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Every moment is a fresh beginning.

T.S. Eliot



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MESSAGE FROM THE EDITOR

Welcome to the Spring issue of OccuZone! This is the season for new beginnings, renewed focus and nurturing new collaborative endeavours. It provides an opportunity for introspection and reflection on how the past 18 months has changed our lives and inspires everyone to look forward and appreciate the countless beauty and abundance all around us.

I would like to begin this issue with a few well-deserved words of thanks and gratitude. First, I would like to extend a big thank you to the outgoing contributing editors Dr Tanusha Singh (past NIOH Research Committee Chair) and Prof Nisha Naicker (former head of Epidemiology & Surveillance), and also Angel Mzoneli, the newsletter's previous Editor-in-chief, for doing an outstanding job in putting together the OccuZone newsletter over the past 9 editions. They were all instrumental in the conceptualisation of this publication and their contributions must be acknowledged and celebrated today. I am also so grateful to Ms Mzoneli for her leadership and support as the outgoing Chief Editor. You all leave very large shoes to fill. A distinct feeling of "standing on the shoulders of giants" - the view is breathlessly committing but at the same time stunning.

In our pursuit to keep you up to date with the latest developments of the Institute, we share with you the various activities and projects, which the NIOH has been working on in the past quarter. In this issue of OccuZone, we highlight our research activities - with a special focus on the the autopsy of cardiorespiratory organs of deceased miners

that revealed COVID-19 related complications. An essential function of the NIOH is the surveillance of occupational exposures and health outcomes and in this edition we present an overview of the pathological findings based on the Pathology Disease Surveillance (PATHAUT) Reports for 2019. We also profile the NIOH Quality Assurance Department and showcase all the quality management systems that the NIOH has maintained over the years. Lastly, we highlight various training sessions offered by the Institute including the COVID-19 related webinars in both the formal and informal economies.

I would like to thank the editorial team for their valuable time and expertise in producing this publication, and the authors for their valued contribution to this issue.

On behalf of the editorial team, we hope you enjoy this issue.

Shanaz Hampson



NEWSLETTER

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MESSAGE FROM THE RESEARCH COMMITTEE CHAIR



As we embark on this journey with new team members, it is important to acknowledge and celebrate the phenomenal work conducted as well as goals achieved by our predecessors. Dr Tanusha Singh has set an excellent example as the outgoing Research Committee Chair. We endeavour to continue her legacy and foster her research philosophy moving forward.

To this end, it has been a busy quarter where the NIOH supported many research activities. The most prominent locally have been the talks and posters presented at the recent NHLS Pathology Research and Development (PathReD) Congress. The topics covered broad and varied aspects of occupational health, conducted by key departments at NIOH as well as the national Safety, Health and Environment (SHE), Quality Assurance departments and the Biobank - housed on the NIOH premises. Please feel free to view these under the scientific program on the PathReD website (<https://pathred.nhls.ac.za/>).

The research focus of this edition centers around a local research project underway within the Pathology Section, where the autopsy of cardiorespiratory organs of deceased miners revealed COVID-19 related complications. We also showcase the scientific publications produced by our staff during the quarter. We then profile one of our emerging researchers, a Medical Scientist working in the HIV and TB in the Workplace Unit.

In the international arena, the NIOH submitted the second annual report for the World Health Organisation Collaborating Centre (WHOCC) regarding projects that:

1. Support WHO's work to identify and analyse lessons learned from the development and implementation of the national programme for occupational health of health workers in South Africa, where the NIOH published one paper already (i.e. Moodley et al. 2021, BMC Infectious Diseases 21(1):138) and submitted another paper for consideration.
2. Provide technical inputs to support WHO's work towards the development of the WHO/ILO global report on occupational health of health workers, where the study utilizing a mixed methodological approach was approved and data collection has been initiated.
3. Support WHO's work on the informal economy, focusing on research and policy development, where the informal economy survey has been completed and the formal economy study has been approved by ethics, and fieldwork data collection has commenced.
4. Provide technical inputs in support of WHO's activities towards providing guidance and policy options for action by the health sector to improve health and safety of poor informal economy workers, where a systematic review was published (i.e. Naicker et al. 2021, Int. J. Environ. Res. Public Health 18(6), 3189).

We continue to wish our readers safe and prosperous work environments during these challenging times and hope that the research content herein will stimulate interactions and spark a renewed interest in all the research-related possibilities.

Dr Natasha Sanabria

RESEARCH

AUTOPSY OF CARDIORESPIRATORY ORGANS OF DECEASED MINERS REVEALS COVID-19 RELATED COMPLICATIONS

Correspondence: Dr Anita Gildenhuys, AnitaG@nioh.ac.za

The Pathology section plays a pivotal role in occupational health and carries out the statutory requirement of examining the cardiorespiratory organs of deceased miners in terms of the Occupational Diseases in Mines and Works Act: Act 78 of 1973. The autopsy service generates a great deal of information about the organs that are examined. Consequently, organs of deceased miners were received by the NIOH in 2020 and early 2021, where 11 miners who succumbed due to complications of COVID-19 infection have been identified. Subsequently, the Pathologists have embarked on a COVID-19 related research project on the cardiorespiratory organs of these deceased miners, which is led by Dr Gildenhuys.

The hearts and lungs of these miners are currently being examined in a systematic fashion, in order to document the types of

COVID-19 related pathologic changes as well as their distribution and severity. This is a unique opportunity for the Pathology section to have access and examine multiple sections from entire organs. In contrast, other studies in South Africa on COVID-19 related pathology can only rely on small post mortem needle biopsies.

