	Top Achiever of the Year – Assistant: 2018
Greg C Little	Top Achiever of the Year – Technologist: 2018
Evert P du Toit	Top Achiever of the Year – Hygienist: 2018

SAIOH Past Presidents	
Celia Keet (2019)	Peter-John Jacobs (2014)
Julie Hills (2018)	Johann Beukes (2012–2013)
Kenneth Hlungwane (2017)	Melinda Venter (2010–2011)
Jaco Pieterse (2016)	Seni Myeni (2008– 2009)
Cas Badenhorst (2015)	Deon Jansen van Vuuren (2005– 2007)

of 20 years and who have made distinct contributions to the advancement of the profession. Wholehearted congratulations to Mrs Julie Hills, Prof. Fritz Eloff and Mr Johann Beukes.

As usual, a number of deserving and outstanding members received the coveted SAIOH Awards. A big congratulations to the 2019 Annual Award winners on their achievements!

Not only did SAIOH recognise the Fellows and Award winners, but special recognition was also given to SAIOH Past Presidents of the last ten years, without whom SAIOH would not be the internationally recognised professional body that it is today. Their hard work and dedication are invaluable, and this was just a small token of our appreciation.

### ANNUAL GENERAL MEETING

As is customary at each SAIOH Conference, SAIOH conducted its Annual General Meeting (AGM), which was well attended. This year, the AGM included the required vote for three new Council members who needed to be elected onto the SAIOH National Council for the term 2020/2022. Although bittersweet, as it sees three Council members exiting, it opens the doorway for fresh, new thoughts and energy. Congratulations to Naadiya Nadasen, Moses Mokone and Deon Swanepoel on their election to Council. We are confident that you have the dedication and passion to grow SAIOH into an even greater professional organisation during your two-year term.



### SAIOH Past Presidents

Photograph: Rebecca Dick, SAIOH



**Receiving Fellow Awards from SAIOH Vice-President, Norman Koza (L-R): Julie Hills, Deon Jansen van Vuren (on behalf of Johann Beukes), and Prof. Friz Eloff**

Photographs: Rebecca Dick, SAIOH

# 39th Annual SASOHN Conference and AGM

**Bella Sepalameo**, SASOHN Pretoria Chairperson, e-mail: msepalameo@nti.co.za

The 39th Annual SASOHN Conference took place from 30 October to 1 November 2019 at the Council for Scientific and Industrial Research (CSIR) in Pretoria, where the jacaranda trees were in full bloom in brilliant lilac and violet colours. SASOHN Pretoria region hosted the Conference and aligned presentations to meet, as far as possible, the following SASOHN goals:

- The promotion of the highest possible standards in occupational health practice; by encouraging accreditation and upgrading professional qualifications;
- The provision of a supportive network for occupational health nursing practitioners (OHNPs) working in a business environment, and a forum for sharing problems and experiences;
- The development of professional capacity and excellence through the presentation of workshops, conferences, and training projects, including specific efforts to keep members abreast of changes in technology and legislation;
- The encouragement of cost-effective delivery of quality occupational health services in the country; and
- The promotion of adherence by organisations to the legal requirements set in terms of current South African and international legislation.

The theme of the 2019 Conference was *Fifty Shades of Purple: Our Professional Image*. The SASOHN Pretoria region wanted delegates to share a very different conference experience and deliberate on that image and how it is projected, and how to establish their own positive reputation. The selection of workshops and conference topics allowed SASOHN members to attend and accumulate continuous professional development (CPD) points.

## DAY ONE

The Conference started with three simultaneous workshops on Wednesday 30 October 2019, with presentations by experts in their respective fields.

Dr Sharon Vasuthevan presented the first workshop on "Professional Image", which focused on nurses and how they can develop and establish their professional reputations. She provided interesting insight into professional images and how to socialise with colleagues, professionally, by bringing out the best in ourselves and our peers. Her visual style of presenting allowed her to balance the text and image and to convey her message by demonstrating the similarities between herself and the audience; that, alone, encouraged the audience to engage with the topic.

