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- Southern African Institute for Occupational Hygiene
- South African Society of Occupational Health Nursing Practitioners
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From the Editor . . .

Gill Nelson,
Editor-in-Chief

May was an exciting month for occupational health globally, with the convening of the 32nd International Commission on Occupational Health (ICOH) Congress in Dublin, Ireland. Many of the four *Occupational Health Southern Africa* societies' members, including some editorial board members, attended the event. There will be a bumper report on the ICOH Congress in the next issue of the Journal.

May 2018 also saw the ground-breaking silicosis court action suit being settled. On 3 May, South Africans woke up to the news that a settlement of R5 billion had been reached between mine workers and a number of gold mining companies to compensate those who developed silicosis or tuberculosis in the gold mines. Each affected miner (or the widow or dependents) will receive a portion of the money that will be administered by a Trust set up specifically for this task. It is estimated that there are 50 000–100 000 former mine workers with silicosis.[1] The disbursement of payments, however, is dependent on further legal processes.

The case has taken almost six years to settle after Richard Spoor filed the class action motion on 21 Dec 2012.[2] It was argued that gold mining companies were aware of the dangers of inhaling silica dust but, nonetheless, failed to protect workers.

We have published several papers on silicosis over the years, such as 'Silicosis elimination in South Africa' (Rees, 2006)[3] and 'Clinical guidelines on isoniazid preventive therapy for patients with silicosis in South Africa' (De Jager et al., 2014). [4] As recently as in the previous issue of the Journal, Ehrlich et al. addressed the issue of the switch-over from analogue to digital chest radiography,[5] and teWaterNaude presented a method for reading plain chest X-rays.[6] South Africa has one of the highest silicosis rates in the world. In life, the disease is diagnosed by trained expert radiologists; after death, autopsies are used to diagnose new cases and to confirm those diagnosed during life. Although silicosis was recognised as an occupational respiratory disease in gold miners as early as 1912, it was never properly managed, and the rates of silicosis diagnosed at autopsy have been rising for several decades.[7] In 2016, of the 850 deceased mine workers who came to autopsy, 199 (23.4%) had silicosis[7] and the rate continues to rise. The occupational exposure limit for respirable silica dust in South Africa is 0.1 mg/m^3, but this does not seem to be low enough to prevent disease.

South Africa is not new to setting up trusts to compensate workers for occupational diseases. The Q(h)ubeka Trust was established in March 2016 to compensate mine workers with silicosis from Anglo American and AngloGold mines.[8] "The settlement set aside a total of R395 million in compensation for qualifying claimants, which amount now forms the basis of payments being made to qualifying claimants by the Q(h)ubeka Trust."[9] By 30 April 2018, 1 114 claimants had been approved for a total payment of R116 million.[10] Prior to this, in the early 2000s, three asbestos disease settlements were reached. Excluding the 'closed-list' Cape Plc case, there have been 4 820 individuals afflicted with asbestos-related diseases, including benign asbestosis and malignant mesothelioma, who have qualified for financial compensation from either the Kgalagadi or Asbestos Relief Trusts (JM teWaterNaude, personal communication). No doubt, we will be hearing much more about the silicosis class action settlement in the months to come.

Photograph: Claire Waters

We have no papers about silicosis in this issue. However, we continue David Stanton's historical series on slavery, present research on musculoskeletal disorders in commercial motorcycle drivers in Ibadan, Nigeria, and report a psychiatrist's view on return to work after prolonged sickness absence.

SASOM says goodbye to Jenny Acutt after 14 years of dedicated service, SASOHN reports on the Gauteng Central managers' brunch, the MMPA presents a practical approach to the Code of Practice for medical incapacity due to ill-health and injury, and SAIOH reports on recent exciting events. We also have exciting news from OSHAfrica, a new platform to support the development of occupational health and safety practitioners on the continent.

Winter is upon us – the ideal time to find a warm, comfortable space in which to read and write, both for pleasure and professionally. I wish you many productive hours as you engage in these activities over the next few months.

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Upcoming events

LOCAL EVENTS

DATE	PLACE	EVENT	MORE INFORMATION
13-15 June 2018	Holiday Inn Rosebank, Johannesburg, Gauteng	2018 African Occupational Health and Safety Conference	E-mail: info@asbconsulting.co.za
22-23 June 2018	Protea Hotel by Marriott, OR Tambo Airport, Johannesburg, Gauteng	SASOM Annual Congress	E-mail: info@sasom.org Website: http://www.sasom.org/
10-14 July 2018	Apex Environmental Centre of Excellence, Umbogintwini, KwaZulu-Natal	OHTA W505 – Control of Hazardous Chemical Substances	E-mail: dee@apexenviro.co.za Website: www.apexenviro.co.za
28 Jul 2018	TBC	MMPA Noise Induced Hearing Loss Symposium	E-mail: mbalenhleb@mpas.org.za
14-18 Aug 2018	Apex Environmental Centre of Excellence, Umbogintwini, KwaZulu-Natal	OHTA W504 – Asbestos & Other Fibres	E-mail: dee@apexenviro.co.za Website: www.apexenviro.co.za
17-19 Aug 2018	Sun City, North West	SAMA Conference	E-mail: thabison@samedical.org Website: https://www.samedical.org/conference
10-12 Sep 2018	Khaya iBhubesi, Parys Free State	PHASA Annual Conference	E-mail: sabine@confco.co.za Website: https://www.phasa.org.za/phasa-confence-20182
12-15 Sep 2018	Cape Sun Hotel, Cape Town Western Cape	Pan African Travel Medicine Congress	E-mail: admin@sastm.org.za Website: www.sastm.org.za
23-26 Oct 2018	Champagne Sports Resort, Central Drakensburg, KwaZulu-Natal	SAIOH Annual Conference	E-mail: info@saioh.co.za Website: http://www.saioh.co.za/page/SAIOHConference18
31 Oct-2 Nov 2018	Spier Hotel, Stellenbosch, Western Cape	SASOHN Annual Conference	E-mail: office@sasohn.co.za Website: www.sasohn.co.za/home.php
24-26 Jul 2019	Durban Exhibition Centre, Durban, KwaZulu-Natal	KwaZulu-Natal Industrial Technology Exhibition (KITE)	E-mail: info@kznindustrial.co.za Website: www.kznindustrial.co.za

HEALTH AWARENESS DAYS, WEEKS AND MONTHS

MAY

Anti-tobacco Campaign Month
Burns Awareness Month

5	World Hand Hygiene Day
6-12	National Burns Awareness Week
6-13	Hospice Week
8	World Red Cross Day
10	Global Move for Health Day
12	International Awareness Day for Chronic Immunological and Neurological Diseases
12	International Nurses Day
17	World Hypertension Day
28	International Day of Action for Women's Health
31	World No Tobacco Day

JUNE

Men's Health Month
National Blood Donor Month

3	National Cancer Survivors Day
5	World Environment Day
5-11	World Heart Rhythm Week
14	World Blood Donor Day
16	Youth Day
24-30	SANCA Drug Awareness Week

INTERNATIONAL EVENTS

DATE	PLACE	EVENT	MORE INFORMATION
25-26 Jun 2018	Kuala Lumpur, Malaysia	4th World Congress on Nursing & Healthcare (WCNH 2018)	E-mail: wcnh-2018@ scientificfederation.com Website: http://scientificfederation.com/nursing-2018/
12-13 Sep 2018	Leuven, Belgium	Employability in the 21st Century – 2nd International Conference on Sustainable Employability	E-mail: philippe.kiss@securex.be Website: www.employability21.com
24-26 Sep 2018	Manchester, UK	X2018: 9th International Conference on Exposure Science	E-mail: kate.jones@hsl.gsi.gov.uk Website: https://www.x2018.org
4-6 Oct 2018	Dakar, Senegal	First International Congress of the Senegalese Society of Health at Work and Environment (SOSESATE)	E-mail: info@sosesate.org Website: www.sosesate.org
24-26 Apr 2019	Budapest, Hungary	7th Federation of Occupational Health Nurses within the European Union (FOHNEU) International Congress	E-mail: fohneupresident@gmail.com Website: http://www.fohneu.org/7th%20Congress
22-24 May 2019	Paris Issy-les Moulineaux, France	Fifth International Conference on Wellbeing at Work	E-mail: waw2019@inrs.fr Website: www.inrs-waw2019.fr

Sick leave and work absence
Part 2: Returning to work after prolonged sickness absence: a psychiatrist's perspective

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Keywords: **psychology of working, work ability, return to work, sickness absence, impairment, disability**

Work is an integral part of modern life, and employment is the means of obtaining economic resources that are essential for material gain and participation in society.[1] Work gives life meaning for most individuals and provides income for life's necessities – food, shelter, clothing and medical care.[2] Working is also intimately linked to our evolutionary past, as our survival was dependent on our ability to locate food, find shelter, and develop a community for mutual support.[3] Loss of work, on the other hand, has been linked to problems such as interpersonal conflict, reduced self-esteem, substance abuse, and other mental health problems.[4]

Due to the fact that many healthcare professionals, including the treating psychiatrist, believe that it is their duty to advocate on behalf of the patient, it is the experience of the author that they avoid discussing the benefits of returning to work with their patients. Usually, the reason for this is that the workplace may have been a contributing factor to the patient's mental illness; hence the discussion is avoided. This paper will address the barriers to returning to work as well as assessment of work ability. Workplace interventions will be addressed in a follow-up paper.

There is a growing body of research demonstrating the harmful effects to health following prolonged certified work absence.[5] Doctors need to take cognisance of their roles in managing problems associated with sickness certification, considering present-day findings about the benefits of work.[1] Many doctors appear to be unaware of the potential harm that medically-excused prolonged time off work can cause.[6] Recovery is said to be faster and more successful if people can do some work while recovering.[5]

Longitudinal studies reveal that, once a person commences certified work absence, they commonly start sliding down a slippery slope that leads to long-term 'worklessness', as work absence tends to perpetuate itself. In other words, the longer someone is off work, the less likely it becomes that they will ever return.[7] According to the American Medical Association (AMA) Guides to the Evaluation of Work Ability and Return to Work, 50% of people out of work for eight weeks will not return to work, and 85% of people out of work for six months or more will never return to work on a sustained basis.[2]

The effects of work absence, according to Dunstan,[8] are a progressive deterioration in physical and psychological health, a six-fold increase in the rate of suicide, interpersonal relationship problems, loss of identity and self-worth, financial hardship, and a general erosion of quality of life. In their review, Waddel and Burton[1] found unemployment to be associated with increased rates of overall mortality and, specifically, increased mortality from cardiovascular disease and suicide; poorer physical health; lung cancer; susceptibility to respiratory infections; higher rates of medical consultation; medication consumption and hospital admission; poorer mental health; and psychological wellbeing and disability. In a sense, one can equate long-term worklessness with a slow and painful death.

Being booked off for sick leave could, in some cases, lead to temporary impairment which would mean that the person is unable to work for a period of time, usually three to six months. It is around this time that insurance cover will become an issue if the person or their employer has taken out insurance for such an eventuality. The treating doctor may then be called upon to submit reports to the insurance company and therefore needs to be proficient in the ability to assess work ability and impairment objectively.

MANAGING THE 'SICK-ROLE'

There appears to be a common, naïve belief amongst South African psychiatrists that being away from work will, in itself, 'allow the medication to work and the patient to heal' in an atmosphere of reduced stress.[6]

Studies have shown that older doctors and those consulting at a higher rate per hour issue more certificates, and doctors with high levels of postgraduate training issue fewer certificates.[9]

The doctor's ability to give quality advice to patients, regarding fitness for work, is largely dependent on their skills in managing the clinical areas involved, and in addressing the relevant occupational factors.[5,10] There are several factors that doctors should consider when advising patients on fitness for work.[11] These factors, together with the skills required, are listed in Table 1.

BARRIERS TO RETURNING TO WORK

It is not uncommon for patients, after being booked off for some time, to be faced with obstacles to returning to work.[12] These include:

Table 1. Clinical knowledge and skills relevant to sickness certification

Factors to consider	Skills required
The nature of the patient's medical condition and how long the condition is expected to last	Diagnostics, and in accessing data about appropriate periods of incapacity for different conditions
Functional limitations due to the condition, particularly in relation to the tasks the patient performs at work	Functional disability assessment, taking an occupational history, and knowledge of the workplace
Any reasonable adjustments that might enable the patient to continue working	An understanding of the needs of employers and employees and relevant legislation, including the Employment Equity Act, and the employer's obligation towards 'reasonable accommodation'
Clinical management of the condition, which is in the patient's best interest, regarding work fitness	Therapeutics, and current best clinical practice and evidence-based treatment guidelines Knowledge and understanding of the occupational therapist's role in functional assessment and vocational rehabilitation
Managing any conflict of interest between the psychiatrist's advocacy role and the patient's need for economic support or compensation	Knowledge of roles and responsibilities of the certifying doctor, the employer and the other agencies involved Negotiation and managing confrontation
Managing the patient's expectations in relation to their ability to continue working	Clinical consultation and eliciting any 'hidden agendas'

- Stigma and discrimination by employers and the public: disabled people regularly put employers' negative attitudes high on their lists of barriers to working. This is particularly the case for people with mental health problems.[13]
- The benefits trap: disabled people may be reluctant to return to work and give up their benefits in case they cannot manage in their 'old' job. Disabled people also report difficulty with accessing appropriate information about in-work benefits.[5]
- Loss of motivation, confidence and skills: keeping motivation, self-confidence and self-belief are all factors considered to be important indicators of staying employed. In this context, relatives' and friends' attitudes and expectations are also important.[14]

ASSESSING WORK ABILITY AND RETURN TO WORK

In the preface to the first edition of the AMA Guides to the Evaluation of Work Ability and Return to Work, the editor, James Talmage, makes the following pertinent points about return to work after sick leave:[2]

"The healthcare provider is often looked to by other parties for guidance with regard to approaches to return to work. However, it is not a subject about which physicians receive extensive training in their medical education. Patients, employers, and disability insurers believe physicians have the necessary knowledge and experience to answer disability certification questions scientifically, not realising that few physicians actually have had any formal training in such certification.