The preliminary results thus far indicate that COVID-19 related acute lung injury correlates to Diffuse Alveolar Damage (DAD) on histologic examination (see Figure A). In addition, the Pathologists have found that Pulmonary thrombi are also a common complication of DAD in these tissue samples (see Figure B). These findings contribute to the observed disease progression and severity in the South African population and highlight the role that routine testing plays in identifying new research areas.

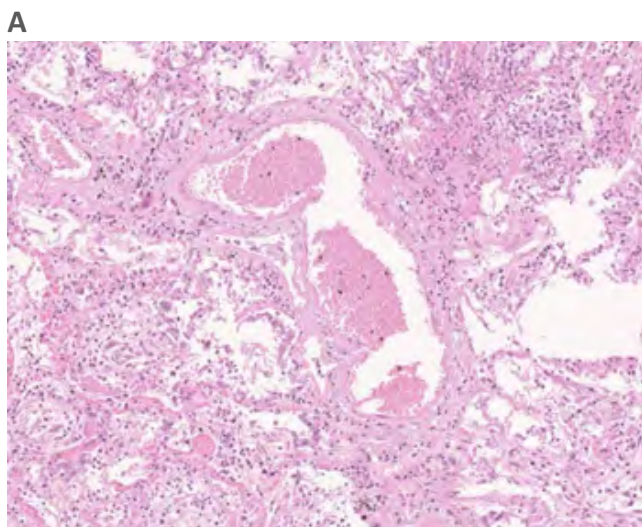


Figure A: Hyaline membranes, indicative of Diffuse Alveolar Damage

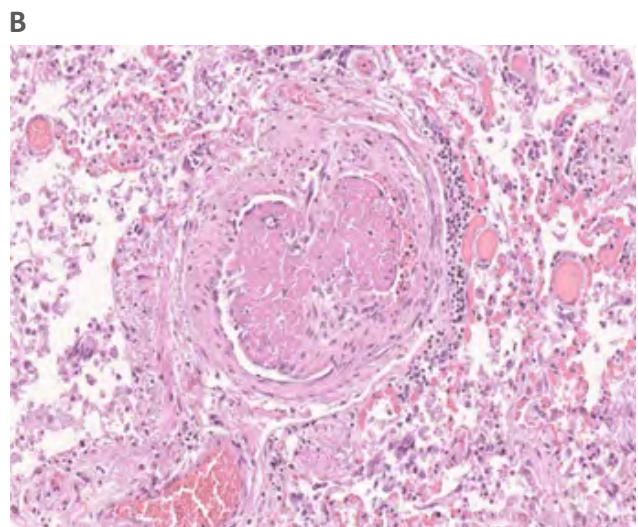


Figure B: Organizing pulmonary thrombus



Title: A review of metal levels in urban dust, their methods of determination, and risk assessment

Author(s): CC Kaonga, IBM Kosamu and W Utembe.

Source: Atmosphere 2021, 12, 891.

<https://doi.org/10.3390/atmos12070891>

Abstract: This review gives insights into the levels of metals in urban dust, their determination methods, and risk assessment. Urban dust harbors a number of pollutants, including heavy metals. There are various methods used for the sampling of urban dust for heavy-metal analysis and source apportionment purposes, with the predominant one being the use of plastic sampling materials to avoid prior contamination. There are also various methods for the determination of metals which include atomic absorption spectroscopy (AAS) and inductively coupled plasma-mass spectrometry (ICP-MS), among others. Studies have shown that pollutants in urban dust are mainly derived from industrial activities and coal combustion, whereas

traffic emissions are also an important, but not a predominant source of pollution. The varying particle-size distribution of urban dust and its large surface area makes it easier for the deposition and transport of heavy metals. Risk-assessment studies have shown that metals in urban dust could cause such problems as human pulmonary toxicity and reduction of invertebrate populations. The risk levels seem to be higher in children than adults, as some studies have shown. It is therefore important that studies on metals in urban dust should always incorporate risk assessment as one of the main issues.

Keywords: heavy metals; pollution; urban dust; risk assessment; toxicity; human health

Title: Occupational risk of airborne Mycobacterium tuberculosis exposure: a situational analysis in a three-tier public healthcare system in South Africa

Author(s): DO Matuka,

T Duba, Z Ngcobo, F Made, L Muleba, T Nthoke and TS Singh

Source: Int. J. Environ. Res. Public Health 2021, 18, 10130.

<https://doi.org/10.3390/ijerph181910130>



Abstract: This study aimed to detect airborne Mycobacterium tuberculosis (MTB) at nine public health facilities in three provinces of South Africa and determine possible risk factors that may contribute to airborne transmission. Personal samples (n = 264) and stationary samples (n = 327) were collected from perceived high-risk areas in district, primary health clinics (PHCs) and TB facilities. Quantitative real-time (RT) polymerase chain reaction (PCR) was used for TB analysis.

Walkabout observations and work practices through the infection prevention and control (IPC) questionnaire were documented. Statistical analysis was carried out using Stata version 15.2 software. Airborne MTB was detected in 2.2% of samples (13/572), and 97.8% were negative. District hospitals and Western Cape province had the most TB-positive samples and identified risk areas included medical wards, casualty, and TB wards. MTB-positive samples were not

detected in PHCs and during the summer season. All facilities reported training healthcare workers (HCWs) on TB IPC. The risk factors for airborne MTB included province, type of facility, area or section, season, lack of UVGI, and ineffective ventilation. Environmental monitoring, PCR, IPC questionnaire, and walkabout observations can estimate the risk of TB transmission in

various settings. These findings can be used to inform management and staff to improve the TB IPC programmes.