The second workshop was presented by Ms Megan Hoskins, a psychiatric intake clinician and marketing liaison officer at Akeso Clinics, and Mrs Adriana Coetzee, the nursing services manager at Akeso. The presentation was on "Dual therapy in substance abuse and addiction". Akeso is a group of psychiatric hospitals that manages patients with their own specialised programmes, which include a general psychiatry unit, a dual diagnosis addiction unit and an

adolescent unit. They spoke about patients who go through difficult and transitional periods in their lives due to the death of a loved one, a divorce, or relationship conflicts. As Akeso, they believe that healing occurs through an integrated, proven process that involves a multi-disciplinary team of professionals and the highest international standards of clinical ethics and practice. Dual therapy, as provided by the Akeso group of hospitals, focuses not only on an individual's treatment needs, but also on effective education and good support systems provided by families and communities. The presenters involved the audience throughout the presentation, and encouraged participants to break into small groups to discuss challenges that they face in their workplaces, and how to assist employees with addictions.

The third workshop was presented by Mr Mpilo Booi on "Technological development in the prevention of noise-induced hearing loss". Mr Booi is a hearing coach audiologist from Noise Clipper. He focused on the technological developments of noise-induced hearing loss and reiterated that, although OHNPs focus on the working environment, noise-induced hearing loss can start in the home or in social environments (e.g. from noise from buses). He further explained the types of hearing loss that damage the inner ear or auditory nerves, causing conductive hearing loss (temporary or permanent). The challenge with hearing loss is that once the damage is done it cannot be reversed. There are other causes of hearing loss, including infections, medications and ageing. He also indicated the equipment or devices that can be used to test hearing in both children and adults.

The day concluded with a 'Trip around the world' cocktail event, where delegates could explore the four chosen continents, their diverse cultures, and the food. It was indeed an evening of fun under a fresh night sky, with delegates and exhibitors sampling delectable food from four continents' stalls, while enjoying the dance floor, wine and soft drinks.

## DAY TWO

The second day started with an opening address by the SASOHN President, Ms Denise Minnie, who challenged members to align themselves, and SASOHN, to business values. By giving relevant feedback from meetings, workshops and conferences, the OHNP promotes the profession and adds value to the business.

The Conference sessions continued and Ms Milly Ruiters gave the first presentation on the Department of Employment and Labour's expectations in relation to occupational health and safety (OHS). She communicated the importance of improving occupational healthcare services and intersectoral collaboration, the existing legislation, and involvement of all relevant stakeholders.

Prof. Mavis Mulaudzi spoke about professional accountability and ethics in occupational health. She focused on ethical principles and reminded the OHNPs about critical and ethical decision-making and how to apply ethical principles in our daily practices by being caring and conscientious moral agents.

Dr Karen Michel spoke about compliance and quality, and the implications of these on OH service delivery. She explored the perceptions of occupational health practitioners about compliance with existing legislation, quality of service delivery, and possible accreditation of OHS. She emphasised that occupational health should be accessible to all workers through quality OHS. The focus of the presentation was that the OHNPs should move out of their comfort zones and make their voices heard; they were encouraged to present on national and international events relevant to their practice.

The second session started with Dr Neale Lange, a physician and sleep specialist residing in the USA, presenting "Sleep and fatigue impact on the human body". He provided valuable insight into the human body's requirement for rest and sleep, and discussed his research findings on the effect of medication and other substances, as well as shift work, on a person's sleep.

Mr Matthew Ncube, partner at Nhlupho Business Optimization Solutions, and a senior executive member of the International Labour Organization and World Health Organization joint initiative for occupational safety and health in Africa, presented "The fourth industrial revolution and its impact on occupational health practice". The main question was: "are we ready for the fourth industrial revolution—what does occupational health look like in South Africa and the rest of Africa?" Mr Ncube provided some insight into the traditional role of occupational health systems and the journey we would have to take to adopt an integrated systems approach to create a resilient occupational health and safety culture in South Africa

Dr Penny Orton, lecturer at Durban University of Technology (DUT) and a member of the South African Nursing Council, spoke about how health informatics and e-learning can enhance occupational health practice. She provided valuable insight into how e-learning is managed and encouraged us all to embrace the available technology to ensure that we stay up to date with new developments in education and training. Ms Annelize Jacobs, an OHNP working at Plascon in Port Elizabeth,