The editors and authors of this handbook have a firm belief, supported by science and consensus, that work is good for man and that it is the physician's role to encourage work and return to work as part of treatment."

The American College of Occupational and Environmental Medicine, the American Academy of Orthopaedic Surgeons, and the Canadian Medical Association strongly recommend that physicians return patients to their usual work roles as soon as possible.[2] A similar view is taken by the AMA, encouraging physicians to advise their patients to "return to work at the earliest date compatible with health and safety" and, through the care of the physician involved, facilitate a patient's return to work.[15]

Fitness for work is a dynamic concept because of the changing nature of two variables, namely work and health conditions. Therefore knowledge of both is required.[16]

There are three matters to consider when a doctor is asked about a patient's ability to return to work, viz. risk, capacity and tolerance. Risk refers to the chance of harm to the patient, co-workers or the general public if the patient engages in specific work activities. Capacity refers to concepts such as strength, flexibility and endurance, and is measurable with a fair degree of scientific precision. Tolerance, however, is a psychological concept. It is the ability to tolerate sustained work or activity at a given level. The patient might have the ability to perform a certain task but not the ability to do it comfortably, hence tolerance is not scientifically measurable or verifiable.[2] The employer also has a responsibility to provide reasonable accommodative measures in cases where the employee is still impaired, upon returning to work.[17,18]

In terms of assessing work ability, the AMA Guides[2] suggest using an organised approach, asking the following questions:

1. What is the job in question?
2. What is the patient's medical problem?
3. Is there significant risk of harm with work activity?
4. Is the patient physically able to do the job?
5. Does the patient have the ability to do their work at an acceptable risk?
6. Does the patient want to work?
7. Can the patient tolerate the work, considering the side effects of the medication, e.g. sedation or poor concentration and cognitive problems related to the mental illness?

Physicians assessing a patient for return to work should be aware of the important supporting role occupational therapists can play in the decision-making process through functional capacity assessments (FCAs), specifically. FCA is a method for assessing the residual capacity of the injured worker for return

to work. The process usually involves an assessment of the match between the demands of the worker's job or workplace and the residual functional capacity of the worker, the results of which guide interventions to address any mismatch.[19]

THE RETURN-TO-WORK CONVERSATION WITH THE PATIENT

In the United Kingdom, general practitioners (GPs) often feel that managing work and health issues per se goes beyond their role. Research has identified four main factors that influence GPs in their attitudes to the management of return-to-work issues: the doctor-patient relationship, patient advocacy, pressure on consultation time, and limited occupational health expertise.[20] In South Africa, no literature currently exists regarding this issue amongst psychiatrists. However, in conversations with fellow psychiatrists, the author believes the same to be true for them.

A qualitative study by Cohen in 2009 explored GPs' perceptions of the management of individuals in receipt of long-term incapacity benefits.[21] There was consensus among participants that the management of long-term worklessness was not the GP's role. GPs did not feel that discussion about work-related issues with their patients was of high importance, or their responsibility and, as a consequence, did not routinely enquire about work or attitudes about returning to employment. Some GPs felt that having a return-to-work discussion with a patient already on temporary or permanent disability was not their responsibility as they were not the ones who had said that the person was incapable of working. Others said that they avoided having the discussion altogether.

Some doctors said they were aware of the physical and psychological effects of long-term worklessness and had a responsibility to address these issues in the consultation, but felt limited in what they could achieve.[21] There was clear agreement among participants that negotiation with patients about return to employment was not easy, and a number of participants described feeling uncomfortable about raising the subject of work. They believed that patients often did not want to discuss employment with their doctors. Patients expected GPs to be their allies and to support their claims for insurance benefits without challenging them. It was agreed that GPs lacked training about the health effects of worklessness.[21] There is no reason to believe that GPs in South Africa feel any differently about these matters.

CONCLUSION

It is imperative that the medical community in general, and the occupational health fraternity in particular, shows leadership on the issue of return to work after sick leave. There is some work to be done to make other medical practitioners and those in the allied health professions, e.g. psychologists and occupational therapists, aware of the need to adopt a disability prevention model of thinking, and increase awareness of how rarely permanent disability should be the outcome.

The assumptions that absence from work is medically required, and that only correct medical diagnosis and treatment can reduce disability, are incorrect. It is clear that prolonged time away from work is harmful to the individual. Patients' expectations need to be managed and occupational therapists should be engaged early in the process of extended sick leave certification.

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Occupational health litigation and the development of occupational hygiene

Slavery – Part 2B: Gold, silver and the Atlantic slave trade (New Spain continued)

DW Stanton

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"The deeper the mine, the more fearful these risks become. The walls give way, or the rocks fall, and crush numbers; shocks and explosions are frequent; … A mine is a damp, close and dark cavern, where noxious vapours are the only atmosphere: and the hazards incurred in ascending and descending, and from the falling in of the ground, are fearful: the workmen are half naked, grisly, and armed with heavy bars, or loaded with piles of ore; and sickness and fluxes are frequent." [1]

Lawyer and scholar Francisco Xavier de Gamboa, 1761
Selected text from a longer description of the working conditions at the Spanish silver mines of New Spain

"Some of the numerous problems associated with deep mining, such as drainage of water from low levels, difficulty of ventilation at great depths, lack of sufficient timber for extensive reinforcement of deep mines, proved almost beyond Spanish technical knowledge to solve." [2]
Professor Robert Cooper West, expert on mining in Latin America, commenting in 1949 on the silver mines of New Spain

BACKGROUND TO THIS SERIES OF PAPERS

Part 1 of this paper on slavery reviewed *Slavery from Ancient Times* and provided the introduction to the series of papers on slavery.[3] Part 2A introduced *The North Atlantic slave trade and gold mining under the Spanish on the island of Hispaniola*;[4] Part 2B on Spanish America started by exploring slavery in the context of gold and silver mining in New Spain (Mexico);[5] and continues in this paper by addressing working conditions. Further sub-sections of this paper will discuss the associated mercury mines of Almadén, Spain; the Potosí silver mines in colonial Peru, and the mercury mines at Huancavelica. Efforts to improve working conditions at the Spanish gold, silver and associated mercury mines during the colonial period will be covered in the final part of Paper 2B.

WORKING CONDITIONS

A. MINING

As in other locations, unhealthy and dangerous working conditions occurred in Spanish America throughout colonial rule.[6,7] Most gold was mined from alluvial deposits in low wet areas. Workers often spent long periods in water, and were exposed to tropical diseases.[6] Conversely, the silver veins were often formed at great height: almost all above 3 000 m in Peru and 1 800-2 400 m in New Spain.[6] Some early Spanish mine excavations in New Spain did start as gold mines but changed to silver at the hundred-foot (30 m) level.[8]

In 1531, Quiroga, a royal auditor, reported to the *Council of the Indies* on the orphans in the monasteries, whose parents had perished in the mines of New Spain: *"They are numerous, as the stars of heaven and the sands of the sea."* [9,10]

The ten plagues

The missionary, Fray Toribio de Benavente, arrived in New Spain in 1524, less than three years after the fall of the Aztec capital, Tenochtitlán.[7,11-14] Influenced by the Biblical 'ten plagues of Egypt', he described what he considered to be the 'Ten Plagues of New Spain': 1) smallpox; 2) slaughter during the conquest; 3) a great famine following the fall of the city of Tenochtitlán; 4) Indian and African overseers; 5) excessive tribute and services demanded from the Indians; 6) gold mines and the craving for gold; 7) rebuilding the 'great city of Mexico'; 8) enslavement of Indians to work in the mines; 9) transport service for the mines; and 10) dissensions among the Spaniards.

The fatal effect of the gold mines on the Indians[9] is illustrated in the descriptions of the sixth, eighth and ninth plagues: *"... for in addition to the taxes and tributes paid by the towns which had been granted to the Spaniards, the latter began to seek for mines, and it would be impossible to count the number of Indians who have, up to the present day, died in these mines. Gold of this country was a second golden calf, worshipped as a god, for they came all the way from Castile through many dangers and difficulties to adore it. Now that they have it, please God it may not be to their damnation."* (sixth plague) [13] *"So great was their haste, in some years, to make slaves that from all parts of Mexico they brought in great herds of them, like flocks of sheep, in order to brand them... The fact that...*

Figure 1. ***The Work in Silver Mines.*** **Horizontal panel in grisaille, by Diego Rivera –** ***Historia de Morelos: Conquista y Revolución*****, 1929-30, Palacio de Cortés, Cuernavaca** *Photograph: Dave Cooksey, 2010 - México City, Flickr*

branding was cheap produced so many marks on their faces, in addition to the royal brand, that they had their faces covered with letters, for they bore the marks of all who had bought and sold them." (eighth plague)[13]

With regard to the ninth plague, Indians travelled 70 leagues (± 400 km) and more to bring provisions to the mines. On arrival, the Spanish mine masters would detain them for several days to work. The provisions they had brought for themselves were soon exhausted, and then they starved as no one would give them food and they had no money to buy it. Consequently, some died on the way to the mines, at the mines, on the way back, and just after returning home. At the mines of Oaxaca, where gold mining had occurred before the Spanish conquest, the numbers of deaths were particularly high: *"For half a league around these mines and along a great part of the road one could scarcely avoid walking over dead bodies or bones, and the flocks of birds and crows that came to feed upon the corpses were so numerous that they darkened the sun, so that many villages along the road and in the district were deserted. Other Indians fled to the woods, abandoning their houses and fields."* [13]

In his letter of 1529 to Charles V, Fray Zumárraga wrote: *"... I do say that this immoderate loading is diminishing them very rapidly. And it is necessary that Your Majesty remedy it, because otherwise the end of this country will soon be seen, like that of the islands of Española, Cuba, and others, for this loading was the principal cause of their ruin…"* [15]

Gamboa (1717-1794), a lawyer who spent almost 15 years litigating mining cases in the courts of Mexico City,[16] wrote this in his book on the Mining Ordinances of New Spain: *"It is true that the cruelties of many persons at the time of the conquest, and perhaps of not a few, even at the present time, in respect of the mines and in the pursuit of treasure, are such as the ear will not endure; but the persons who perpetrate them, are neither sanctioned by the nation, nor permitted by the laws to escape with impunity…"* [17]

Few developments in mining technology

For silver mining, colonial miners exploited an open pit and followed veins of ore that twisted deeper into the earth.[18] As holes in the ground became shafts, drifts and adits (gradually sloping tunnels), and mining continued to be carried out by inexperienced adventurers, mining methods had to be learned by trial and error. Many Indians and Africans died as lessons were learned by accidents, cave-ins, flooding and similar mishaps.[19] Extracting silver-bearing ore from narrow veins relied on pick- and bar-wielding labourers; human carriers brought the rock to the surface in heavy sacks on their shoulders.[20] Back-breaking work with heavy tools and brute force to extract silver ore, overseen by a slave driver with a multiple stranded whip, is depicted in a horizontal panel in grisaille (painted to look as if it is carved) by Diego Rivera (Figure 1).

Gary Jennings, who specialised in historical fiction, spent 10 years in Mexico researching his Aztec novels. His third book, *Aztec Blood*, provides some information on conditions in the northern silver mines at the opening of the 17th century, through the eyes of a fictional mine slave. Cristo, a mestizo, was sentenced for life; *"but since few survived more than a year in the mines, a life sentence was no great matter."* [21] Cave-ins occurred constantly and many slaves died *"the first time their pick strikes"* as mine owners used minimal timber-shoring because of the expense: *"Vast quantities of timber were required in the smelting process, and the wood had to be hauled over great distances. It was cheaper to replace workers than pay for timber."*

Progress in the advancement of mining methods was slow. The horse- or mule-powered whim (*malacate*), employed for lifting ore, water and rubbish in bags suspended by ropes, did not become widely used until the 18th century.[20] Blasting powder, employed in Hungary in 1627, [22] was not used in New Spain until 1703.[19]

The Spanish period of mining came to an end with the War of Independence (1810-1821),[19] during which time many of the mines were abandoned, went into decay, caved in, and/or filled with water. A number of mining archives, going back some three centuries, were destroyed.[23] In 1823, the new Republic decreed a mining law which allowed foreigners to enter into mine development and abolished many of the prohibitory taxes and Spanish monopolies.[8] English capitalists began to invest heavily in the mines of Mexico, followed by the Germans and Americans. Cornish miners arrived with their mining expertise and culture, and it was believed that the application of steam power to drain mines, raise ore to the surface in kibbles

(iron buckets), and crush the ore, would revolutionise mining.‡

Cornishman Captain Garby, in a letter dated 1824,[24] stated that there were many of the mines, from 90 - 270 m in depth *"that have no shaft or machinery for discharging either water or stuff, but all accomplished by manual labour on men's shoulders."* Only in the deeper mines was the animal-powered whim used. The largest and deepest mine was La Valenciana which had very large entrance galleries but, according to Garby, *"in this immense mine there is not a single level that you can put a barrow through"* to move ore from the face.[24] In the network of very small passages the underground workers would have needed to crawl in near pitch-blackness.[25] Thomas Brocklehurst, on his visits to the silver mines of Pachuca in 1881, reported, *"From the galleries of the lowest levels we ascended by vertical ladders to the upper ones and we had to creep through holes barely large enough to admit us."* [26]

For more than three centuries Indian and black slaves, and forced and free workers, would have faced dangers such as deep narrow shafts, long narrow tunnels, wooden ladders and supports, and limited-use tools which amounted to very hard labour, flooding and poor mine ventilation.[27] The usual 12-hour shifts *(sol a sol)* in the colonial mines *"led to fatigue and decrease in resistance to contagion."* [2] Once they had completed the excavations, they had to bring the ores to the surface by hand, up narrow ladders and over flimsy rope bridges suspended above underground chasms.[28]

Thermal environment

If they arrived safely at the surface, those emerging from warm humid shafts into the cold air, even at moderate altitudes, could catch colds and pneumonia. Many poorly clothed *tenateros* (those who carried the ore in bags on their backs to the surface) died in this way.[2] The temperature at the bottom of Valenciana mine (with a perpendicular depth of 513 m) was measured by Humboldt at 34° C. As the temperature at the mouth of the mine in the open air in winter (at an altitude of just over 2 000 m) could drop to 4 or 5° C, *tenateros* could be exposed to a change of temperature of 30° C or more.[29]