Keywords: TB; airborne transmission; occupational health; healthcare workers; environmental sampling; real-time PCR; TB infection control; ventilation; UVGI; hierarchy of controls



Title: Ten-year risk of fatal cardiovascular disease and its association with metabolic risk factors among waste pickers in South Africa

Author(s): F Made,
EA Nonterah, N Tlotleng, V Ntlebi and N Naicker.

Source: BMC Cardiovasc Disord (2021) 21:336
<https://doi.org/10.1186/s12872-021-02150-y>

Background: Cardiovascular disease (CVD) is the leading cause of death among non-communicable diseases in South Africa. Several metabolic risk factors contribute to the development of CVD. Informal workers such as waste pickers could be unhealthy lifestyle naive, and most public health research on CVD does not include this understudied population. This study estimated the 10-year risk of fatal CVD and its association with metabolic risk factors in an understudied study population of waste pickers in Johannesburg, South Africa.

Methods: A cross-sectional survey was conducted among waste pickers in two landfill sites in Johannesburg. We used the Systematic Coronary Risk Evaluation (SCORE) risk charts to estimate the 10-year risk of fatal CVD. We then employed ordinary least squares regression to assess the association between the 10-year risk of fatal CVD with metabolic risk factors. Other variables adjusted in the regression model were HIV status, education, income, injuries from work, clinic visits in the previous 12 months, and alcohol consumption.

Results: A total of 370 waste pickers were included in this analysis, 265 (73.41%) were males. The mean age of the participants was

34 years. The majority were between the age of 20 and 39 years. More than 55% of the waste pickers did not visit a clinic in the previous 12 months, and 68.57% were smoking. The 10-year survival probability from CVD was more than 99% for both males and females. In the multivariable regression model, elevated blood glucose showed a non-significant increase in the mean percentage of 10-year risk of fatal CVD. Waste pickers who were overweight/ obese, and hypertensive had high statistically significant mean percentages of the 10-year risk of fatal CVD compared to those who did not have the metabolic risk factors.

Conclusions: Prevention of 10-year risk of fatal CVD in this understudied population of waste pickers should target the control of obesity, hypertension, and diabetes. Health awareness and education for waste pickers will be an important step in reducing the burden of these metabolic risk factors. We further recommend that health systems should recognize waste pickers as a high-risk group and consider extensive CVDs surveillance.

Keywords: Obesity; Hypertension; Diabetes; Cholesterol; Smoking; Age; Understudied populations



Title: Commodification of biomaterials and data when funding is contingent to transfer in biobank research

Author: M Maseme

Source: Medicine, Healthcare and Philosophy, 20 July 2021

<https://doi.org/10.1007/s11019-021-10042-3>

Abstract: It is common practice for biobanks and biobank researchers to seek funding from agencies that are independent of the biobank that often stipulate conditions requiring researchers to grant access and share biomaterials and data as part of the agreement - in particular in international collaborative health research. As yet, to the author's knowledge, there has been no study conducted to examine whether these conditions could result in the commercialization of biomaterials and data and whether such practice is considered ethical. This paper therefore seeks to answer the question of whether such sharing of biomaterials and data for biobank research in exchange for funding from sponsors and funders in collaborative health research is ethically justified. The central idea of this paper is based on an argument against commodification of the body and its parts,

which includes biomaterials and data and holds that it is ethically wrong to commodify humans and their body parts. The arguments against commodification of biomaterials and data explored are the Kantian approach argument as it relates to interference of commodification with human dignity which is linked to a diminished sense of personhood, an argument against commodification that is based on a dilution of altruism and lastly the communitarian approach anti-commodification argument which emphasizes a social responsibility to the common good. Arguments in support of commodification based on liberal individualism and consequentialism are also discussed.

Keywords: Commodification; Biomaterials and data; Biobank research

Title: Issues and challenges in the application of the IEUBK model in the health risk assessment of lead: a case study from Blantyre Malawi

Author(s): W Utembe and M Gulumian

Source: Int. J. Environ. Res. Public Health 2021, 18, 8207.

<https://doi.org/10.3390/ijerph18158207>



Abstract: The risk assessment of lead (Pb) requires the use of biokinetic models to translate measured concentrations of Pb in food and environmental media into blood lead (BPb). The aim of this study was to assess the applicability of the Integrated Exposure Uptake Biokinetic (IEUBK) model in the health risk assessment of Pb among children in Blantyre. Children (152) aged 1–6 years were recruited into this cross-sectional study, and foods, house dust, playground soil, water, and venous blood (1 mL) were collected and analyzed for Pb. A seven-day food frequency questionnaire (FFQ) was used to collect food consumption data. The concentrations of Pb ranged from 0.01 to 3.3 mg/kg in food, 2.3 to

265 mg/kg and 1.5 to 482 mg/kg in house dust and playground soil, respectively, as well as 2.0 µg/dL to 50.4 µg/dL and 6.8 to 39.2 µg/dL for measured and predicted BPb, respectively. Various statistical tests indicated less than satisfactory agreement between measured and predicted BPb values. Despite the lack of reliable food consumption data and other limitations, both the predicted and measured BPb values indicate that children in Blantyre are exposed to high levels of Pb, largely through food and soil as a minor source.

Keywords: Lead; exposure; biokinetic modelling; children

Title: National Covid-19 hospital admissions and mortality among healthcare workers in South Africa, 2020-2021

Author(s): N Tlotleng, W Jassat, C Cohen, F Made, T Kootbodien, M Masha and N Naicker.