**Pretoria Conference Organising Committee with SASOHN President, Denise Minnie, at the Gala Dinner (L-R) — front: Kim Davies, Louwna Pretorius, Tirsia Barnard, Elizabeth Sebata, Bella Sepalamele, Denise Minnie, Motlagomang Monyaki; back: Alta Kruger, Geoff Titi, Godiragetse Sithole, Gloria Mabe, Daizy Lawrence, Katekani Maluleke**  
Photograph: Theresa Bezuidenhout

discussed "Risk assessment in the hazardous chemical industry", and the importance of conducting risk assessments in the chemical industry. She focused on appropriate medical surveillance and biological monitoring. She also provided feedback on her experiences in a project that gave an in-depth insight into accurate record-keeping and data management to ensure compliance with relevant regulations.

Dr Sebolelo Seape, a specialist psychiatrist working in the private and public sectors, presented "The impact of mental health conditions on occupational health services". She focused on early identification, treatment, care and management of these challenging health conditions, and provided evidence-based, national and global statistics.

The final presentation was by Dr Elton Dorkin and Dr Vanessa Govender. Both doctors are involved in occupational health services in the mining industry. They presented "Navigating the currents of occupational health with a focus on mining" and concentrated on occupational lung diseases that pose a threat to past and current mine workers. They also discussed the challenges of the long latency periods of these diseases, which can develop many years after employees have left the mines. They updated the delegates on the latest developments regarding court judgments. As per the silicosis class action settlement, involving six gold mining companies, mine workers (and their dependants on behalf of them), who were in their employ from 1965 onwards, can claim compensation for silicosis and tuberculosis. The Tshiamisu Trust is being established for this purpose.

## AWARDS AND ACCOLADES

The SASOHN Gala Dinner was well attended by SASOHN members and proved to be another memorable night, where members who performed exceptionally were recognised by the SASOHN President. The following awards were presented:

<b>Ian Webster Silver Award</b>	Aletta Dedekind (Western Cape)
<b>Mentor of the Year</b>	Yvonne van Zijl (Gauteng Central)
<b>Region of the Year</b>	KZN Coastal
<b>President's Award</b>	Joan Visser (Western Cape)
<b>Executive Committee Representative of the Year</b>	Louise de Wet
<b>Journal Article of the Year</b>	Angie Butkovic
<b>Best Poster</b>	Amanda van Jaarsveld

Every year, SASOHN has a poster competition at the Annual Conference to encourage members to share valuable evidence-based practice cases or discoveries related to occupational health. Applicants may enter their posters as formal or informal research. This year, nine entries were received, with one overall winner of the competition (Amanda van Jaarsveld).

## ACKNOWLEDGEMENTS

SASOHN would like to express our heartfelt appreciation to all exhibitors, sponsors and delegates for their support and attendance at the Conference.

# SASOM 2019 Annual General Meeting and Conference

**Claudina Nogueira**, SASOM ExCo Member and ICOH Vice President, e-mail: claudinanogueira@hotmail.com

**Prof. Daan Kocks**, SASOM Chair and ICOH National Secretary for South Africa, e-mail: info@sasom.org

**Dr Jenny Sapire**, SASOM National Secretary 2019, e-mail: jenny.sapire@lifehealthcare.co.za

**Jaco Botha**, Project Coordinator in the SASOM Office, e-mail: info@sasom.org

The South African Society of Occupational Medicine (SASOM) Eastern Cape Chapter hosted the SASOM Annual General Meeting (AGM) and associated Conference at the Protea Hotel Port Elizabeth Marine, Summerstrand, Port Elizabeth, on 23 November 2019.

## CONFERENCE PROGRAMME

The Conference brought together approximately 90 delegates, presenters, organisers and exhibitors (Amtronix (Pty) Ltd and Sanofi Pasteur), under the theme of *Difference between Medically Fit and Unfit to Work*, and was accredited for six Continuing Education Units (CEUnits) by the South African Medical Association (SAMA). The last SASOM ExCo meeting of the year was held on Friday 22 November; the AGM followed the close of the Conference, on Saturday 23 November.

Dr Logan Naidoo, Chair of the SASOM Eastern Cape Chapter, officially opened the Conference and welcomed all participants. The morning session was chaired by Dr Adriaan Combrinck (SASOM Treasurer) who introduced the first four presenters.