Heavy ore loads

Humboldt criticised many aspects of mining in New Spain (and Peru): the waste of blasting powder, the erroneous choices of mine ventilation, and neglect of the subterraneous geometry, until the establishment of the School of Mines in Mexico City in 1792. On the enormous expenses of ore transportation at the Valenciana mine, with the large numbers of men employed to carry the ore to the surface on their shoulders, he commented they *"remain continually loaded for six hours with a weight of from 225 to 350 pounds [102-159 kg], and constantly exposed to a very high temperature, ascending eight or ten times successively, without intermission, stairs of 1800 steps."* [29] He considered that *"Well contrived operations would facilitate the extraction of minerals and the circulation of air, and would render this great number of tenateros unnecessary, whose strength might be employed in a manner more advantageous to society, and less hurtful to the health of the individual."* [30]

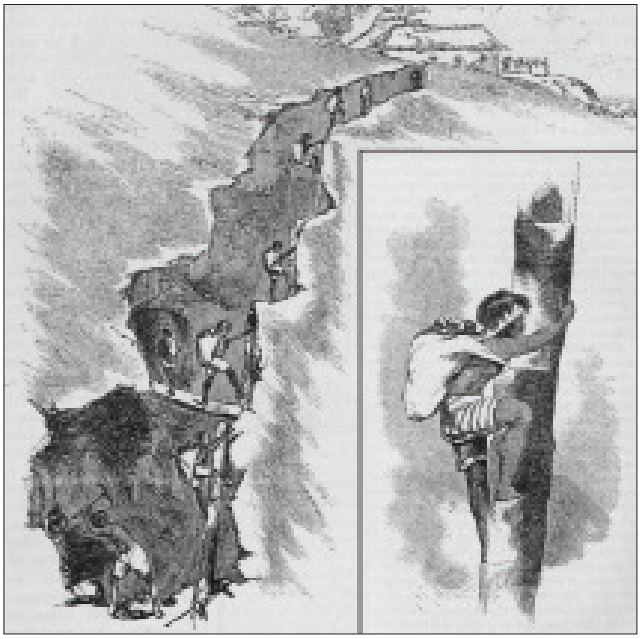

Figure 2. Use of *tenateros* (ore carriers) at a silver mine in Honduras *Source: Harper's New Monthly Magazine, May 1856*

Figure 2 illustrates *tenateros* employed at a Central American silver mine carrying ore loads of around 57 kg on their shoulders in the 1850s.

Poor mine ventilation

West[2] reported that only crude methods were utilised. At Parral mines, small shafts were sunk from the surface to ventilate the upper levels, and air shafts were constructed between levels. As the forcing of air by means of bellows, water devices, or heating machines was seldom practised, working conditions were poor in the lower levels where the air became stagnant and fouled by toxic gases from the burning of candles and fire-setting.[2] While the candles lit the way, they also created carbon monoxide and smoke. In poorly ventilated areas, miners could have died directly from carbon monoxide poisoning or suffered injury from falling after becoming unconscious. In around 1730, the silver mines of Zacatecas consumed some 80 tonnes of candle wax and more than 1.5 tonnes of wick, annually.[20]

High dust exposures

Work in the silver mines was gruelling; miners dug, loaded and hauled rocks in near darkness by candle light for days at a time.[31] Through the 16th and 17th centuries, those breaking ore with picks and bars would have been exposed to very high dust levels which would have increased with the introduction of blasting in the 18th century, producing suffocating clouds of dust and cave-ins. Fine airborne dust, containing respirable quartz (crystalline silica),* would have travelled throughout the mines, affecting all those underground.

‡ The problems of transferring technology to Mexico were underestimated, with high transportation costs for equipment and spares, the lack of wood to fuel boilers, and the lack of workers familiar with the equipment. Mercury prices also increased greatly between 1825 and 1850, with the Rothschilds monopolising the world mercury market. By 1850, all but one of the British silver-mining companies in Mexico had failed.[20]

* Ore samples analysed from the principal mining areas were generally composed of *"compact quartz, spotted or veined with metallic matters."* [32]

Humboldt stated that: *"This occupation of Tenateros is accounted unhealthy, if they enter more than three times a week into the mines."*[29] But the labour which ruined the most robust constitutions was that of the *barenadores*, who blew up the rock with powder: *"These men rarely pass the age of 35, if from a thirst of gain they continue their severe labour for the whole week. They generally pass no more than five or six years at this occupation, and then betake themselves to other employments less injurious to health."*

Doris Ladd, in her review of the miners' strike at Real del Monte in 1766 and associated working conditions, described the *'bitter wages'* of death and disability, either by silicosis or mining accidents.[33] Respirable dust levels were further exacerbated by the introduction of compressed air rock drills for drilling holes for explosive charges. This led to the first cases of silicosis being recognised at Real del Monte in 1898.[34]

B. REFINING

Around 1536, Germans skilled in mining techniques brought the knowledge of smelting silver ores. Following their arrival, the shipping of mined silver to Spain began to assume importance.[35] Detailed information on silver refining and associated environmental contamination with lead and mercury is provided by Saúl Guerrero.[36,37] During the colonial period, almost 40% of silver was refined by smelting in the presence of lead, and just over 60% was obtained by amalgamation with mercury.

Smelting with lead

Sophisticated processing of silver ore to extract silver is attributed to the Chaldeans in about 2500 BC, using the 'cupellation' process.[38] From 650 to 350 BC, the Athenians extracted 7 000 tonnes of silver, and more than two million tonnes of lead from the large deposits at Laurium, using slave labour.[39] Early methods of separation were inefficient; more than one-third of the silver mined by the Athenians was lost in the slag.[40]

In New Spain, smelting of lead sulphide ores with lead was conducted under high temperatures and reducing conditions to produce a silver-rich lead with worthless gangue components (unwanted mineral) separated in the slag. In the second step (cupellation or refining stage), oxygen was blown onto the molten lead in a cupel (shallow, porous container) to form litharge (lead oxide) which entrained the majority of other metals, leaving the silver. Litharge (*'greta'* in Spanish text) was skimmed off to be recycled. That absorbed by the bottom of the cupel (made from bone ash or the ashes of plants) to form *'cendrada'*, was also recycled to recover any silver lost in the ash. The health hazards of this process were mentioned by Bartolomé de Medina in the mid-16th century: *"And so I have seen how such ores are processed in many places using greta and cendrada and with great cost to the owners of the mines and with great risk to the life and health of those involved in their processing, both of Indians and Africans."*[36,41]

High lead exposures

Workers at the smelting and refining furnaces would have been exposed to airborne lead fumes, and the fumes and smoke would have drifted throughout the refining hacienda, affecting the entire workforce. Exposure to airborne lead dust would have occurred when handling the bars of molten lead and associated slag, working with *greta* or *cendrada*, and from wind-borne dust from the stockpiles of lead-containing material within the compound. Hands, arms, hair, clothing and food would have been contaminated. Wives working as crushers and/or washing contaminated clothes would have been exposed to lead dust, as would the children playing in the dirt of these compounds.[36] Gamboa wrote that, between smelting runs, the inside of the furnace was scraped with a crow or iron bar and *"here the unfortunate smelters suffer much, during an hour of great labour; for the furnace is hot in the extreme, the crow is heavy, and the incrusted matter adheres very closely."* The *"smoke and vapour from the slag"*, quenched by water, was poisonous and the smelter workmen were subject to *"violent pains in the stomach."*[1,36]

In addition to the lead health hazard caused through inhalation and ingestion at the workplace and living quarters, extensive lead pollution from the chimney stacks affected local woodlands, livestock and surrounding communities.[36] Woodlands were also depleted as charcoal was required as fuel for smelting.

Amalgamation with mercury

The use of mercury for amalgamation with gold goes back to antiquity.[7,42] It was used in the sub-Saharan gold fields in Africa from the 12th century, and on an industrial scale well before its use in New Spain.[43] From 1460 to 1485, eight tonnes of African gold was produced via amalgamation in Egypt and north Africa, with an additional three tonnes produced in Europe, consuming a total of 45 tonnes of mercury from Almadén.[36,43]

Amalgamation of silver ores is attributed to the Venetians as early as 1480.[36,44] and was adopted for use with silver ores in New Spain by Medina.[7,44-47] The so-called patio process, where the amalgamation slurry was spread out in tortas (cakes) placed in a courtyard (patio), was used from the 1550s, and quickly spread through the Spanish New World. Silver was extracted from finely ground silver ores by mixing saltwater brine and a magistral, or reagent (usually copper or iron pyrite), with mercury to form the torta. The salt started a chemical reaction in which the reagent released the silver from the ore to form an amalgam with the mercury,[44] which could be heated to recover the silver, and the mercury for reuse. Amalgamation remained substantially unchanged until the end of the 19th century when it was replaced by the cyanide process.

High dust exposures

In the production of finely ground ore, the mills were very dusty places and mill workers would have suffered from acute and chronic silicosis and silico-tuberculosis. Water or animal-driven stamping mills lifted iron 'heads' weighing up to 68 kg to drop and crush the concentrate to sand-like consistency on stone platforms,[18] or in a large wooden mortar, well lined with iron.[1] The ore, when reduced to powder, was passed through sieves of iron wire.[1] A 1681 report on Pachuca indicated that some of the Indians *"have been made so sick from the dust of the mills that they have died from it."* A 1737 report indicated that, of the *repartimiento* Indians sent to the mines of Taxco, some worked in the mills from sunup to evening prayers, *"with the result that many*

of them die vomiting blood." [2,48] To address the dust problem, now commonly known as silicosis, José de Gálvez, the Visitor-General of New Spain (1765-1771), suggested that research should show ways of avoiding this by using water and carrying on the processes in enclosed troughs instead of in the open.[49] Humboldt pointed out that, in some great amalgamation works of New Spain, the *arrastras* for wet grinding (circular mills of ancient origin introduced into New Spain about the same time as the patio process in the 1550s) were unknown and the dry stamping and sieving process was the norm. He reported that unequal and coarse-grain crushed ore did not amalgamate well and *"...the health of the workmen suffers greatly, in a place where a cloud of metallick dust is perpetually flying about."* [30] In his letter of 1824, Captain Garby described the dry stamping of the ore with mills carrying eight heads of 34-45 kg worked by four mules at a time. In 24 hours, about five tons of ore could be crushed. This was followed by a wet grinding process using 20 *arrastras*, each with four large stones dragged around in a circular pit by two mules at a time, changing every six hours, to produce an ore slime in 24 hours. The slime was then drained to a consistency of a thick paste for amalgamation. To pulverise the five tons of ore required around 100 mules and 30 men.[24]

Figure 3 shows some examples of *arrastras* from small operations. At the top, a mule-powered *arrastra* with a rotating wheel moving in ever-expanding circles at Villa Alta in the late 1700s is depicted. The sketch in the centre shows an *arrastra* using a large flat stone that was dragged around in a circular pit to crush and grind ore. The lower images are of a Honduran hammer boy breaking up ore into a size suitable for use in an *arrastra*, and of a 'Chilean Mill', a development of the *arrastra*, with two round stone wheels driven by an overhead geared mechanism powered by water wheels.

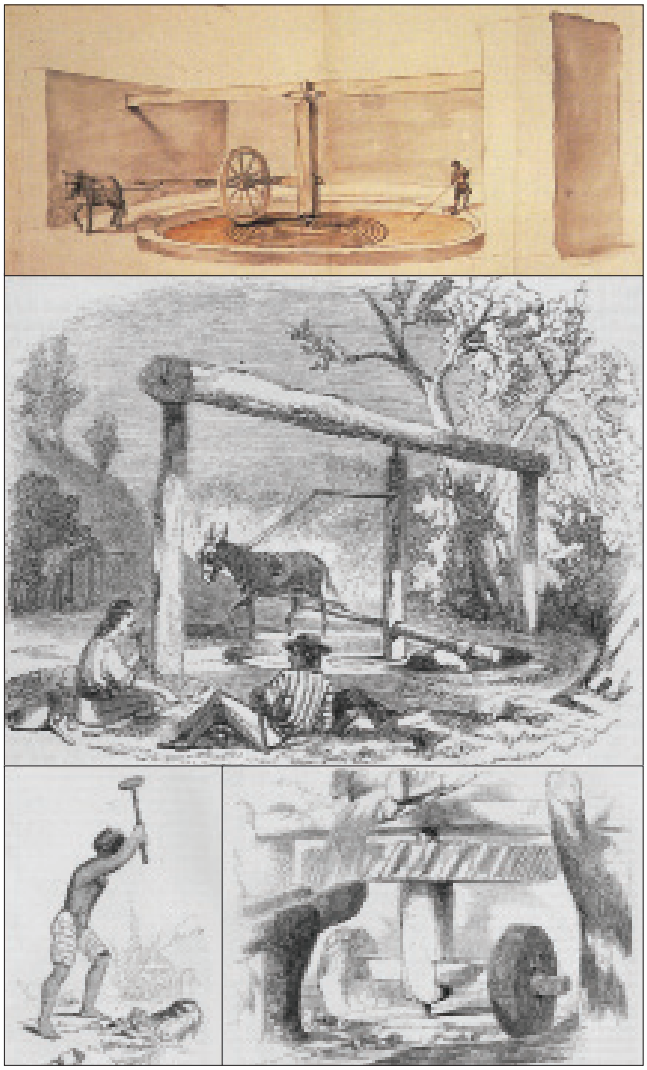

Figure 3. Examples of mule- and water-powered *arrastras*
Sources: Figura No. 2, 2014; Harper's New Monthly Magazine, May 1856 and April 1860

Mercury exposure

Mercury exposure would have occurred during various stages of the amalgamation process conducted outdoors, such as the manual addition of mercury to each amalgamation torta, and mixing by men treading the torta. Higher mercury vapour exposures would have occurred when the amalgam was squeezed through cloth to force out the excess mercury, particularly during the heating stage to separate the silver and mercury from the amalgam, and in the final casting of the silver bars when any remaining mercury was volatilised. The workers did not use gloves or other personal protective equipment to avoid skin contact with mercury.