Source: Covid-19 Special Public Health Surveillance Bulletin, Vol 18. Supplementary Issue 10



Abstract: Healthcare workers (HCWs) in close contact with SARS-CoV-2-infected patients have an increased risk of infection compared to non-HCWs, but little is known about the clinical course and risks for mortality amongst HCWs in South Africa. In this study, we compared the characteristics of hospitalised HCWs against non-HCWs with COVID-19 and assessed those factors associated with COVID-19 mortality among HCWs. Data from 5 March 2020 to 30 April 2021 were obtained from DATCOV, the national surveillance programme monitoring COVID-19 admissions in all private and public hospitals across South Africa. A logistic regression model was used to determine factors associated with COVID-19 HCW admissions and mortality.

As of 30 April 2021, there was a total 169,678 confirmed COVID-19 admissions reported on DATCOV, of which 6,364 (3.8%) were HCWs. Compared to non-HCWs, HCWs were more likely to be younger, to be white or of non-black race, have pre-existing obesity and asthma, be admitted in the private sector and in the Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Northern Cape and North West provinces, be admitted in pre-wave 1 [(aOR 3.0; 95%CI 2.4-3.7)], wave 1 [(aOR 2.1; 95%CI 1.8-2.5)] and post-wave 1 [(aOR 1.3; 95%CI 1.0-1.7)]

compared to wave 2, were less likely to be male (aOR 0.3, 95%CI 0.3- 0.4), and have HIV and chronic kidney diseases. There was an increased risk for in-hospital mortality in HCWs in the older age group (40-49 [aOR 3.8; 95%CI (1.6-8.80)]; 50-59 [(aOR 4.7; 95%CI 2.0-10.9)] and 60- 65 years [(aOR 9.8; 95%CI (4.2-23.0)] compared to HCWs less than 40 years, with comorbidities such as hypertension, diabetes, chronic kidney diseases, malignancy and TB. Mortality was decreased for HCWs who were coloured [aOR 0.5; 95%CI (0.3-0.8)], and admitted in the public sector [aOR 0.7; 95%CI (0.5- 0.9)] in pre-wave 1 [aOR 0.6; 95%CI (0.3-0.9)] compared to wave 1 period.

It is concluded that in-hospital mortality in HCWs was associated with age, race, wave period, presence of comorbidities and health sector. Policies should be put in place to remove older HCWs with comorbidities from direct patient care. Acquired immunity from infections in the first wave could have led to a decline in HCW COVID-19 cases in the second wave. With the roll-out of vaccines amongst HCWs, we expect a further decrease in COVID-19 cases and mortality amongst this group, despite the fact that the country has entered a third wave of the COVID-19 pandemic.



Title: Importance of surface topography in both biological activity and catalysis of nanomaterials: can catalysis-by-design guide safe-by-design

Author (s): M Gulumian, C Andraos, A Afantitis, T Puzyn, NJ Coville.

Source: Int. J. Mol. Sci. 2021, 22, 8347

<https://doi.org/10.3390/ijms22158347>

Abstract: It is acknowledged that the physicochemical properties of nanomaterials (NMs) have an impact on their toxicity and eventually their pathogenicity. These properties may include the NMs' surface chemical composition, size, shape, surface charge, surface area, and surface coating with ligands (which can carry different functional groups as well as proteins). Nanotopography, defined as the specific surface features at the nanoscopic scale, is not widely acknowledged as an important physicochemical property. It is known that the size and shape of NMs determine their nanotopography which, in turn, determines their surface area and their active sites. Nanotopography may also influence the extent of dissolution of NMs and their ability to adsorb atoms and molecules such as proteins. Consequently, the surface atoms (due to their nanotopography) can influence the orientation of proteins as well as their denaturation. However, although it is of great importance, the role of surface topography (nanotopography) in nanotoxicity is not much considered. Many of the issues that relate to nanotopography have much in common with the fundamental principles underlying classic catalysis. Although these were developed over many decades, there have been recent important and remarkable improvements in

the development and study of catalysts. These have been brought about by new techniques that have allowed for study at the nanoscopic scale. Furthermore, the issue of quantum confinement by nanosized particles is now seen as an important issue in studying nanoparticles (NPs). In catalysis, the manipulation of a surface to create active surface sites that enhance interactions with external molecules and atoms have much in common with the interaction of NP surfaces with proteins, viruses and bacteria with the same active surface sites of NMs. By reviewing the role that surface nanotopography plays in defining many of the NMs' surface properties, it reveals the need for its consideration as an important physicochemical property in descriptive and predictive toxicology. Through the manipulation of surface topography, and by using principles developed in catalysis, it may also be possible to make safe-by-design NMs with a reduction of the surface properties which contribute to their toxicity.

Keywords: Nanomaterials; Nanotopography; Metal and metal oxide NPs; Carbon based nano-41 materials; Catalysis; Biological activity; Descriptive Toxicology; Predictive Toxicology; Catalysis; 42 Safe-by-design

Title: Study protocol to determine association between environmental triggers and asthma among children in King Williams Town

Author(s): W Utembe,
RA Yusuf, PC Rathebe

Source: Methods Protoc. 2021, 4, 64. <https://doi.org/10.3390/mps4030064>



Abstract: Asthma affects over 330 million people worldwide, with relatively higher disease burdens in Australia, New Zealand, Africa, the Middle East, and South America. The symptoms associated with asthma were reported to be prevalent in children from the period of 1993 to 2013, in many low- and middle-income countries, due to changes in environmental conditions, such as domestic lifestyle, and urban and industrial developments. (1) Background: Several studies have also shown that children are prone to a severe type of asthma, because of their narrow respiratory airways and susceptibility to irritation from environmental agents.