Dr Greg Kew, SASOM ExCo member, occupational medicine specialist and honorary senior lecturer at the University of Cape Town (UCT), gave the opening presentation titled "Fit or not fit to work: an all-inclusive decision". His presentation covered the core elements of medical 'fitness-to-work' and their implications for the certifying practitioner. He stressed that determining medical 'fitness-to-work' and understanding the aspects of what this means are fundamental knowledge areas for the occupational health practitioner (OHP), and illustrated his points with case studies.

The second presentation, titled "Medical surveillance versus medical diagnosis and the decision of employee impairment", was delivered by Dr Haidee Williams, occupational medicine specialist in private practice and honorary lecturer at UCT. She described how medical surveillance, defined as a "planned programme or periodic examination of employees", should not be confused with 'fitness-to-work' assessments. There may be elements of both surveillance and fitness during one encounter, but it is important for the OHP to maintain clarity in his or her mind about the principal intent of the medical examination. Furthermore, the impact of the medical condition can only be assessed by having a thorough understanding of the workplace through a health risk assessment, and having knowledge of the inherent requirements of the job.

Mrs Marlice Watermeyer and Mrs Chanette van der Merwe, co-directors of Watermeyer and van der Merwe (Pty) Ltd—Occupational Therapists, and official representatives of Occupational Therapy in Occupational Health (OTOH), followed with a presentation titled "Functional capacity evaluations: a critical construct in the management of absenteeism". Their joint presentation reviewed the multi-faceted dilemma surrounding absenteeism due to several illness drivers that require a more holistic approach, including adjustments to conventional approaches. They concluded that occupational therapists have a vital role to play in both preventive and rehabilitative strategies related to illness and subsequent absenteeism management.

Functional capacity evaluations, reports and risk screenings are crucial instruments for providing occupational health stakeholders with valid quantifiable information to manage illness prevalence.

Dr Jan Lapere, SASOM ExCo member and private practitioner in occupational medicine, medico-legal and social labour law, presented in – and facilitated – the discussion session titled "The role of an occupational health professional group in South Africa". This interactive session generated much interest among delegates and was divided into four parts: SASOM history; SASOM current mission, vision, aims and objectives; constraints, requests, benchmarking, and proposed aims and objectives; and public debate.

The afternoon session was chaired by Dr Logan Naidoo. He introduced Ms René Verson, an audiologist in private practice and director of René Verson Audiologists Inc. In her presentation, titled "Hearing impairment and fitness-to-work" she discussed the nature and degree of hearing loss and the impact of hearing loss on the employee's ability to perform adequately in the workplace, against the background of reasonable accommodation of the hearing-impaired person in his or her working environment. She concluded that, since the determination of fitness for work in the hearing-impaired employee is both complex and multi-faceted, a multidisciplinary approach to decision-making should be encouraged.

"Visual impairment and fitness-to-work" was delivered by Dr Theunis Botha, an ophthalmologist in private practice at the St George's Hospital in Port Elizabeth. He gave a short introduction and summary of the legislation regarding visual impairment in the workplace in South Africa, and discussed visual function and its practical evaluation.

Dr Sarel Steyn, a clinical psychologist in private practice and CEO of the Wellness House in Port Elizabeth, discussed "Mental health and fitness-to-work". He elaborated on the primary goals of a psychological 'fitness-to-work' evaluation which are to identify any mental health challenges that an employee might have and to determine the extent to which these might affect an employee's ability to perform his or her job in a safe and effective manner. He stressed that these evaluations assist both the employee and employer by providing direction to utilise the best resources available; hence, the development of policies and procedures that leverage key resources in advance, is of utmost importance.

Dr Blanche Andrews, an occupational medicine specialist and advisor at Sanlam in Cape Town, gave the last presentation of the day titled "Training in the assessment of impairment and disability in the South African context". She explained that a medical assessment provides a key entry point to accessing benefits that support affected individuals. In South Africa, approaches to training health professionals in performing impairment and disability assessments are often inconsistent, resulting in different levels of competencies. To address this training need, representatives from the academic, private and public sectors have collaborated in the development of a core curriculum and training programme that aims to develop capacity in the assessment of impairment and disability within South Africa. She ended by stating

that further collaboration and work are needed to evaluate training needs and optimise existing approaches in this area.