Brocklehurst visited Mexico in 1881 and published a book which included a chapter on the rich silver mines of Pachuca, where the 'patio' system, which had its origin there in 1557, was still followed.[26] The beneficiating hacienda he visited at Loretto consisted of a five- to ten-acre flagged yard, around which were placed the ore-crushing mills, stables, refinery, retorts, and various workshops. High walls provided security for the silver bullion and mercury.

Figure 4 illustrates the open air nature of the patio-mixing process with horses or mules driven around in circles to mix the torta which was contained by a circular curb. After mixing of ore paste, sulphate of copper and saltwater brine for four days, mercury was sprinkled over the mass by men who carried it in canvas bags, which they would shake or knock against their bare thighs as they walked about the torta. After 14-21 days of treading, the mixture was wheeled in barrows to a large tank, through which passed a rapid stream of water. In this tank, around a dozen nearly nude men stirred up the muddy mixture with their feet and legs, causing the clay particles to pass off with the stream, and leaving the amalgam and excess quicksilver at the bottom of the tanks. This residuum was scooped up in small iron jars and taken to a shed for removal of excess mercury and separation of the amalgam into silver and mercury by heating in retorts. The pure silver was finally melted into bars ready for the mint or for manufacturing purposes.

Brocklehurst commented: *"None of the quicksilver is lost or wasted; even the vapour is brought by cold water into its original state, and is again and again made to fulfil its part in the beneficiating of silver... The men and children employed in the processes where so much quicksilver is used did not appear to suffer from its effects, but the old, worn-out horses and mules, used in the treading-out process, soon lose their hoofs and become in other ways unfit for service, except perhaps to yield their skins for leather."* [26]

Humboldt also wrote that it was a remarkable phenomenon to see

Figure 4. Sketch of the beneficiating hacienda at Loretto, Pachuca, 1881 *Image: Wikipedia Commons*

the men who trod the torta in the most perfect health: *"The physicians who practise in places where there are mines unanimously assert, that the nervous affections, which might be attributed to the effect of an absorption of oxid of mercury, very rarely occur."* [29]

In 1843, Saint-Clair Duport, who resided in Mexico for 16 years to improve the treatment of silver ores, reported that those who filter the amalgam and prepare it for distillation often feel an irritation of the nervous system which has no serious consequences.[50] He considered that those charged with distillation were the only workers who were exposed to any real danger of serious mercury poisoning, such as when the supply of cooling water was disrupted or a distillation vessel broke. He considered that such accidents resulting in high mercury vapour exposures occurred only rarely, especially in large workshops, where the distillation apparatus was handled with extreme care.

The chemical transformation of mercury to calomel (mercurous chloride) in the amalgamation process also reduced the emissions of volatile mercury. According to Guerrero: *"The workers of the amalgamation haciendas and the civilian population of the New World were spared the ravages of mercurialism on a major scale both by the safeguards adopted during the heating cycle of the amalgam and by the chemistry of the amalgamation process that consumed mercury by converting it to solid, insoluble calomel."* [37]

By the time of the visits by foreign Europeans to the amalgamation works of New Spain in the late 18th century and early 19th century, when the Indian labour on the mines was free, mercury exposures would have been lower than in previous times for Indian and black slaves. Helmut Waszkis commented that "*We do not know how soon the Spaniards learned to recover the vaporised mercury"* when heating the amalgam,[19] but water traps came into common use for the production of mercury in the 17th century. Gamboa published a description of the patio process in 1761 and the use of a simple vessel of cold water to collect mercury vapour.[1] He reported that: *"The smelting and amalgamation works are noxious, and the maladies which arise from the moisture, fire and vapour, are incurable and frequent."* [1]

West noted that a common form of mercury poisoning, *Stomatitis* (acute inflammation of the mouth and gums), was not mentioned by colonial sources, but was probably present in mining centres with amalgamation works. Duport, according to West,[2] also reported the prevalence of shyness and nervousness *(Erithismus mercuralis*) amongst the mercury distillers of Fresnillo. Ladd, for the period of the miners strike of 1766, considered that distillation was the most dangerous of all phases of silver production, with distillers' exposure to mercury vapour being prolonged and close.[33]

The custom of treading the torta by mules in New Spain was only introduced in the 1780s which reduced the expense of amalgamation by more than a fourth since it was no longer necessary to employ the large numbers of men who trod, barefooted, the torta.[30] The loss of mercury in storage and transit would have been reduced in New Spain by the early 19th century with the phasing out at Almadén of wrapping mercury in leather sacks (baldeses). Mercury started to be packaged at Almadén in iron flasks from 1793.[36,46]

In the late 1700s, European technical teams were sent by Spain to New Spain and Peru to improve the amalgamation process. The head of the mission sent to New Spain (1788-1798) considered that the European opinion was false with regard to the Spanish-American amalgamation process being harmful to health.[51] This was in sharp contrast to that observed by the mission sent to Peru, where forced labour on the mines (under the so-called mita system) remained in place until 1812.

Before discussing mining in colonial Peru, Paper 2B will next address working conditions at the cinnabar mines of Almadén, Spain.

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Work-related musculoskeletal disorders and predisposing factors among commercial motorcyclists in Ibadan North Local Government Area, Nigeria

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ABSTRACT

Background: Studies on the prevalence of work-related musculoskeletal disorders (WRMSDs) among motorcyclists in sub-Saharan Africa are scarce.

Objective: This study aimed to investigate the prevalence of WRMSDs and the predisposing factors among commercial motorcyclists operating in Ibadan North Local Government Area, Oyo State, Nigeria.

Methods: Information was obtained from 122 (of 200) motorcyclists using a structured questionnaire which elicited information on the respondents' demographic characteristics, work experience, and predisposing factors to, and possible causes of, WRMSDs.

Results: The response rate was 61.0%. The age range of the 122 participants was 15-55 years. One hundred and thirteen (92.6%) of the motorcyclists reported WRMSDs and 66.4% of all respondents worked for 6-10 hours daily. Lower back complaints were most commonly reported. WRMSDs were significantly associated ($p < 0.05$) with age, marital status, education, years of experience, hours spent at work daily, and days spent working per week.

Conclusion: The prevalence of WRMSDs was high among these workers. Age, marital status, educational qualification and work behaviour were risk factors.

Keywords: motorcyclists, work-related MSD, lower back pain

INTRODUCTION

Musculoskeletal disorders have been reported as major and the most common cause of severe long-term pain and physical disability that affects hundreds of millions of people across the world.[1] The term 'musculoskeletal disorder' covers a very heterogeneous group of symptoms and illness. In some cases, the illnesses are specific, that is, they have a known anatomical or physiological cause or are due to a known pathologic mechanism and can be clearly distinguished from each other.[2] Work-related musculoskeletal disorders (WRMSDs) are defined as musculoskeletal disorders that result from a work-related event.[3] They are a complete range of inflammatory and degenerative disorders initiated or aggravated largely by the performance of work or in associated work settings.[4,5]

Most occupations are related to a high risk of developing injury [4] and WRMSDs are among the most frequently reported work-related injuries.[6] Generally, driving as a profession entails routine muscular effort, awkward sitting postures, and exposure to whole-body vibration.[7] This suggests that the work tasks and environment put drivers at risk for WRMSDs.[7] High prevalences of WRMSDs, which vary from 53% to 91%, have been reported among drivers in different parts of the world.[8] This is reportedly linked to risk factors that include seat discomfort, exposure to whole-body vibration, long driving time, non-neutral postures, heavy lifting, manual materials handling, and psychosocial factors.[7,9]

The increasing growth of Nigerian towns and cities encourages commercial motorcycling (locally called 'okada') as it is an easier means of navigating through traffic jams.[9,10] It is cheaper than taxi cabs and operates in areas where taxis are not readily available due to the poor state of the roads.[9,10] In addition, motorcycles are compact and agile, consume less fuel, are cheaper to buy, and require less maintenance compared to cars.[11] However, according to Karmegam et al.[12] motorcycle riding involves complex and risky manoeuvres and processes in spite of the advantages.

In addition to the biomechanical and ergonomic risk factors associated with driving, motorcyclists are exposed to a variety of other hazards[12] including fatigue, pollution from other vehicles, and physical harm due to noise, motion and vibration.[9] The workspace of a motorcycle operator is open to direct and indirect risks, resulting in discomfort, restriction to a fixed position, and prolonged stresses from long-distance driving on poor and bumpy roads, all of which can lead to accident, injury or death.[9,12] Evidence in the literature shows that motorcyclists are more vulnerable to personal injury than drivers of cars.[13,14]

In Nigeria, commercial motorcycle riding often involves prolonged sitting on motorcycles that are usually not ergonomically compatible with their riders.[9] Humans are mechanically designed for walking and

not for sitting, which is related to the biomechanical effects of reaction to load and stresses in the body.[16] In a static sitting position, there is increased pressure in the posterior aspect of the spine's disc, as well as strain in the posterior passive elements of the spine. Some authors have attributed this to posterior rotation of the pelvis and flattening out of the lumbar lordosis.[17,18]

Studies among occupational/commercial drivers conducted in south west Nigeria have reported high prevalence of WRMSDs[19,20] (89.3% and 77%, respectively), with the lower back being the body part most commonly affected. Rufai et al. reported a high prevalence of lower back pain among transport workers in northern Nigeria.[21] However, these studies involved only car, bus and lorry drivers. A similar study in Ghana reported a 78.4% prevalence of WRMSDs among drivers but considered minibus drivers only.[7] Onawumi and Oyawale[9] reported WRMSDs among 300 commercial motorcyclists in south west Nigeria but did not calculate the prevalence of WRMSDs or investigate associated risk factors. Their research was focused on problems associated with the ergonomic design of the different makes of motorcycles.

Little is known about the prevalence of WRMSDs among motorcyclists in Nigeria and sub-Saharan Africa. Most previous studies focused on car, bus and truck drivers. Due to the high level of unemployment, commercial motorcycling is becoming a popular occupation among both educated and uneducated Nigerian youths.[9] There is, therefore, a need for more research in this area. This study was designed to investigate the prevalence of WRMSDs and predisposing factors among commercial motorcyclists in Ibadan. This city is the hub of commercial activity in Nigeria, covers the largest geographical area and has the third largest population in the country.[22]

MATERIALS AND METHODS

This cross-sectional survey involved commercial motorcyclists operating within Ibadan North-East Local Government Area of Oyo State, Nigeria. Participants were registered by the National Union of Road Transport Workers (NURTW) in Ibadan North Local Government Area who had no history of traumatic injuries in the six months prior to the commencement of study. Convenience sampling was used to select study participants because the motorcycle park in Ibadan North Local Government Area was the most accessible, in terms of both obtaining the regulating authority's permission and obtaining participants' consent.

Officials of NURTW invited the researchers to the monthly meeting of the union at their headquarter park. The researchers briefed the motorcyclists on the purpose and procedure of the study, and those who were literate and agreed to participate were given the questionnaires to complete after signing the informed consent form. One of the researchers who is a native of Ibadan and fluent in Yoruba (the predominant local language in Ibadan) administered the questionnaires to those participants who had difficulty reading and understanding the questions. Questionnaires were distributed to 200 commercial motorcyclists. Some participants left the park with their questionnaires and promised to return them to the union's office. Motorcyclists who reported having musculoskeletal complaints from sources unrelated to motorcycling (such as domestic activities, farming, gardening etc.) within six months prior to the time of data collection (June 2005), were not included in the study.

Table 1. Socio-demographic characteristics of participants (N = 122)

Variable	n	%	p-value
Age (years)			
15-20	6	4.9	
21-25	15	12.3	
26-30	18	14.8	
31-35	28	23.0	
36-40	27	22.1	
41-45	13	10.7	
46-50	9	7.4	
51-55	6	4.9	0.000
Marital status			
Married	96	78.7	
Single	26	21.3	0.000
Education			
PLC	47	38.5	
Modern School	2	1.6	
SSC	66	54.1	
OND	5	4.1	
NCE	2	1.6	0.000

PLC: Primary School-leaving Certificate
SSC: Senior School Certificate
OND: Ordinary National Diploma
NCE: National Certificate in Education

A 19-item self-administered questionnaire was used for data collection. The questionnaire was derived from standardised questionnaires developed for investigating WRMSDs.[23,24] The questionnaire has three sections: section A, consisting of three questions relating to participants' demographic information; section B, consisting of 11 questions designed to identify factors that predisposed participants to WRMSDs; and section C, consisting of five questions regarding work-related musculoskeletal pain and injury.

The data were analysed using SPSS 25.0 version software (SPSS Inc., Chicago, Illinois, USA). The data were presented as frequencies and percentiles. For the purposes of this study, a WRMSD was defined as pain/discomfort or a motorcycling-related injury to any part of the body. Six-month prevalence of WRMSDs was calculated as the proportion of participants who experienced WRMSDs six months prior to the time of data collection. The chi-square test was used to explore the association between the prevalence of musculoskeletal disorders and demographic variables and work histories. Level of significance was set at $p \leq 0.05$.

The University of Ibadan/University College Hospital Health Research Ethics Committee approved the study. Permission to conduct the study was obtained from NURTW officials. Informed consent was also obtained from study participants.