This study aimed to assess the association between environmental exposure and asthma among children in King Williams Town, South Africa. (2) Methodology: This study adopted a cross-sectional design method, with an estimated sample size of 262 participants. The eligible study participants were enrolled while attending Grey hospital in King Williams Town,

for asthma management. Information will be collected from eligible, stable participants, on asthma treatment, through in-person interviewing in 2021. A semi-structured questionnaire will be administered to the participants. However, as a result of the prevailing COVID-19 pandemic, data may be abstracted from the asthma medical record of the eligible participants. Multivariate regression will be utilized, to describe the correlation between the variables, and the odds ratio will be calculated as well. (3) Discussion and conclusion: The study will objectively identify the local environmental agents that are associated with asthma among children in King Williams Town, in order to reprioritize treatment and preventative strategies. Ethical approval was obtained from the Research Ethics Committee, Faculty of Health Sciences at the University of Johannesburg.

Keywords: Asthma; Environmental Agents; Children; Exposures; Chronic

Title: Safe by design (SbD) and nanotechnology: a much-discussed topic with a prudence

Author(s): M M Gulumian and F Cassee

Source: Particle and Fibre Toxicology (2021) 18:32
<https://doi.org/10.1186/s12989-021-00423-0>



Abstract: Safe-by-Design (SbD) has been put forward as a concept to assure that only safe nanomaterials will reach the market and that safety aspects have already been considered in a very early stage of the innovation process. In practice, several laboratory tests have been proposed to screen newly developed nanomaterials and nano-enabled products to assess their hazardous nature. These tests need to have sufficient predictive power for

possible adverse effects on human health, not only due to acute (peak) exposures, but also for long-term (low dose) exposures as these materials may accumulate over time in organs and tissues.

Keywords: Safe-by-Design (SbD); nanomaterials; nano-enabled products; hazardous

Nosimilo Mlangeni

**Medical Scientist in the HIV TB
in the Workplace Unit**



Why did you choose this career and research path?

I saw this career as a platform to contribute towards positive health outcomes of the general public of South Africa, through evidence based health policies and strategic interventions. It is fulfilling to be a role player in bettering the health of our communities. In terms of research, most notably because in this field one is able to go beyond research findings, into interventions such as strengthening health systems and policy advocacy. It is also inter-disciplinary in nature and blends different disciplines such as economics, sociology and epidemiology to draw a comprehensive picture of health system response and policy formulation & implementation. This provides an interesting interaction with broader aspects of determinants of health in any given population.

What training and qualifications did you undergo and where?

I have a Bachelor of nursing degree (B. Cur) obtained from the University of Zululand, and Master of Public Health (MPH) from the University of Pretoria. I am currently a Public Health PHD candidate at Stellenbosch University.

What are the most enjoyable aspects of doing research?

I find research conceptualization most enjoyable, where one spends time reviewing literature to understand the health and life/work dynamics of the intended study population. With my interests being health systems and policy, this provides good grounds to build towards suitable research methods as well as effective policy recommendations and possible dialogues post research findings.

What are your research highlights to date?

My main highlight is a project we conducted among street vendors, where I was a lead investigator. The findings were presented in one of the e PHASA conference sessions, and a paper has been submitted for publication.

What are your career goals?

One of my main career goals is to create and/or contribute to policies that will bridge health inequities in our society, especially for vulnerable populations.

Occupational health surveillance data provides vital information on the prevalence of occupational related diseases and injuries. It allows trends to be determined and prevention programmes to be monitored and evaluated. Thus, surveillance of occupational exposures and health outcomes is an essential function of the NIOH. In this issue, we present an overview of the pathological findings based on the Pathology Disease Surveillance (PATHAUT) Reports for 2019.



PATHOLOGY DISEASE SURVEILLANCE REPORTS:

INCREASE IN PULMONARY TUBERCULOSIS AND SILICOSIS IN 2019 PATHAUT FINDINGS

Pathaut is a database for recording autopsy findings from mineworkers who worked on controlled mines and works in South Africa. The Occupational Diseases in Mines and Works Act (Act 78 of 1973) provides for the autopsy of miners cardio-respiratory organs for compensation. The autopsy is conducted by pathologists based at the NIOH. The Pathaut system has been in constant operation since 1975 and provides good quality data for surveillance and research. The full annual Pathaut Report for 2019 was released on the NIOH website <https://www.nioh.ac.za/wp-content/uploads/2021/06/2019-PATHAUT.pdf>

This summary provides a short overview of the pathological findings for 2019. The NIOH examined the organs of 759 deceased individuals in 2019. These were 58.6% black africans, 40.4% were white, 0.7% were coloured and 0.3% were submitted without information of their population group. The majority 63.4% were ex-miners, followed by current miners 34.7% and a small percentage 1.9% of cases could not be classified. The overall occupational respiratory disease rates (per 1000 autopsies) for 2019 are shown in Figure 1.