### SASOM ANNUAL GENERAL MEETING 2019

At the AGM, Prof. Daan Kocks (SASOM Chair) read the 2019 Annual Report prepared by the SASOM 2019 National Secretary, Dr Jenny Sapire, highlighting the following activities and outcomes of the past year:

- The SASOM office bearers for 2020 were elected at the AGM: Prof. Daan Kocks (Chair), Dr André Kotzé (Vice Chair), Dr Nicholas (Nick) van de Water (Secretary), Dr Angel Oliver Ndhlovu (Treasurer), and Dr Adriaan Combrinck (Alternate Treasurer).
- As at 31 October 2019, SASOM had 404 members in good standing. This number includes 46 new members, 11 honorary life members and five corporate memberships. Honorary life membership was awarded to Dr Danie Ungerer in 2019.
- Formal communication with organisations engaged in the enhancement of occupational medicine continued with SASOM ExCo members (co-opted) for the National Institute for Occupational Health (NIOH), the Compensation Commissioner (CC), the International Commission on Occupational Health (ICOH), the South African Society of Travel Medicine (SASTM), and the Mine Medical Professionals Association (MMPA).
- SASOM liaison with other organisations continued at both national and international levels, e.g. the South African Department of Labour and Employment (with SASOM being an active participant and contributor in the Occupational Health Forum); *Occupational Health Southern Africa (OHSa)* Journal; and the International Occupational Medicine Society Collaborative (IOMSC).
- SASOM Guidelines are provided free of charge to members in good standing, as a membership benefit. A new format has been implemented for the updating of the Guidelines, ensuring uniformity and adherence to the prescripts of the ISBN number system and copyright regulations. The Guidelines are continuously revised to ensure that they remain relevant for good practice in occupational health/medicine.
- The first Joint Congress of SASOM and the International Scientific Association for Occupational and Environmental Health in the Production and Use of Chemicals (MEDICHEM) was held at the Protea Hotel by Marriott OR Tambo International Airport, Gauteng, South Africa, and is briefly summarised below. SASOM is an affiliate member of ICOH and MEDICHEM acts as the ICOH Scientific Committee on Occupational Health in the Chemical Industry.

### SASOM-MEDICHEM JOINT CONGRESS

The theme of the Congress was *Control of Substances Hazardous to Health: Old and Emerging Issues*. Attendees were accredited with 26 CEU units for full attendance, including two ethics points by the South African Medical Association (SAMA) or four CEU units by the South African Council for Natural Scientific Professions (SACNASP). In a true reflection of global collaboration in occupational health, approximately 110 participants (including invited speakers, delegates and exhibitors) attended the Congress, representing 25 countries: Canada, China, Finland, France, Germany, Greece, Kenya, India, Israel, Italy, Kuwait, Lesotho, Malaysia, Mozambique, Namibia, Nigeria, Portugal, Republic of Korea, Rwanda, Switzerland, Thailand, United Kingdom, United States, Zimbabwe, and South Africa.

The following MEDICHEM Awards were bestowed during the Joint Congress:

- Winner: Young Professionals Programme (YPP) Award – Dr Botembetume Maboso (Mafeteng, Lesotho), for his presentation “Assessing the burden of silicosis, TB and HIV among Basotho formerly employed in South African mines”
- Winner: MEDICHEM Prize – Ms Annelize Jacobs (Port Elizabeth, South Africa), for her presentation “World class occupational health in an emerging market environment”
- Runner-up: MEDICHEM Prize – Dr Itumeleng Ntamatamala (Cape Town, South Africa), for his presentation “Hard metal lung disease: old and emerging issues”

MEDICHEM held a half-day pre-Congress workshop, titled *Chemicals: From Environment to Epidemiology*.

The ICOH Officers Meeting was attended by the ICOH President, Dr Jukka Takala (Finland), the Secretary General Prof. Sergio Iavicoli (Italy), the two Vice Presidents, Prof. Seong-Kyu Kang (Republic of Korea) and Ms Claudina Nogueira (South Africa), and two members of the ICOH Secretariat staff (Italy), Mr Pierluca Dionisi and Mr Antonio Valenti.