RESULTS

Seventy-eight questionnaires were not returned; the response rate was 61.0%. The socio-demographic characteristics of the respondents are presented in Table 1. Most respondents were younger than 36 years (55.0%). The highest educational qualification of the

Table 2. Work-related characteristics of participants (N = 122)

Variable	n	%	p-value
Years of experience			
<1	25	20.5	
1-5	63	51.6	
6-10	34	27.9	0.000
Hours spent working per day			
1-5	7	5.7	
6-10	81	66.4	
>10	34	27.9	0.000
Days spent working per week*			
3	2	1.6	
5	22	18	
6	61	50	
7	37	30.3	0.000
Observed break			
Yes	120	98.4	
No	2	1.6	0.000
Length of break (hours)			
<0.5	6	4.9	
0.5-1	28	23.0	
1-2	34	27.9	
>2	54	44.3	0.000
Easily tired			
Yes	74	60.7	
No	48	39.3	0.000
Frequency of tiredness			
Often	32	26.2	
Sometimes	61	50.0	
Rarely	24	19.7	
Never	5	4.1	0.000
Action taken when tired			
Rest	89	73.0	
Continue working	18	14.8	
Other	15	12.3	0.000

*No motorcyclist worked for 1, 2 or 4 days

Table 3. Prevalence and characteristics of WRMSDs (N = 122)

Variable	n	%	p-value
WRMSDs			
Yes	113	92.6	
No	6	4.9	
No response	3	2.5	0.000
Occurrence of injury			
Sustained Injury	75	61.5	
No injury	47	38.5	0.000
Presence of disability			
Yes	60	49.2	
No	62	50.8	0.000
Type of WRMSD			
Back pain	29	23.8	
Fracture	4	3.3	
Pulled muscle	2	1.6	
Crush injury	6	4.9	
Burns injury	10	8.2	
Other	71	58.2	0.000
Body part affected			
Lower back	98	80.3	
Neck	82	67.2	
Upper back	73	59.8	
Wrist/hand	73	59.8	
Shoulder	71	58.2	
Ankle/foot	64	52.5	
Hip/thigh	55	45.1	
Knee	42	34.4	
Elbow	36	29.5	0.000
Absence from work due to WRMSD			
Yes	69	56.6	
No	53	43.4	0.001

Note: Proportions of responses for 'body part affected' were not compared because participants reported WRMSDs of multiple body parts

majority of respondents was a secondary school leaving certificate (54.1%); most were married (78.7%).

Table 2 shows the distribution of work-related characteristics of the respondents. Most (51.6%) of the respondents had 1-6 years of experience of driving motorcycles. Approximately one third worked more than 10 hours a day, and seven days a week (27.9% and 30.3%, respectively). Most (98.4%) reported taking breaks of varying lengths within working hours; 60.7% were easily tired, but 14.8% of the respondents continued working even when tired.

The prevalence of, and characteristics of those with, WRMSDs are shown in Table 3. A high percentage (92.6%) of the respondents reported WRMSDs, and many had sustained an injury (61.5%). The most common site of pain in the last six months was the lower back (80.3%), followed by the neck (67.2%). The least common site was the elbow (29.5%). Pain was also commonly reported in the ankle or foot (52.5%), and the hip or thigh (45.1%). More than half of the motorcyclists (56.6%) had been absent from work due to pain at least once in the past six months.

Table 4 shows the associations between demographic and work-related characteristics, and WRMSDs as defined in this study. All drivers in each age group reported pain, other than the youngest and oldest age group (in which 50% and 0% reported pain, respectively). The majority with WRMSDs were younger than 41 years, married, had a secondary school education, had been driving motorcycles for 1-5 years, worked long hours and many days per week, took breaks of an hour or more, were easily tired, and rested when tired. All of these factors, other than observing a break, were statistically significantly associated with musculoskeletal pain. All respondents who worked 6-10 hours daily reported having WRMSDs, while 82.4% of those who worked for more than 10 hours reported WRMSDs. Of the 74 respondents who reported becoming easily tired, 71 (95.9%) had experienced WRMSDs, while 42 of the 48 who were not easily tired (87.5%) had experienced WRMSDs.

Table 4. Associations between demographic and work-related characteristics, and WRMSDs (N = 119*)

Variable	n	%	p-value
Age (years)			
15-20	3/6	50.0	
21-25	15/15	100	
26-30	18/18	100	
31-35	28/28	100	
36-40	27/27	100	
41-45	13/13	100	
46-50	9/9	100	
51-55	0/6	0	0.000
Marital status			
Married	93/96	96.9	
Single	20/26	76.9	0.000
Education			
PLC	44/47	93.6	
Modern school	2/2	100	
SSC	66/66	100	
OND	0/5	0	
NCE	1/2	50.0	0.000
Years of experience			
<1 year	22/25	88.0	
1-5 years	63/63	100	
6-10 years	28/34	82.4	0.000
Time spent working per day			
1-5 hours	4/7	57.1	
6-10 hours	81/81	100	
>10 hours	28/34	82.4	0.000
Days spent working per week			
3 days	0/2	0	
5 days	19/22	86.4	
6 days	53/61	86.9	
7 days	31/37	83.8	0.001
Observed break			
Yes	111/120	92.5	
No	2/2	100	0.742
Length of break (hours)			
< 0.5	3/6	50.0	
0.5-1	28/28	100	
1-2	34/34	100	
>2	48/54	88.9	0.055
Easily tired			
Yes	71/74	96.0	
No	42/48	87.5	0.002
Action taken when tired			
Rest	86/89	96.6	
Continue working	18/18	100	
Other	9/15	60.0	0.000

*Three participants did not respond regarding presence of WRMSDs

DISCUSSION

More than 90% of the motorcyclists reported WRMSDs as defined in this study. This is about 30% higher than the 60% back pain prevalence rate reported by Akinbo et al.[25] among commercial motorcyclists in Lagos, Nigeria in 2008. However, our study included WRMSDs involving all body parts, while the study by Akinbo et al., who looked only at back pain which might explain the difference in prevalence rates. Our findings are, however, comparable to those of Akinpelu et al.,[19] who found an 89.3% prevalence rate of musculoskeletal pain among occupational car/bus drivers in the same city of Ibadan where the present study was conducted. Karmegam et al.[26] found an overall prevalence of discomfort (during the riding process) of 52.9% (50.3% for males and 55.5% for females) among motorcyclists in Malaysia. Akinpelu et al.[19] attributed their findings to the bad state of the roads, use of poorly managed vehicles and non-enforcement of roadworthiness tests. Apart from racial and cultural variations, these factors might have accounted for the observed difference between the results in the different studies. Furthermore, prevalence of WRMSDs in this study was assessed as motorcyclists' reported experience of pain/discomfort in the previous six months, and not during the riding process itself; and only male commercial motorcyclists were included.

There was high prevalence of injuries (61.5%) among the participants. This may be attributed to the high rate of road traffic accidents on Nigerian roads with 337 301 accidents and 608 277 injuries or fatalities reported in the country from 1990 to 2012.[27,28] This has been linked to human factors such as impatience, speeding, lack of proper training, drink driving, and noncompliance with road safety laws.[27] Mechanical causes (brake failure, burst tyres, use of fake spare parts, defective or dazzling lights, etc.) and environmental causes (poorly maintained roads, dangerous bends, weather conditions, road obstructions, etc.) of accidents have also been reported in Nigeria.[27]

Body parts most affected by WRMSDs were the lower back, neck, upper back and wrist/hand. Other Nigerian studies have found the lower back to be the most affected body part among drivers of cars, buses and lorries.[19,20] Mohd Hafzi et al.[29] also found lower back pain to be the most commonly reported symptom with a 12-month prevalence of 82.3% and 62.8%, respectively, among occupational and non-ocuppational motorcyclists in Malaysia. Activities such as prolonged sitting, whole-body vibration and awkward postures that have been associated with the risk of developing lower back pain,[30] are all consistent with day-to-day life of commercial motorcyclists. In a recent review by Diyana et al.,[31] a high incidence of WRMSDs among police riders was linked to a combination of exposure to vibrations with prolonged sitting and static posture. Onawumi and Oyawale[9] observed that most of the motorcycles used by commercial drivers lacked back support and were not compatible with the anthropometric characteristics of Nigerian drivers. Karmegam et al.[12] found that the level of discomfort (in all body parts) decreases over time during a testing period with lumbar support. They concluded that the use of lumbar support provided postural stability and integrity for the motorcyclist's musculoskeletal system, particularly the spinal column, during riding.

Onawumi and Oyawale[9] reported that the majority of surveyed motorcyclists complained about shoulder-related, rather than lower back, issues. The motorcyclists seemed to maintain a static neck

posture and were exposed to hand-arm vibration during riding which might have accounted for the high prevalence of observed upper back and neck WRMSDs.[31] Bridger[32] earlier reported that static neck postures, repeated flexion and/or extension of the neck, forceful movements of the upper body, shoulder elevation, and arm abduction, were all possible risk factors for neck pain.

Almost 57% of commercial motorcyclists had taken leave from work because of WRMSDs. This suggests that WRMSDs can have adverse effects on productivity. This is a major characteristic of WRMSDs highlighted by the Centre for Disease Control and Prevention (CDC)[33] which reported that "musculoskeletal disorders are associated with high costs to employers such as absenteeism, lost productivity, and increased healthcare, disability, and worker's compensation costs".[33] However, the extent of the losses associated with WRMSDs is reportedly dependent on the severity of the condition, the nature and quality of healthcare received, and on the characteristics of the patient, such as age and general health status.[34]

Factors that were associated with WRMSDs as defined in this study were demographic characteristics (age, marital status, education and years of experience), time spent working daily, and days spent at work weekly. Age has been reported as a significant correlate of WRMSDs among Ghanaian commercial drivers,[7] and young age as a predictor of traumatic injuries among Ugandan motorcyclists.[35] All participants, other than those aged 15-20 and 51-55 years, reported having WRMSDs. Although the study by Olumide and Owoaje[36] found age to be a predictor of road safety practices among commercial motorcyclists in Oyo State, Nigeria, with younger drivers displaying poorer road safety practices, the findings of this study suggest that all commercial motorcyclists, irrespective of age, are predisposed to having WRMSDs. The prevalence of WRMSDs was high among motorcyclists of lower educational status. This category of motorcyclists is likely to be younger and less compliant with road safety practices compared to their more learned counterparts. The official age for obtaining a driver's licence is 18 years[36], however, the inclusion of younger motorcyclists in a previous Nigerian survey[36] and in the present study, suggests that national traffic laws are not fully implemented.

A higher prevalence of WRMSDs among workers who did not easily get tired suggests that they continued working for long periods, which might have predisposed them to musculoskeletal disorders. Of all respondents that rested when tired, 96.6% had experienced a WRMSD. This suggests that taking rest was not deliberate and/or calculated, because observations about Nigerian commercial motorcyclists is that they rest when there are no commuters. Stress/fatigue and state of the road (27% each) were jointly ranked by the majority of Nigerian motorcyclists, in the study by Onawumi and Oyawale,[9] as risk factors for WRMSDs.

Significant associations were found between WRMSDs and work experience, hours spent at work per day and number of days spent at work in a week. Abledu et al.[7] found significant associations between WRMSDs, and driving more than 12 hours per day and driving at least five days per week, among a cohort of minibus drivers in Accra, Ghana. In a review, Diyana et al.[31] also found that prolonged exposure to segmented or whole-body vibration was significantly linked to incidence of WRMSDs among police riders. It was suggested that the aforementioned risk factors should be targeted for preventive strategies to reduce the incidence of WRMSDs among minibus drivers, since they are modifiable. Prolonged static work posture[37] and sitting for eight hours a day[38] have been reported to be major occupational risk factors for WRMSDs.

Although the data analysed for this study are around 12 years old, the results are relevant as commercial motorcycle riding in Nigeria is still prominent. Neither the conditions of the roads[39,40] nor the level of unemployment[40] has improved. Recent national statistics show that the unemployment rate increased by 13.6% between the last quarters of 2010 and 2017.[40,41] Young school leavers still embrace motorcycle riding as a livelihood.

LIMITATIONS

The non-probability sampling employed in our study limits the extent to which our results can be generalised. We could not select participants randomly because the number of motorcyclists accessible to us was small, and they were a group of workers who are always in haste; hence, we included the few who were available for business at their parks within the local government, and who agreed to participate.

CONCLUSION AND RECOMMENDATIONS

The prevalence of WRMSDs was high among the participating motorcyclists operating in Ibadan North Local Government Area, Nigeria. Age, marital status and educational qualification were identified as demographic risk factors, while years of experience, time spent working daily, days spent at work weekly, and length of breaks observed daily while working were work-related risk factors.

Reducing time spent in the process of commercial riding and observing breaks during working hours are recommended for these workers to reduce the incidence of WRMSDs. Postural education and exercise, stretching, ergonomic instructions and work behaviour modifications will also be of benefit to commercial motorcyclists.

LESSONS LEARNED

1. The lower back is the most affected body part in commercial motorcyclists in Ibadan.
2. Younger and lowly educated commercial motorcyclists appear to be more predisposed to work-related musculoskeletal disorders.
3. Prolonged driving of motorcycles might cause commercial motorcyclists to experience work-related musculoskeletal disorders.

Authors' contributions

AOJ and OJA were involved in the conceptualisation of the study, the acquisition of data, initial statistical analyses, and drafting of the manuscript; OMO re-analysed the data, and carried out final preparation of the manuscript; SOB and EMU reviewed the data analysis results, and critically revised the manuscript. All authors read and approved the final version of the manuscript.

17. De Carvalho DE. Time varying gender and passive tissue responses

DECLARATION

The authors declare no conflicts of interest.

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NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH
Division of the National Health Laboratory Service

International Women's Day celebration at the NIOH: press for progress

The National Institute for Occupational Health (NIOH) joined people around the globe in celebrating International Women's Day on 8 March 2018. This day also commemorated the NIOH's 3rd anniversary of the *Gender, Health and World of Work (Gender@Work) Programme*, which was initiated by Dr Sophia Kisting, to address gender equity and gender mainstreaming in South African workplaces.

Over the past year, there has been an increased focus on issues of gender disparity in the workplace. The #MeToo movement, for example, galvanised action against sexual harassment in the entertainment industry, so much so that the Time magazine 'Person of the Year 2017' award was given to the 'Silence Breakers' who helped to champion the movement. This has led to numerous resignations and much litigation, proving that awareness and reporting of such victimisation in the workplace can bring about real change.

In line with this, the NIOH's International Women's Day event aimed to create an open forum for discussion about workplace gender issues that are often brushed under the carpet and go unchallenged. It aimed to raise awareness of disparities in workplaces, in an attempt to find solutions collectively to bring about more gender-equitable workplaces, where men and women can contribute and thrive.

The event was opened by Mrs Violet Gabashane, National Health Laboratory Service (NHLS) Senior Manager of Monitoring and Evaluation (on behalf of the NHLS CEO), and guests were welcomed by Dr Sophia Kisting, NIOH Executive Director. Both speakers emphasised the need to speak openly about challenges of gender mainstreaming, and highlighted the threat of silence to compounding problems experienced by both sexes within the workplace.