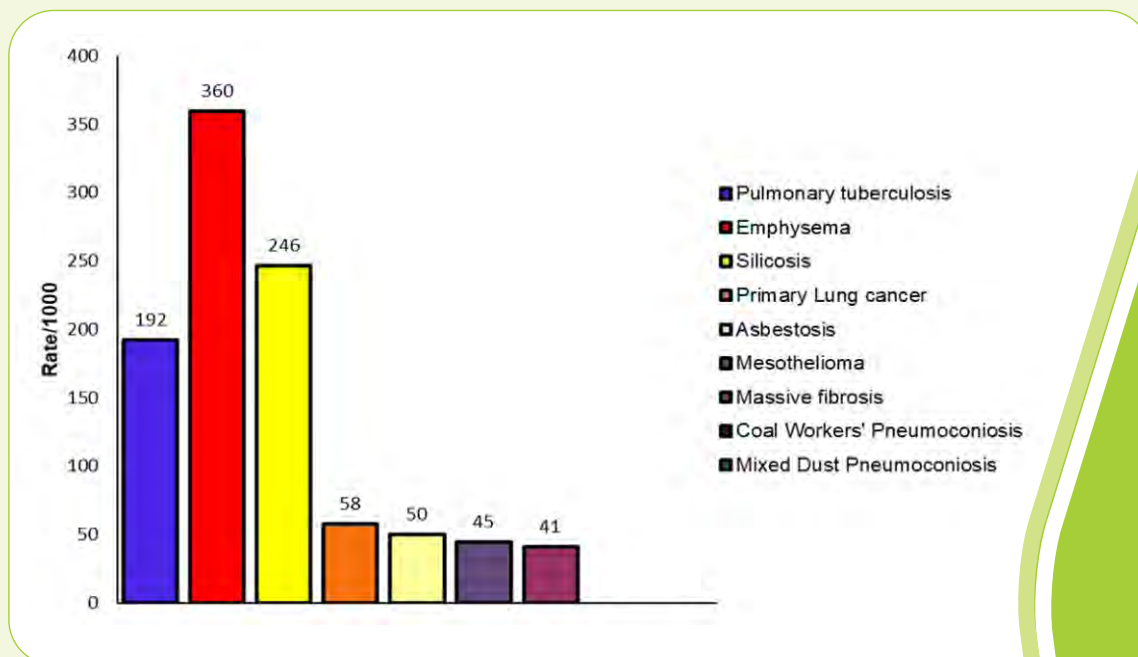


Figure 1: Overall Disease rates for 2019

The overall rate of pulmonary tuberculosis (PTB) increased from 138/1000 in 2018 to 192/1000 in 2019. The rate also increased in black gold miners 216/1000 in 2018 to 290/1000 in 2019 (Fig 2). This is the first increase seen

since 2007 when the peak in infections was reached. This situation will require further monitoring, although the COVID-19 pandemic in 2020 and 2021 may have an impact on disease and autopsy rates.

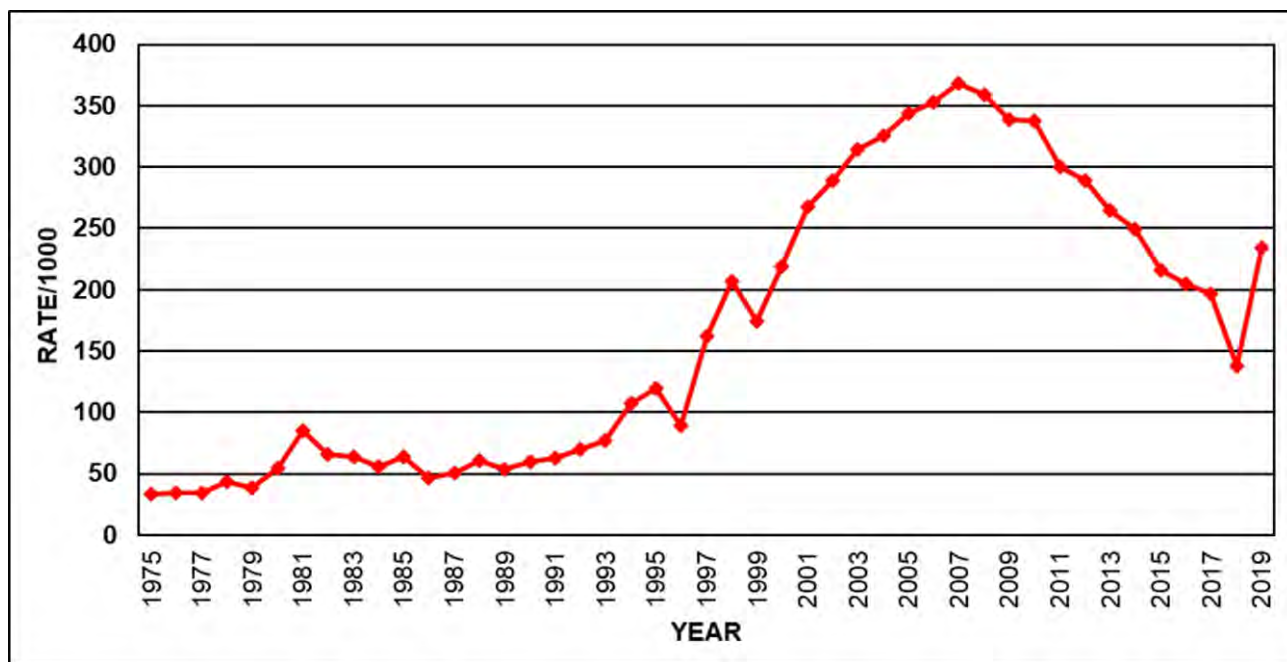


Figure 2: Active PTB rates in Black miners at autopsy (1975-2019)

Active pulmonary TB (PTB) was diagnosed in 19.2% (n=146) of all autopsies in 2019, predominantly in Black miners (71%).

The highest rates of active PTB (216/1000 autopsy's) were from the gold and platinum (142/1000) mining industries.