The ICOH Regional (African) National Secretaries Meeting was chaired by Prof. Seong-Kyu Kang (ICOH Vice President for National Secretaries) and attended by the ICOH National Secretaries for Kenya (Dr Kibor Keitany), Nigeria (Dr Uche Enumah), South Africa (Prof. Daan Kocks), and Zimbabwe (Dr Blessing Garamumhango); the ICOH National Secretaries for Mali (Dr Birama Diallo) and Togo (Dr Silvere Kevi) attended remotely via Skype.

### SASOM WEBSITE

SASOM members have made good use of the new interactive and dynamic SASOM website, which was launched in October 2018 to replace the previous outdated version. A review of the monthly statistics for the website from January to October 2019 indicated a steady monthly increase in the number of visits (10-month total = 16 027), number of unique visitors (10-month total = 9 281), and pages opened and viewed by visitors (10-month total = 83 838). These three parameters increased substantially from July to October 2019, most likely due to interest generated in the Society by the SASOM-MEDICHEM Joint Congress participants and others.

### REMINDER: SASOM ANNUAL AUTHOR PRIZE

SASOM is encouraging researchers working in the field of occupational health in Africa to publish their research findings. SASOM will provide a cash award to a novice author who is the first author of the best paper published in OHSa in a calendar year, as judged by the Editorial Advisory Panel. This new initiative is a collaboration between OHSa and SASOM, and the prize for 2020 will be awarded in January 2021. Eligibility for the prize is limited to researchers who have not previously published a paper in OHSa or any other accredited academic journal. Membership of SASOM is not a prerequisite.

### SASOM MEMBERSHIP FOR 2020

SASOM members are reminded that renewal of their annual membership (or submission of a new application for membership) is due by 31 January 2020, to ensure receipt of all the OHSa issues for the year. Access to the ‘Members Area’ on the SASOM website will only be granted to paid-up members, with effect from 1 February 2020. Please access the website, [www.sasom.org](http://www.sasom.org), for more information.

# Message from the MMPA President

**Dr Muofhe Murwamphida**, MMPA President, e-mail: [mbalenhleb@mpas.org.za](mailto:mbalenhleb@mpas.org.za)

The Mine Medical Professionals Association (MMPA) welcomes you to 2020! As some of you may recall, in 2019 we committed, as the MMPA, to remain an integral and indispensable discipline within the mining industry by:

- Promoting best practice in mine medicine;
- Promoting the health and productivity of the workforce;
- Gathering and disseminating knowledge;
- Serving the interests of mine professionals within the mining industry;
- Increasing our membership numbers;
- Raising our visibility; and
- Raising awareness about our activities.

The MMPA increased its membership numbers in 2019 and will put definitive action plans in place, aimed at members, to ensure that we deliver on our promises. In order to fulfil our vision of raising the profile of medicine in the mining industry, we plan to host three academic symposiums and an Annual Congress in 2020. Past academic symposiums have been a great success and provided a platform for sharing best practices and disseminating knowledge. They also provided an opportunity for health professionals to keep abreast of the latest developments in medicine in mining.

## AIMS AND OBJECTIVES FOR 2020

The MMPA is committed to:

- Study, discuss and bring to the attention of our members any matters of medical and general interest pertaining to the mining industry;



**Dr Muofhe Murwamphida,**  
MMPA President

- Promote the interests of the medical profession in the mining industry;
- Formulate and review guidelines for a desirable standard and scope of medical practice within the mining industry;
- Promote and organise continuing medical education;
- Promote medical research by members; and
- Foster a friendly relationship and exchange of views among members of the MMPA and other organisations connected to the mining industry.

## BENEFITS OF BEING A MEMBER OF THE MMPA

There are many benefits of being a member of a professional organisation such as the MMPA, including:

- Knowledge sharing;
- Gaining Continuing Professional Development (CPD) points;
- Incident sharing and learning;
- Networking with peers;
- Interaction with industry leaders; and
- Attending dedicated industry-focused seminars.

We encourage our members to participate in tripartite forum initiatives, such as the Occupational Health Dialogue, regional tripartite forum meetings, World AIDS Day and World TB Day.