Ms Lebogang Ramafoko, Soul City CEO, stressed that, despite the Bill of Rights, the Employment Equity Act and our progressive legislation, women still do not enjoy the freedoms that are enshrined in our Constitution and written in our laws. They continue to be victims of sexual violence, to earn less than their male counterparts, to head poorer households, and to spend large proportions of their own money on their children, while taking on the lion's share of duties in the home.

The burden that women face is compounded by their high prevalence of illness: women have a statistically higher burden of chronic diseases and HIV, as well as injuries, than men. The proposed solution was an urgent change in the narrative of gender norms in our society; a change that should be undertaken on both individual and society levels, to ensure that the barriers to women fully enjoying their rights are lifted.

Mr Redha Ameur, from the International Labour Organization (ILO), spoke on 'Care work and the care economy in a changing world'. Care work is defined as work within the home or community, including personal care for children or for aging or ill adults, as well as household maintenance duties. Mr Ameur highlighted the fact that these duties are often provided by women, particularly poor women, frequently as an unpaid, added responsibility.

A suggested solution to these challenges is the introduction of transformative care policies which include leave policies (e.g. parental leave), care services (e.g. early childhood development and care), social protection and cash transfers (e.g. childcare grants), flexible work arrangements (e.g. teleworking and flexitime), and infrastructure policies (e.g. sanitation and delivery of water to homes).

Prof. Himla Soodyall addressed the topic of 'Safeguarding Africa's scientific future through science, technology and innovation: education of women and young scientists'.

From L to R: participants networking with Redha Ameur (ILO); Sr Goitsimang Buffel (NIOH); Ms Lebogang Ramafoko (CEO, Soul City); Dr Sophia Kisting (Executive Director, NIOH); and Naledi Mangqalaza (NIOH)
Photograph: Mr Guy Hall

She reported that, within academia, female academics tend to drop out after postgraduate studies while males are more likely to move into senior academic professions. Recognition of this trend led to the establishment of the Organization for Women in Science for the Developing World (OWSD) which aims to address these challenges through training, research and networking opportunities for women scientists. Prof. Soodyall concluded her talk by reiterating that, to tackle the challenges that women face in the scientific community, there needs to be greater focus on adaptation, remaining relevant, and ensuring open communication.

Advocate Michelle Odayan spoke about 'Solutions for gender-based violence in workplaces'. She stressed that solutions include a shared ownership of the problem, and that collective action is needed to address our core values and culture around what is tolerable. We need to change from *talking* to *action* which, in turn, needs to be visible, with vigilant measurement and impact evaluation. This should be vigorously maintained to ensure that the changed outcome is sustained. She emphasised that, within workplaces, a zero-tolerance policy framework to gender-based violence should be the objective. This starts with committed leadership and a planned approach with a few targeted outcomes. Effective communication strategies should follow these policies, together with regular training to nurture a safe workplace where gender-based issues are openly discussed.

Mr Dumisani Rebombo, the manager of community education and mobilisation of SONKE Gender Justice, shared a video clip entitled 'Pretty girl' which depicted a young man addressing a young woman in a very inappropriate manner. Following this, he told an impactful and moving personal story of changing societal norms and behaviours in order to bring about gender equity.

Mrs Nkhensani Masekoa of the Mine Health and Safety Council (MHSC) discussed initiatives to address the challenges faced by women in mining, in line with the goals of the Culture Transformation Framework, to eliminate racism, genderism and any forms of unfair discrimination within the South African mining industry. In addressing the challenges of protecting the health and safety of women in mining, the MHSC is focussing on personal protective equipment for women, best-practice guidelines to ensure safety and security of women, and sexual harassment awareness programmes for miners.

Mrs Jacintha McLeod (Naidoo), who previously worked as a senior manager at the Railway Safety Regulator of SA, and is currently managing Nanyata Siyaya Holdings (a health and safety consultancy company), spoke on behalf of women in railway safety in South Africa. She stated that, while many women contribute to the railway sector, more representation is needed at all levels as a matter of good business practice. Strategies to attract more women to the railway industry should be implemented in both the recruitment and succession planning stages, and should include a platform for women to talk, structured succession programmes, opportunities to highlight female role models and communicate their successes, flexible work structures, job rotation opportunities, and ongoing measurement of goals.

The presentations were followed by a panel discussion facilitated by Mr Simphiwe Mabhele of the ILO. The topic of discussion was 'Decent work and care work in a changing world'. This dis-cussion took cognisance of the additional burdens on women that often widen the equity gap in the workplace. It was recognised that solutions are urgently needed in this area if we are to reach SDG 5, which relates to gender equity.

Panellists included role-players from organised labour federations, employer organisations and government departments. Representations were made by the Department of Labour (DoL), Department of Mineral Resources (DMR), Business Unity South Arica (BUSA) , Black Business Council in the Built Environment (BBCBE), the Chamber of Mines (CoM), and Solidarity Trade Union.

The three main questions that the panel members considered were:

1. What constitutes care work in your sector/ industry of work?
2. Is care work widening the gap between women and men in paid employment in South Africa?
3. Are there policy solutions that can be developed and implemented within your sphere of influence that would decrease this gap; in a way of progressing towards delivering on the relevant Sustainable Development Goals (SDGs), namely SDG 3 *(Ensure healthy lives and promote wellbeing);* SDG 5 *(Achieve gender equality and empower all women and girls)* and SDG 8 *(Decent work and economic growth)*?

The Panel made several pertinent points around care work. It was acknowledged that care work cuts across all sectors of the economy in South Africa – formal and informal – and impacts on gender equality; and that it is even more pronounced in rural than urban settings. Male-dominated industries (mining and construction) were commended on their efforts to ensure greater female representation, but were also encouraged to redouble their efforts to reach more female employees, so that the industry's gender targets are exceeded.

Moving forward, it was strongly agreed that more policies and guidelines to address gender equity issues are needed, so that all workers can be protected. It is also imperative that these policies be properly implemented. One such policy gap relates to childcare at work. Important next steps for business include establishing crèches and nursing rooms within places of employment. These and other efforts could decrease the care burden of parents and improve the work/life balance of all employees.

In summary, changes have been made to address several gender equity issues within the employment space, but much more can be done. The development and implementation of policies aimed at protecting and promoting women employees is essential to the realisation of gender equity, as envisioned in SDG 5. This requires a concerted effort to translate discussion points into effective action.

The NIOH sincerely wishes that the dialogue will continue to grow with old and new stakeholders, as we join the 'silence breakers' globally to work towards gender equity and decent work for all.

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Cadmium exposure and occupational health

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Cadmium (Cd) is a naturally occurring heavy metal that usually complexes with other elements, such as zinc, lead and chloride.[1, 2] It is a toxic environmental and occupational pollutant.[1, 3, 4] In the early 20th century, itai-itai disease (referred to as ouch-ouch disease due to the pain in bones and joints), the most severe form of chronic Cd poisoning, occurred in Japan due to both environmental pollution and occupational exposure.[3]

Most commonly, occupational exposure to Cd occurs during battery recycling, fabrication of nickel-cadmium batteries, manufacturing of Cd-containing paint pigment, lead smelting, galvanising of steel, and in nuclear power plants. Cadmium is also used as an anti-corrosive agent and a stabiliser in plastics,[1] and phosphate fertilisers contain large concentrations of Cd.[2]

In humans, occupational exposure occurs mainly from inhalation, particularly during welding and soldering.[1] Exposure from ingestion comes from the consumption of contaminated water and foods such as high fibre-containing foods, shellfish, organ meats and leafy vegetables. Dermal absorption is negligible.[1,2]

Cigarette smoking is also a significant source of Cd exposure. The lung can absorb up to 60% of Cd present in tobacco smoke. Smokers can have up to five times the blood levels of Cd present in non-smokers.[2] Smokers of 20 cigarettes a day absorb approximately 0.5-2.0 ug Cd.[5]

Absorption of Cd in the lung alveoli from inhaled Cd-containing respirable dust and fumes is dependent on particle size and solubility. Approximately 10-50% of inhaled Cd-containing dust is absorbed. Following ingestion, 5-10% of Cd is absorbed. Several factors influence Cd absorption, e.g. age, composition of the ingested contaminant, and zinc and calcium deficiencies which potentiate the absorption of Cd. Interestingly, iron deficiency also enhances Cd absorption in the gut. At low iron levels, the expression of the metal ion transporter (DCT-1) is stimulated, facilitating Cd uptake. Generally, urinary Cd levels in women and children may be higher than in men as iron deficiency tends to be more prevalent in these groups.[1,2,5,6]

The distribution of absorbed Cd is independent on the route of absorption and is distributed to other tissues from the liver, bound to proteins – primarily metallothionein (MT) – and less frequently, albumin.[5] Absorbed Cd accumulates in the liver and kidney and induces synthesis of MT.[3] Cd complexes with MT and is transported to the renal cortex – the major site of Cd deposition. The kidney is the preferred organ for uptake of Cd, given this receptor-mediated uptake by MT. The Cd-MT complex is filtered through the glomerulus and reabsorbed in the proximal tubules of the kidney.[3]

The MT from the CD-MT complex is degraded in the lysosomes of the renal tubule, releasing the free Cd into the tubules, while the MT becomes available again to rebind further absorbed Cd. This is a cyclical process, ensuring that Cd remains in a minimally toxic state.[2,5] When the concentration of Cd in the renal cortex exceeds the MT availability, renal tubular damage occurs. The free Cd generates reactive oxygen species within the renal cortex, causing cell death and tubular necrosis. The earliest manifestation of this is tubular dysfunction that results in the loss of low molecular weight proteins (tubular proteinuria), such as beta-2-microglobulin, in the urine. The tubular dysfunction results in conditions such as Fanconi's syndrome.[1, 2, 5]

Cd is a cumulative toxin, the kidney being the main organ of long-term Cd accumulation, with a half-life of approximately 10-20 years.[3, 7] After long-term low-level exposure, half the body burden of Cd is localised in the kidney and liver.[7] Some authors state that the primary organ of accumulation of Cd depends on the duration of exposure. Short-term exposure results in accumulation in the liver.[3] The other target organ affected by long-term exposure to Cd is the skeleton, as manifested by osteoporosis and osteomalacia.[2,5,7] This is a result of the disruption of Vitamin D metabolism in the kidney as well as renal loss of calcium and phosphorous from renal tubular dysfunction.[2,3] Other clinical manifestations of chronic Cd exposure include olfactory dysfunction, cardiovascular disease, hypertension, and male infertility.[1,2]

Cd is classified as a suspected human carcinogen. The International Agency for Research on Cancer (IARC) has classified Cd and its compounds as a Group1 human carcinogen implicated in lung cancer. The National Toxicology Program in 2000 has also classified Cd and its compounds as a human carcinogen.[8] Recently, further epidemiological studies have

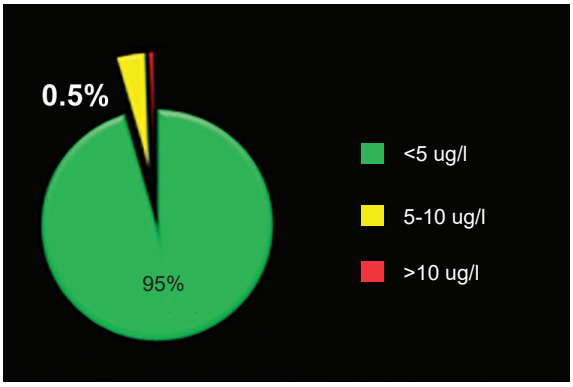

Figure 1. Blood cadmium exposure levels, Ampath industrial clients 2015-2018

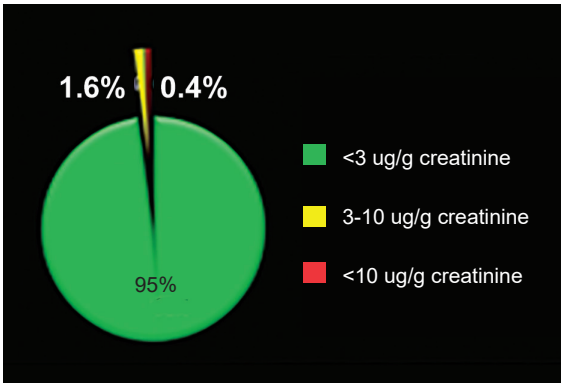

Figure 2. Urine cadmium exposure levels, Ampath industrial clients 2015-2018

shown a link between Cd exposure and prostate, breast and pancreatic cancers.[8,9]

Several molecular and cellular mechanisms act synergistically to induce carcinogenesis from long-term chronic Cd exposure. In general, the main pathogenesis is from mutagenic oxidative stress, epigenetic changes, and dysregulation in cellular proliferation.[5,6]

As excretion of Cd is very slow (excreted mainly in the urine but also in faeces, hair and nails), Cd concentrations increase with age.[5, 7] The biological exposure-monitoring of Cd uses two biological samples for Cd level estimation, i.e. blood and urine, both influenced by current exposure and body burden.[7] The half-life of Cd in blood is approximately 75-128 days, most likely reflecting deposition in target organs.[1] Further, in moderately exposed individuals, blood Cd reflects recent exposure (a few months).[1,7] Urine Cd levels are influenced by the intensity of exposure and whether renal damage is present or not:

1. In new exposures there is a time lag before one can correlate urine Cd levels with exposure.
2. At low exposure levels, urine Cd levels reflect body burden.
3. At high exposure levels and without renal damage, urine Cd is influenced by body burden and also correlates with renal concentrations of Cd1.[7]

Several occupational organisations have suggested different biological exposure indices (BEIs) and action levels. At Ampath, the BEI of 10 ug/g creatinine is used as per the Occupational Health and Safety Act (Act No. 85 of 1993). The World Health Organization (WHO) and OSHA (Occupational Safety and Health Administration of the United States) suggest that control measures should be taken when levels exceed 5 ug/g creatinine. OSHA suggests an action level of 3 ug/g creatinine. Epidemiological studies relating BEIs and biological effect suggest that biological evidence of renal tubular dysfunction increases in individuals whose urine Cd exceeds 10 ug/g creatinine.[7]

In figures 1 and 2, the distribution of urine Cd and blood Cd levels are represented for Ampath's industrial clients. These results reflect that occupational exposure to Cd is consistent with recommended guidelines. In view of this, it will be interesting to investigate the degree of renal dysfunction as assessed by urine beta-2-microglobulin levels, at the different cut points of urine Cd concentrations.