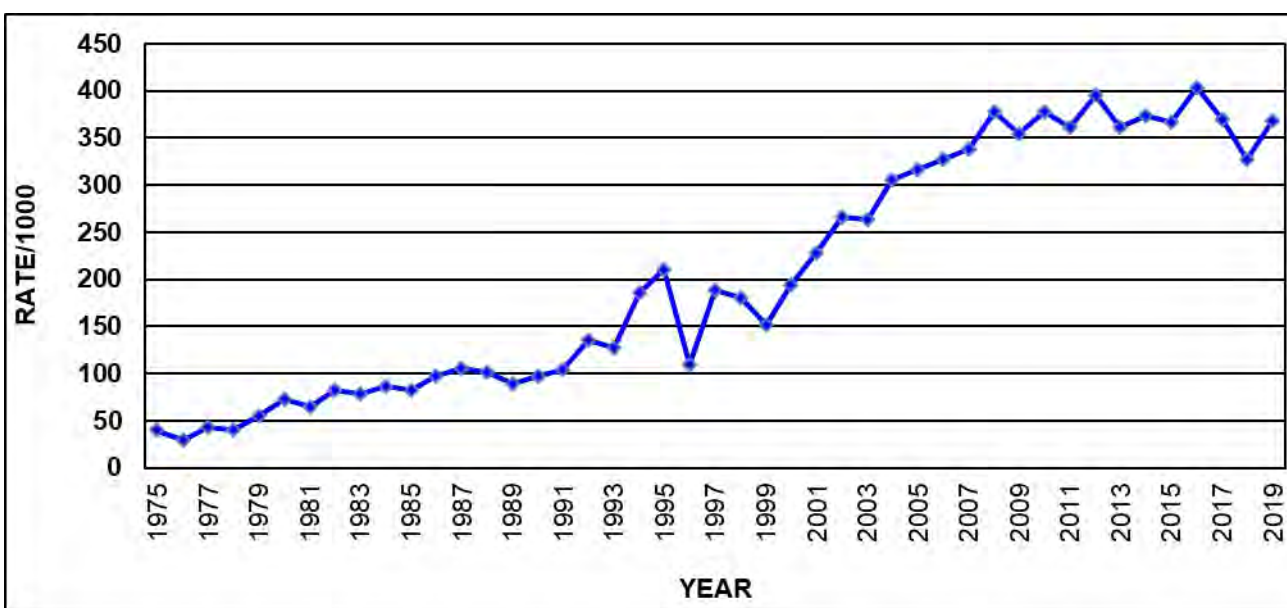


Figure 3: Silicosis rates in Black miners at autopsy (1975-2019)

The overall rate of silicosis also increased from 215/1000 in 2018 to 246/1000 in 2019. The rate in gold miners increased to 338/1000 in 2019 compared to 312/1000 in 2018. In black gold miners, the rate increased from 328/1000 in 2018 to 368/1000 in 2019, having fluctuated between 378/1000 in 2008 and 368/1000 in 2019. The rate in white gold miners increased from 296/1000 in 2018 to 309/1000 in 2019. A total of 84% of the silicosis cases were employed in the gold mining industry.

The findings in this summary must be interpreted with caution as a referral bias exists where there is a low autopsy rate for black men who have left employment at the mines, but the majority of retired white miners are autopsied. The number of autopsies have decreased steadily over the years, probably reflecting the concomitant decrease in the number of miners employed in the industry.



Image 1: Microtome wax block cutting for preparation of stained tissue on glass slides

Women are increasingly being employed in the mining industry and 3.4% of autopsies conducted in 2019 were on women. On average, the women were younger than the men and worked mainly in the gold (45.8%) and asbestos mines (45.8%). A large proportion 45.5% for the women diagnosed with disease suffered from PTB while the remainder suffered asbestosis, mesothelioma and emphysema.

For more information on the Pathology Disease Surveillance Reports at the NIOH, please contact the Pathology Division at 011 712 6519 or info@nioh.ac.za



The NIOH continues to provide specialised, cost effective occupational health and safety services to national and provincial government departments as well as various industries including the private sector. In this issue, our service delivery showcases all the quality management systems that the NIOH has maintained over the years, which reflects positively on the quality of services that are provided by the Institute.



AN ACHIEVEMENT TO BE PROUD OF:

NIOH QUALITY ASSURANCE AND ACCREDITATION

The field of quality assurance (QA) involves ensuring that tasks, procedures and processes are executed accurately and achieved through verification, certified by an independent body such as the International Organization for Standardization (ISO). ISO is a non-governmental organisation that develops global standards to guarantee the quality, safety and efficiency of products, services and systems.



As part of ensuring that a high level of service delivery is upheld, the QA department continues its efforts in maintaining the accreditation for various quality management systems within NIOH's specialised laboratories as well as adding new methods or scope to the existing services rendered.

Currently the NIOH is the only entity in South Africa that has obtained accreditation on four different quality management systems: ISO15189 (medical laboratories), ISO 17025 (testing and calibration laboratories), ISO 17020 (conformity assessment for inspection bodies) and ISO 9001 (quality management system).

These are further detailed in the figure below:



Image 1: The NIOH QA and National Biobank team.
Image taken prior to Covid-19.

Table 1: The NIOH's current test accreditation

Accreditation	Region	Laboratory No	Laboratory name	Discipline/Scope
ISO15189	NIOH	M0276	Analytical Services	Inorganic Chemistry
		M0276	Analytical Services	Organic Chemistry
		M0276	Immunology/Microbiology	Immunology
		M0276	Pathology	Histology
		M0276	Pathology	Cytology
ISO17025	NIOH	T0660	Analytical Services	Water testing: mercury
		T0660	Analytical Services	Water testing: aluminium
		T0660	Occupational Hygiene	Environmental methods:
		T0660	Immunology/Microbiology	Microbiology: MTB
ISO17020	NIOH	OH0079	Occupational Hygiene	Asbestos
		OH0079	Occupational Hygiene	Lead
		OH0079	Occupational Hygiene	Noise-Induced-Hearing-Loss
		OH0079	Occupational Hygiene	Hazardous Chemical Agents
ISO9001	NHLS-NIOH	Z19/21021	National Biobank	Biobank

The NIOH uses a quality improvement process to maintain its different ISO systems.