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# The doctor's role as a gatekeeper in the compensation legislation claim process



**Dr Luvuyo Dzingwa** – RMA Medical Manager, e-mail: ldzingwa@randmutual.co.za

The last two decades have seen changes in occupational health, partly reflecting the changes in occupational processes and exposures, social activism, and litigation, which have led to the emergence of ethical issues related to occupational health.<sup>1</sup> Ethical dilemmas confronting occupational medicine are becoming more complex, due to the development of science, legal responsibilities of different relevant parties, and forever-changing health and safety regulations.<sup>1,3</sup> These requirements and compensation legislation provisions introduce new dimensions and factors to be considered in both ethical guidance and conduct, making some occupational healthcare professionals (OHPs) feel like they are under siege.

Despite political and social pressures, the core healthcare ethics offer moral guidance in addressing ethical dilemmas. This article describes the doctor's ethical, moral and professional responsibilities in the compensation claiming process, in terms of the Compensation for Occupational Injuries and Diseases Act (COIDA) (Act No. 130 of 1993), which provides compensation for permanent impairment caused by occupational injuries, or diseases sustained or contracted by employees arising out of, and in the course of, their employment.

Doctors play a gatekeeper role in the claim process that impacts on access to coverage and determination of benefits for the injured or diseased employee. The gatekeeper function is based on the assumption that occupational causality is established, and medical determinations are scientific and objective. Doctors are obligated to determine whether a claim is submittable or not, based on the occupational causality and validity of the claim. If this is disregarded, the doctor becomes merely a conduit, abdicating and shifting professional responsibility to the next level in the compensation claiming process. There are factors that may influence the decision to submit a claim in spite of the doctor's supposed objectivity, medical training and diagnostic ability. Social and economic forces, and the doctor's feelings for the claimant, may affect his/her decisions as much as, or more than, medical data.<sup>2</sup> As a fundamental principle, it is imperative and mandatory that all healthcare professionals practise healthcare ethical tenets, viz. justice, autonomy, non-maleficence and beneficence.<sup>2,3</sup>

The Hippocratic Oath provides ethical standards and defines acceptable behaviour of healthcare professionals' roles and obligations in society.<sup>4</sup> The pursuit of good, avoidance of harm, and beneficence, should be proactive. The ways in which harm can occur are not limited to worsening of a patient's condition in a clinical setting, or physical maltreatment.

Doctors provide crucial input to the compensation system with regard to medical care for injured or diseased workers, and written reports. These reports are critical for liability acceptance, and continuation of care provided to the worker. Submission of incomplete or inexhaustive information or medical reports for adjudication causes harm and injustice. The claim may be repudiated, the liability decision may be delayed, or a limited liability might be accepted, resulting in delay or denial of prompt and appropriate levels of care and other legislated benefits. Submission of incomplete or inexhaustive information or reports also burdens the system administratively, as additional follow-up actions with the relevant parties become necessary.

This takes resources and time away from assessing claims that have fully investigated and meticulously documented reports. The COIDA benefits are intended only for those whose injuries and diseases were more likely than not to have been caused by work-related activities. Clogging the system with non-occupational and/or invalid claims is unfair to the claimant, as it creates unfounded expectations, and it is also against social justice as it disadvantages the group with legitimate claims. Justice is broad; it is not limited to one-on-one interactions but also considers the welfare of the genuinely affected group.

The COIDA covers both injuries and diseases. Claims for injuries are relatively easy to assess as they result from accidents, and time of injury is simple to establish. It is critical that the clinical examination and findings are accurately documented within a reasonable time-frame, regardless of the severity of the injury/injuries. Establishing occupational causality is difficult for most diseases due to time lags, specifically for those diseases with latency periods, or those caused by cumulative exposures. Doctors need to define the injury and indicate whether and how it is related to employment. This applies equally to a disease as occupational causality must be established before liability is considered for the claim. Doctors' reports and medical evaluations are used to determine the claimant's eligibility for benefits and to resolve disagreements over treatment, permanent impairment rating, and other issues. It is critical for the doctor to understand these complex roles and clinical assessments, records and reports, and how they can impact on the wellbeing of claimants.