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The birth of OSHAfrica

'Africa has no data'. This has repeatedly been said in occupational safety and health (OSH) circles: at the 2014 XX World Congress on Safety and Health at Work in Frankfurt, at the 2015 International Congress on Occupational Health (ICOH) in Seoul, and more recently at the 2016 International Conference on Occupational Safety & Health (TIOSH) held in Istanbul, and the 2017 XXI World Congress on Safety and Health at Work, held in Singapore.

To address this issue, we started our journey towards the creation of OSHAfrica. During ICOH 2015, we convened a meeting of African delegates to reflect on how we could strengthen the continent's contribution to occupational health. The key focus areas we identified were inter-continental collaboration, information sharing, and publishing in peer-reviewed journals. There was a lull in our efforts after we returned home to our busy schedules. However, in 2016/2017 we reached out to colleagues for whom we had contact details and formed a WhatsApp group, which we named OSHAfrica. Initially, the group had only 16 members but today it has more than 170 members representing 32 African countries.

In 2017, OSHAfrica was registered as a legal entity. The vision of OSHAfrica is to create an enabling, collaborative working environment for African OSH professionals, where increased information sharing will dilute the silo effects of isolation. This includes translating research outcomes into practice, by using the available information to support African regional OSH policies and legislation. OSHAfrica also seeks to promote the development of OSH competencies within Africa, thus scaling up existing knowledge bases and developing new ones. This is possible through OSHAfrica's professional collaborations with other OSH groups across the globe. The knowledge will be shared in our work with institutions in Africa to develop and improve OSH departments and training curricula, ensuring that members have access to affordable, high quality training and certification platforms.

OSHAfrica is led by a gender-balanced Board of Trustees with representation from most regions of Africa. The Trustees are responsible for providing inspired leadership to the membership of OSHAfrica, ensuring that policies and decisions are in line with the realities of OSH in Africa, and that the improvement of workplace safety and health across the continent is prioritised. The Board Members are experienced and passionate practitioners, and include four occupational health physicians, three OSH practitioners, and a chemist:

- Mr Ehi Iden *(CEO, Occupational Health and Safety Managers, Nigeria)*
- Dr Minha Rajput-Ray *(Born and grew up in Kenya. Medical Director, NNEdPro, Global Centre for Nutrition and Health, Cambridge, United Kingdom)*
- Dr Dingani Moyo *(OSH consultant; Midlands State University; National University of Science and Technology, Zimbabwe)*
- Ms Hanan M. F. Elnagdy *(OSH specialist, Ministry of Manpower, Egypt)*
- Mr Charles B. Odhiambo *(Ministry of Labour, Kenya)*
- Dr Thuthula Mandisa Balfour *(Chamber of Mines, South Africa)*

Mr Ehi Iden, Coordinator and Member of the OSHAfrica Board of Trustees

- Dr Ahmed Elsheikh (Born in Egypt. *Director of Quality and Patient Safety at Security Forces Hospital, Makkah, Saudi Arabia*)
- Ms Emily Esenam Akumah *(Independent OSH consultant, Ghana).*

Our website www.oshafrica.africa went live on 31 January 2018, after three years of hard work. This development has been hailed and welcomed by fellow Africans and the international OSH community, including the European Network Education and Training in Occupational Safety and Health (ENETESH), DGUV Germany, and the Partnership for European Research in Occupational Safety and Health (PEROSH).

In 2018, all African OSH professionals are encouraged to register and become members of OSHAfrica. This can be done online at http://www.oshafrica.africa/registration/.

Having a database of OSH professionals will enable us to connect them across the continent, and profile members according to their core areas of expertise. Currently membership is free, but we envisage introducing a paid subscription from 2019.

OSHAfrica also plans to host an international conference in 2019. This will probably be in South Africa, and discussions are under way to confirm this.

Africa now has a global OSH voice – proof that we can do anything when we are commited. OSHAfrica is not about a country, it is about the African continent.

You can follow us on Twitter – @osh_africa, Facebook – OSHAfrica, or visit our website – www.oshafrica.africa.

Report by:
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Managing crystalline silica dust to intensify the fight against TB: a regional approach

BACKGROUND

The Southern Africa Tuberculosis and Health Systems Support (SATBHSS) Project is a regional initiative implemented in four countries, namely, Lesotho, Malawi, Mozambique, and Zambia. The project aims to improve the coverage and quality of key tuberculosis (TB) control and occupational lung disease services in targeted geographic areas of the participating countries, and to strengthen regional capacity to tackle the burden of TB and occupational diseases. The interventions are being implemented through three overarching components: (i) innovative prevention, detection, and treatment of TB; (ii) regional capacity for disease surveillance, diagnostics, and management of TB and occupational lung diseases; and (iii) regional learning and innovation, and project management.[1]

The project targets underserved populations with high TB and/or TB/HIV burdens, including mining communities, labour-sending areas, transport corridors, and cross-border areas.[1] The project strengthens efforts to achieve goals set in the United Nations (UN) Sustainable Development Goals (SDGs), the Southern African Development Community (SADC) Protocol on Health, the African Union (AU) Catalytic Framework to End AIDS, TB and Eliminate Malaria in Africa by 2030, the SADC Mining Protocol, and the AU Mining Vision. The project has adopted a regional multi-stakeholder and multi-sectoral approach to respond to TB. The New Partnership for Africa's Development (NEPAD) Agency and Eastern Central and Southern Africa Health Community (ECSA-HC) are collaborating to provide technical support to project countries, and enhance regional coordination. The project is funded by the World Bank (WB).

To ensure mutual capacity strengthening and knowledge-sharing, the project countries have taken leadership in various thematic areas where they have a comparative advantage in tackling the scourge of TB. Leadership responsibilities for the various technical areas are as follows: Zambia (mining regulation and occupational health); Malawi (continuum of care); Mozambique (economics of TB/sustainable financing of laboratories and surveillance) and Lesotho (monitoring and evaluation, and research).

THE LINK BETWEEN TB AND SILICA DUST

Workers' exposure to crystalline silica dust and other hazardous substances results in silicosis, other lung diseases, and cancer which are, at times, incurable diseases, and lead to increased risks of contracting TB.[2] Prevention of workers' exposure to hazardous dust is limited by the availability of comprehensive regulations, which is a huge challenge in the SADC region. This, especially, is with regards to the management, monitoring, and control of hazardous airborne dust in mining workplaces.[3]

IDENTIFIED GAPS

The project has so far identified critical occupational health and safety (OHS) gaps, which include inadequate infrastructure, inadequate policies and regulations, limited occupational health monitoring and evaluation equipment, insufficient quality improvement systems, and inadequate human capacity and competencies to address occupational health adequately. Solving these challenges requires a collaborative and coordinated multi-stakeholder approach. There is an urgent need for strategic partnerships, and regional multi-sectoral and multi-disciplinary engagements, to curb the scourge of TB and silicosis in southern Africa. Just like the 2018 World TB Day theme 'Wanted: Leaders for a TB-Free World', partners are needed to solve this regional challenge.

SOUTHERN AFRICA TUBERCULOSIS AND HEALTH SYSTEMS SUPPORT (SATBHSS) PROJECT

Use these platforms to get updates of project activities:
Website: http://www.satbhss.org/
Twitter: https://twitter.com/SATBHSS_Project
Facebook: https://www.facebook.com/SATBHSS/
YouTube: https://www.youtube.com/channel/UCpfa6BVEg8WhTDIgYDLwfAg

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New Partnership for Africa's Development (NEPAD Agency)

SASOHN Gauteng Central managers' brunch

The South African Society of Occupational Health Nursing Practitioners (SASOHN) Gauteng Central had the pleasure of hosting a business brunch for managers on 14 March 2018. The objective of the brunch was to inform managers of the activities and roles of SASOHN as a society, and more importantly, for them to understand the value of the occupational health nursing practitioners (OHNPs) they employ. The brunch was held at Ora Bella Restaurant in Boksburg, the venue that SASOHN Gauteng Central uses to host their monthly meetings and workshops. Ora Bella exceeded expectations with their wonderful decor, table settings and scrumptious buffet brunch. Shortly after arriving, guests and members were encouraged to enjoy the buffet brunch and to network.

Sue Martinuzzi, the SASOHN Gauteng Central Chairperson opened the meeting and welcomed both managers and members. There were 60 people in attendance, 13 of whom were managers. The meeting intentionally commenced with the usual business matters on the agenda, giving the managers an opportunity to participate and witness a normal SASOHN regional meeting. Sue addressed matters arising from the previous meeting and all new items on the agenda. This discussion was followed by the Committee Portfolio Holders who presented their reports.

Yvonne van Zijl, in her role as Treasurer, invited everyone to donate small change towards the 'Coffee Kitty' before delivering her financial report. All money raised through the region is donated to the social project supported by SASOHN Gauteng Central. It is amazing how much money is collected in this way, and at this meeting in particular, with the extra help of the managers, a very generous sum accumulated. Yvonne explained how SASOHN gives back to its members through bursaries and sponsorships. In 2018, three SASOHN Gauteng Central members were sponsored to attend the International Commission on Occupational Health (ICOH) conference in Dublin, all of whom presented papers.

Agnes Ramodipa, holder of the Portfolio for Education, presented the education report. The Academic Day, to be held in May 2018 in Johannesburg, was discussed, and members were urged to book and attend. The Continued Professional Development (CPD) points, as proposed by the South African Nursing Council for introduction in 2019, were discussed briefly, and members were encouraged to begin their portfolios of evidence. The importance of the manager's support of the OHNP in obtaining the required CPD points was emphasised. The required support includes allowing the OHNP time off to attend regional meetings, academic days, conferences and workshops. Agnes reminded everyone that March is Tuberculosis (TB) Awareness Month, and that members should also educate their clients about listeriosis.

Andiswa Bombil, who manages the Social Responsibility Portfolio, gave a brief overview of the Siyabonga Isineke Stimulation Centre, the SASOHN Gauteng Central social responsibility project for 2018. She reminded everyone that winter is coming and that blankets and other items of warm clothing are desperately needed for the organisation. The Centre has no permanent home as it burned down and they are in dire need of donations.

In concluding the business meeting, Agnes introduced the SASOHN President, Denise Minnie. Denise gave an informative talk, exploring the role of SASOHN as a professional society. SASOHN was established in the 1960s as a discussion group, and developed into a professional society in the 1980s. Currently, there are 10 regional societies under the SASOHN umbrella. From humble beginnings of a few industrial nurses, the Society now has more than 1 200 paid-up members across South Africa. There are also a number of members in neighbouring Southern African Development Community (SADC) countries.

The Society's objectives were highlighted with an emphasis on the value added to companies that engage and embrace occupational health services. SASOHN strives to develop members professionally through regular regional meetings, conferences, academic days and workshops.

The regional meetings provide a network where members provide support, share information, and discuss problems and experiences with each other. Senior, experienced members play an important role in the mentoring of junior OHNPs, prior to them practicing independently. This is important for the transfer of knowledge from one generation to the next. For practical experience, student occupational health nurses spend time with experienced OHNPs in the work environment and are provided an opportunity to translate theory into practice.

OHNPs play a varied role in the company: from ensuring compliance with occupational health legislation, advising management on occupational health issues, reducing absenteeism through case management, and implementing medical surveillance, to the treatment and management of work-related injuries and diseases. The role of the occupational medical practitioner (OMP) is not forgotten, as the OHNP and OMP work closely together.

SASOHN engages and cooperates with various state departments, including the Departments of Labour, Health, Mineral Resources and Transport, as well as the National Institute for Occupational Health (NIOH). The society works closely with other professional organisations with an interest in occupational health, such as The South African Society for Occupational Medicine (SASOM) and the Southern African Institute of Occupational Hygiene (SAIOH). SASOHN is represented at an international level within organisations such as ICOH, which ensures the Society's continued professional development.

SASOHN bestows professional recognition on members for excellence in the field of occupational health nursing. This recognition includes awards for the best OHNP student of the year, the best OHNP of the year in either a corporate or individual capacity, and the best OHNP mentor of the year. A further benefit of membership is the professional indemnity insurance that SASOHN provides to all paid-up members, as well as the subscription to *Occupational Health Southern Africa*.

Feedback received from members and the regional committee members was positive, and it is hoped that the managers left with a better appreciation of SASOHN as a society, and also enjoyed this social time with their OHNPs.

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A practical approach to the mandatory COP for medical incapacity

The mandatory Code of Practice (COP) for the management of medical incapacity due to Ill- health and injury became effective on 31 May 2016. It was issued to assist occupational medical practitioners (OMPs), safety, health and environment (SHE) officers, and human resources (HR) consultants to manage employees with medical incapacity in the mining industry. This COP, if implemented and complied with, will ensure that employees suffering from medical incapacity return to their normal, adjusted or alternative work, wherever possible, by making early return-to-work recommendations. It also ensures that a fair and consistent approach is applied, where employees cannot be accommodated in the workplace after medical incapacity.

It is highly recommended that a medical incapacity management committee (MIMC) is formed at each mine clinic site, to ensure fair and consistent handling of medical incapacity cases. The Committees should allow the employee, or a representative, to present the case, and should then discuss the findings and recommendations with the employee and/or representative. It is important that the findings are conveyed to the employee in writing, and that the minutes and attendance registers of the meeting are documented.

The MIMC should consist of a multi-disciplinary team that will be trained on the site-specific medical incapacity processes, and may include the following people:

- A chairperson who should be a senior human resources official
- A medical incapacity coordinator who takes care of administration tasks, including sending meeting invitations, and ensuring that medical reports, consent and other necessary documents are available prior to the Committee meetings
- An OMP who will draft a report detailing the medical incapacity and provide recommendations based on the fitness of the individual
- A safety or occupational hygiene professional, where appropriate
- The employee concerned
- The direct supervisor or line manager of the employee
- Any other employee representative, specialist, social worker or occupational therapist permanently or temporarily co-opted by the chairperson to assist the MIMC in fulfilling its function

Entry into the medical incapacity process is triggered by:

- High frequency or long duration sick leave absenteeism as identified by the HR department/consultant
- Abnormal findings during medical surveillance by the occupational health team
- Medical specialist reports, indicating medical incapacity
- Line managers reporting poor work performance or attendance
- Self-reporting by an employee

The HR consultant should then schedule a meeting with the employee to determine the cause of absenteeism or poor work performance, after which they would classify the employee into one of the following categories:

- Employee with a medical condition
- Employee with social problems
- Employee with incapacity not due to a medical condition

All employees suffering from medical conditions should be assessed by an OMP who would refer the employee for medical incapacity management, should the employee be found unfit to continue in his or her occupation.