Accurate, complete and timely submission of reports by a doctor, and cooperation with parties in the compensation system, can prevent delays in the delivery of benefits to claimants and avoid unnecessary and costly tribunal hearings.

It is acknowledged that healthcare professionals are experts who need to exercise their professional independence in the execution of their functions. Doctors must strive to submit quality reports timeously, familiarise themselves with legislative requirements and provisions, and develop their competence and remain well informed with regard to scientific and technical knowledge.

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# 10 steps to checking your spirometry result

**Lindsay Zurba** – Education for Health Africa,  
e-mail: linds@educationforhealth.africa

**Peter Stanyer** – Stanyer Electroserve,  
e-mail: peter@stanyersa.com



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-part series briefly outlines each step, one by one.

## STEP 8: GRADING

Impaired lung functions are generally graded to quantify respiratory impairment/disability for medico-legal purposes, and to optimise and standardise treatment. Severity scores are most appropriately derived from studies that relate pulmonary function test values to independent indices of performance, such as ability to work and function in daily life, morbidity, and prognosis. In general, the ability to work and function in daily life is related to pulmonary function, and pulmonary function is used to rate impairment.<sup>1</sup>

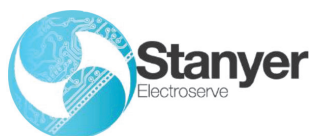
The predicted forced expiratory volume in one second (FEV<sub>1</sub>) % is used to grade severity in patients with pulmonary defects but has little applicability to patients with upper airway obstruction, such as tracheal stenosis, where obstruction could be life threatening and yet be classified as mildly reduced.<sup>1</sup>

Current American Thoracic Society (ATS) and European Respiratory Society (ERS) recommendations define a predicted FEV<sub>1</sub> % of > 70 as mild impairment, 60–69 as moderate impairment, 50–59 as moderately severe impairment, 35–49 as severe impairment, and < 35 as very severe impairment.<sup>1</sup> Table 1 illustrates the proposal by Quanjer, Pretto, Brazzale and Boros<sup>2</sup> for a new grading system for the categorisation of airways obstruction for those still using predicted FEV<sub>1</sub> % lower limit of normal (LLN) and/or Z-scores for interpretation. However, FEV<sub>1</sub> is still the preferred parameter for severity grading.

The new classification system is simple, easily memorised and clinically valid. It retains previously established associations with clinical outcomes and avoids biases due to the use of predicted FEV<sub>1</sub> %.

**Table 1. Proposed new grading system for the categorisation of airways obstruction<sup>2</sup>**

Obstruction	Grade	ATS/ERS 2005	Proposed
Mild	1	> 70% pred	Z-score ≥ -2.0
Moderate	2	60–69% pred	-2.5 ≤ Z-score < -2.0
Moderately severe	3	50–59% pred	-3 ≤ Z-score < -2.5
Severe	4	34–49% pred	-4 ≤ Z-score < -3.0
Very severe	5	< 35% pred	Z-score < -4.0
Mean grade		2.79	2.69



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Using the grading in Table 1, the spirometry result in Table 2 would be graded as grade 4 severe obstructive impairment when using predicted FEV<sub>1</sub> % (40%). When using the Z-score (-3.37) for interpretation, the result would also be graded as a grade 4 severe impairment.

**Table 2. Example spirometry test result for grading the impairment**

Spirometry	Pred	LLN	Actual	%Pred	Z Score
FEV <sub>1</sub> (L)	3.14	2.24	*1.29	*40	-3.37
FVC (L)	4.26	3.07	3.13	73	-1.57
FEV <sub>1</sub> /FVC (%)	74	61	*41	*55	-4
FEF 25–75% (L/sec)	2.20	0.57	*0.34	*15	-1.88
FEF max. (L/sec)	7.94	5.47	*3.90	*49	-2.69
Expiratory time (sec)			12.59		

Caution should be used when using spirometry alone to grade impairment for medicolegal or other purposes. Although the predicted FEV<sub>1</sub> % has the best correlation with respiratory impairment, especially in chronic obstructive pulmonary disease (COPD), it may be only one component of impairment. If there is a discrepancy between the history, clinical severity and spirometry, additional investigations are indicated, and the individual should be referred to a specialist with diagnostic lung function facilities.

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