A medical or health risk assessment must be conducted to establish:

- The potential for returning the employee to their own, adjusted or alternative work (work capacity evaluation)
- The potential health and safety risks of allowing the employee to continue with their own, adjusted or alternative work
- The potential to make structured early return-to-work recommendations, which might include ongoing rehabilitation, physical or psychological treatment, and vocational rehabilitation
- Early return-to-work recommendations to prevent the employee developing a disability mindset
- If and when an employee with medical incapacity will qualify as a person with a disability, so that the employer can introduce the necessary interventions as required under the Employment Equity Act No. 55 of 1998.

Once the work capacity evaluation is completed, a decision can be made by the MIMC to return the employee to their own occupation, or to adjusted or alternative work.

Reasonable accommodation applies to applicants or employees with disabilities who are suitably qualified for the job. The obligation to accommodate an employee reasonably might also arise when an applicant or employee voluntarily discloses a disability-related accommodation need, or when such a need is evident to the employer. Employers must try to accommodate employees as far as is reasonably practicable when work, or the work environment, changes or when the impairment that affects the employee's ability to perform the essential function varies. This may include adapting existing facilities for accessibility, re-organising workstations, restructuring the job so that non-essential functions are re-assigned, adjusting work time and leave, retraining, and/or providing specialised supervision.

If the employee is not satisfied with the medical panel process or decision, he or she has the right to lodge an appeal, as per Section 20 of the Mine Health and Safety Act No. 29 of 1995, to the Medical Inspector, and should be informed of this right during the process.

Medical incapacity varies and, as such, the merits of each case should be considered before applying a 'one size fits all' approach.

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Report from SAIOH's President and Council Members

MESSAGE FROM THE SAIOH PRESIDENT

It is always exciting to be part of a growing organisation and to recognise the continuous developments and rising membership numbers. This proves that we are part of a profession that is growing at a good rate in southern Africa. Whilst this trend is positive, we need to recognise that occupational hygiene remains a small profession worldwide, and that many more qualified and competent occupational hygienists are needed to make an impact on reducing workplace exposures and related occupational illnesses.

In southern Africa we have many young and enthusiastic members entering our profession, and we need to encourage them to study and grow into competent practitioners. Our academic institutions are working on curricula and the development of programmes to serve our needs better. For example, the Bachelor of Science degree at North West University (NWU) is well supported and is due to deliver our first set of practitioners with a specialised qualification in occupational hygiene; and the Occupational Hygiene Training Association (OHTA) modular learning programme continues to operate and gain popularity.

There are many options for members to improve their knowledge and close gaps in their subject-related competence. The Southern African Institute for Occupational Hygiene (SAIOH) provides excellent guidance and tutorials on its website, to increase members' knowledge and to prepare them for SAIOH registration assessments. We encourage you to access this information and to make use of the tools provided.

Other important opportunities to learn and share experiences are the local branch meetings (usually at no cost, and offering excellent presentations by experienced peers), and the SAIOH Annual Conference. Preparation for the Conference, with the theme, 'Raising the bar in occupational hygiene: informed control reduces worker exposures', is progressing well. Three excellent international facilitators have been secured to present the pre-conference Professional Development Courses (PDCs). Several other international experts have been invited to deliver keynote addresses. More details will be provided on these presenters and the PDC content in upcoming issues of *Occupational Health Southern Africa*. We also urge you to keep a look-out for mail drops and notices on the website – you will not want to miss these amazing PDCs, or the Conference.

I was lucky to participate in the Eastern Cape Discussion Group meeting early in March. I found a wonderful group of enthusiastic members keen to learn and share experiences and, of course, to support and promote SAIOH. This group is well supported and is on the right track to becoming a fully-fledged SAIOH branch. Please bear in mind that all of these initiatives earn you important Continuing Professional Development (CPD) points, so it is in your best interests to make an effort to attend the branch meetings.

SAIOH PARTICIPATION IN THE RE-CURRICULATION MEETING AT CAPE PENINSULA UNIVERSITY OF TECHNOLOGY (CPUT)

Representatives from the Environmental Science Departments of the Tshwane University of Technology (TUT), the Cape Peninsula University of Technology (CPUT), the Durban University of Technology (DUT), and the Central University of Technology (CUT), meet on an annual basis to discuss the curricula for qualification programmes which incorporate occupational hygiene content. The aim of the collaborative meeting is to standardise the subject content throughout technical institutions in South Africa. This year, SAIOH representatives were invited to share information that will ensure that our recognised requirements for occupational hygiene practice are included in the curricula. The input from SAIOH will also ensure that students are better prepared for obtaining SAIOH certification once they are qualified.

All the President's men (and women): Julie Hills, SAIOH President, participated in the March meeting of the SAIOH Eastern Cape Discussion Group in Port Elizabeth
Photograph: Brett Williams

This year's re-curriculation meeting was hosted by CPUT at the end of January. SAIOH representatives actively participated as follows:

- *Objectives of SAIOH:* Hennie van der Westhuizen (SAIOH Council Member: Technical Portfolio) gave an overview of the SAIOH objectives, and in particular, focused on the growth of SAIOH. His presentation was well-aligned with the objectives of the technical institutions in terms of student development.
- *OHTA courses:* Mark Harrison (Public Relations Officer, SAIOH Western Cape Branch) presented on the OHTA courses that he had completed, providing a personal account of his own learning experiences. His presentation was well received, and generated much interest and many questions from the audience.
- *The SAIOH Self-Assessment Tool and Skills Definitions:* Celia Keet (SAIOH Vice President and Immediate Past Chair of the Western Cape Branch) presented the SAIOH self-assessment tool and, more importantly, the skills definitions used by SAIOH to allocate certification levels and required knowledge. The collaboration representatives requested permission from the SAIOH Professional Certification Committee (PCC) to use the content and definitions contained within the tool to align the content of their own qualification specifications better. Subsequent to their request, SAIOH drafted an official communication, recommending and allowing the use of the tool to aid the development and the education of students.

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Tribute to Jenny Acutt

SASOM Project Coordinator retires after 14 years of dedicated service

JENNY ACUTT

BA Cur (UNISA), MSc Nursing (Wits), RGN, RM, CHN, N Ed, N Admin, OHN

Born Jenneke van Suilichem in Pretoria in 1939, Jenny graduated as a general nurse from the Andrew McColm Hospital in Pretoria. She then worked at the Philadelphia Mission Hospital near Groblersdal in Mpumalanga until she turned 21 and was able to register with the South African Nursing Council (SANC).

In 1961, Jenny moved to England to train as a midwife, but the Royal College of Nurses refused to register her qualification as she lacked two months of male medical nursing experience in her general nursing course! She completed those two months at the Dudley Road Hospital in Birmingham where the patients, many of whom had called in at South African ports during World War II, affectionately called her 'Sarie Marais'.

On completion of her midwifery training, Jenny toured through Europe and worked in the Wilhelmina Gasthuis Hospital in Amsterdam, before the call of home became too strong. She returned to South Africa and, while working at the Mowbray Maternity Hospital in Cape Town, met her future husband, Robin. They settled in Salisbury in Southern Rhodesia (now Zimbabwe) in 1965.

Her children, Jann and Robin Anthony, were born in 1967 and 1969, and she found it very satisfying to be a stay-at-home wife and mother. Notwithstanding, an official from an international food and cosmetics company approached her and convinced her to provide healthcare to his employees. She soon realised that some aspects of their work impacted on their health. Since this was before the days of the Internet, the only information that she could find on healthcare for workers was half a page on 'The Factory Nurse' in a Royal College of Nursing publication.

On returning to South Africa in 1978, she worked for an engineering company. There she met Dr Phil Piek who supported her quest for occupational health information and introduced her to AC (Stella) Coetzee and Yvonne Campbell, who provided valuable input towards her professional development. This led to her registering for a course in occupational health nursing, which entailed attending lectures on two afternoons a week in the boardroom of the South African Nursing Association in Pretoria. Lecturers included Prof. AM Coetzee (Head of the Department of Community Health, University of Pretoria), Dr Hardy de Beer (dermatologist), Dr H Konig (ophthalmologist), Dr Phil Piek (occupational medical practitioner), Bunny Mathysen from the National Occupational Safety Association (NOSA), and Dr JR Johnston (occupational hygienist), among other experts. There were 12 students who worked in different industries in Pretoria in that first course for the certificate in Occupational Health Nursing.

The South African Society of Occupational Health Nursing Practitioners (SASOHN) was inaugurated in 1981, and Jenny received the membership number 0016.

She went on to study for a BA Cur at the University of South Africa (UNISA) with Community Health and Nursing Education as her major subjects. In 1983, together with Theo le Roux, she established the Pretoria School for Occupational Health under the auspices of the Northern Transvaal Association of Occupational Health Nurses, a branch of SASOHN. The course lectures were based on the books *Occupational Health Practice* (1973) by RSF Schilling, *Lecture Notes on Occupational Medicine* (1976) by HA Waldron, and later *An introduction to Occupational Health Nursing in South Africa* (1983), compiled and edited by Dr Mike Baker and AC (Stella) Coetzee; and the World Health Organization (WHO) publication *Early Detection of Occupational Diseases* (1986).

As interest in training as occupational health nursing practitioners grew throughout South Africa, the course was converted to a distance learning programme and was eventually handed over to Prof. Barbara Robertson, Head of the Department of Nursing Education at the University of the Witwatersrand (Wits) in 1992.

In 1994, SASOHN honoured Jenny with an Honorary Life Membership for her efforts in, and valuable contributions to, the education of occupational health nursing practitioners in South Africa.

Jenny continued to lecture on the nursing aspects of occupational health, and set and marked assignments and examination papers in her spare time until 2008 (when an official course convenor was appointed at what was then known as the 'The Centre for Additional Nursing Studies' in the Wits Department of Nursing Education).

Dr Ansie J Kotze of the Nursing Department at UNISA invited Yvonne Campbell and Jenny to contribute a chapter on 'The nurse in the Occupational Health Service' to her book *Occupational Health for the Nurse and Other Health Workers* which was published in 1992, followed by a second edition in 1997 to which Jenny contributed a second chapter on 'Emergencies and Disaster Planning'.

When Dr Kotze retired, Jenny and Susan Hattingh revised the third edition, which was published as *Occupational Health – Management and Practice for Health Practitioners* in 2003. Subsequently, new information was incorporated into a second revision of the third edition in 2009. This was followed by the fourth edition in 2011 and the fifth edition in 2016. Jenny contributed various chapters to Juta's *Manual of Nursing – Health Care Priorities*, Volume 3, which was edited by Ann Young, in 2005, as well as to *Vlok's Community Health*, sixth edition, which was edited by Marina Clarke in 2014.

In 2004, Jenny was awarded her MSc degree with distinction from Wits for her dissertation titled 'Air flow limitation and the prevalence of chronic bronchitis amongst cement workers in South Africa.' Prof David Rees, from the National Institute for Occupational Health (NIOH) in Johannesburg and the Wits School of Public Health (SoPH), was one of her supervisors.

In the same year Jenny retired from active occupational health nursing and was appointed Project Coordinator for The South African Society of Occupational Medicine (SASOM). She retired officially this year and the SASOM Chairman, Prof. Daan Kocks, has stated categorically and proudly that Jenny assisted greatly with the growth and success of SASOM in South Africa in the 14 years that she served as the SASOM Project Coordinator, based at SASOM's national office in Pretoria. Jenny was the oldest occupational health nursing practitioner actively working in the field at the time of her retirement.

Whilst Jenny deeply appreciates the love and support she received, firstly from her parents and then from her own family – husband Robin, daughter Jann, son Robin Anthony, and their respective families – she sincerely thanks everyone who impacted so positively on her professional career of many years, and helped shape who she is today. Jenny acknowledges that occupational healthcare, in all its varied facets, is moving forward at a rapid pace, and she admires the dedication of all involved in this process that benefits the health and wellbeing of our workforces.

On behalf of the South African occupational health fraternity, SASOM wishes Jenny all of the best with her retirement.

SAVE THE DATE – SASOM ANNUAL CONGRESS 2018

This year's SASOM Annual Congress will take place on 22 and 23 June 2018, at the Protea Hotel by Marriott, OR Tambo International Airport, Kempton Park. The theme of the Congress is 'Occupational Health – Looking back to move forward: old lessons inform solutions for new issues'. Please access the SASOM website (www.sasom.org) for more information, and to download the draft programme and the registration form.

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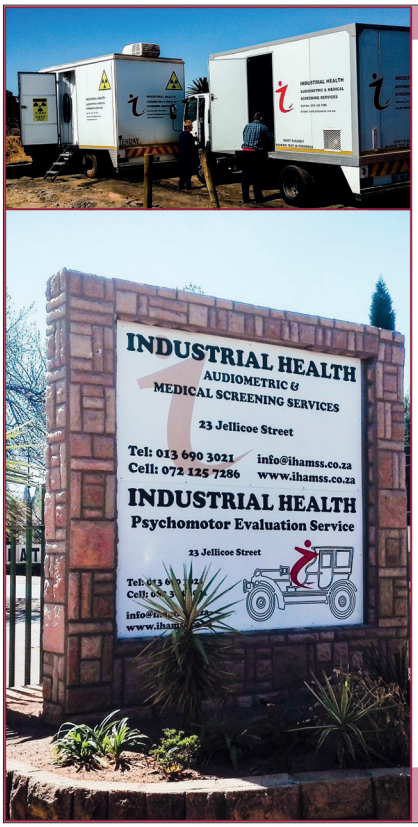

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