The process flow is illustrated below and involves resource, process and improvement processes.

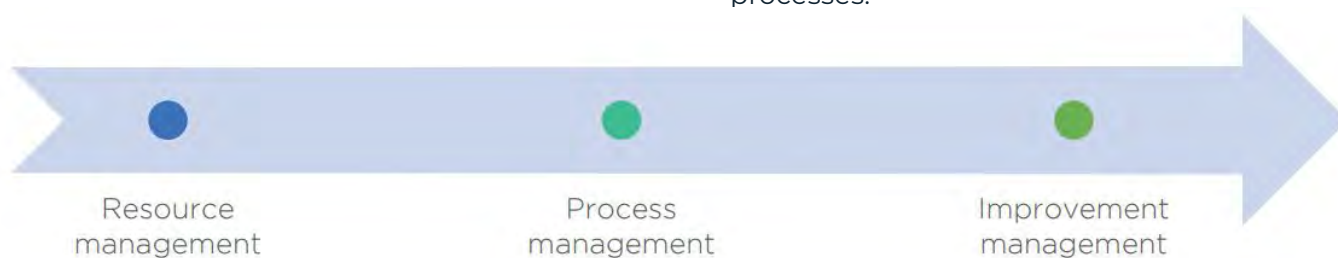


Image 2: Audit quality improvement process flow for the NIOH

Budget constraints within the NHLS during the past financial year advocated the introduction of tighter control of costs in laboratories. This meant that laboratories at NIOH were required to expand their scope and add more technical signatories to comply with existing standards and within financial means. Therefore, the NIOH extended its testing scope and technical signatories. The technical signatories (under ISO17025) increased and now include four in the Analytical Services Metals Laboratories ; one in the X-ray Diffraction (XRD) Laboratory within the Occupational Hygiene Section, as well as three in the Microbiology Section. There are also 4 technical signatories under

ISO17020, bringing the total number of signatories to 12 across the standards.

The quality approach used in the process involves the training of staff, validation of procedures and implementation of proper quality control systems. Internal audits also play a vital part in examining the deficiencies in our system and ensuring the competence of all signatories are aligned to the requirements of the South African National Accreditation System (SANAS). This expansion is a sign of a healthy quality system. It is a gift that keeps on giving in terms of confidence in the results or outputs provided to customers after analysis.

THE IMPORTANCE OF INTERNAL-AUDITS IN THE QUEST FOR SELF-IMPROVEMENT & CONTINUOUS PROFESSIONAL DEVELOPMENT

The QA Section conducts internal audits on an ongoing basis to ensure that the quality management system remains intact. This process normally includes calibration and quality systematic checks. To this end, monthly accreditation meetings are held with each NIOH Section. It has also been able to provide pre-SANAS internal audits, training and support to NHLS laboratories, including proficiency testing scheme guidance to staff. QA is also responsible for coordinating external audits from SANAS and a number of other different external clients for the NIOH.

The Department ensures that all NIOH laboratories and other non-technical areas receive the necessary priority to make sure that quality management systems are implemented, maintained and upheld. The Section also provides support to NHLS laboratories to obtain SANAS approval for their quality management systems and technical competence. These laboratories are assisted with pre-assessments for SANAS audits, gap analyses, internal audits, Committee for Evaluations and Technical Function (CEFT) evaluations and quality assurance training.

The Maintenance of accreditation and continual professional development go hand-in-hand. To this end, the QA department regularly conducts internal training to strengthen the quality management systems in place.

This includes training on:

- Documentation
- Writing of non-conformances
- SANAS R80
- TR28
- TR26
- TG25
- Risk management
- Non-conforming events
- Root cause analysis
- How to handle and use spill kits
- Use of PPE
- Monitoring quality indicators
- Validations

IMPLEMENTATION OF ISO 9001

In 2018, a decision was taken to implement ISO 9001: 2015 within the non-technical/support departments at NIOH. Overall since then, there has been continued progress right through from training to implementation across a range of departments.

The NHLS National Biobank is currently the first certified entity under ISO 9001. Other departments that have made significant progress in this regard since inception are:

1. Epidemiology & Surveillance Section
2. Information Services Section
3. SHE Department
4. Occupational Medicine Section



The benefits of the ISO 9001 implementation within the NIOH to non-technical departments include the following:

- A display of commitment to quality and a willingness to work towards improving service efficiency in both the core and non-laboratory processes
- Improving the credibility of the organisation (ISO 9001 QMS is an internationally recognised standard)
- Assisting in the improvement of consistency of operations throughout the NIOH
- Enhancing the company's image – as viewed by customers, shareholders and employees.

ACCREDITATION MAINTENANCE

Accreditation is a mechanism to award professional and national recognition to facilities that provide high quality care. Once accreditation is achieved however, it must be maintained. This sounds relatively simple but in fact is quite a time-consuming, rigorous process that can at times be daunting. For the NIOH, a challenge that is most often experienced in terms of maintaining these 4 standards is the requisite resource support that is required and ranges from human to financial resource deficits. However, despite these challenges, the QA department has systematically and

diligently ensured that these systems have been maintained and upheld.

The NIOH QA prides itself on customer service and focuses on providing confidence that quality requirements will be fulfilled. The Institute strives to increase compliance and has initiated applications in addition to SANAS recognised categories in the coming year. This will include Good Laboratory Practice (GLP) for the Toxicology and Biochemistry Section. The GLP accreditation is based on the OECD's principles for laboratories that only conduct research on non-medical samples.

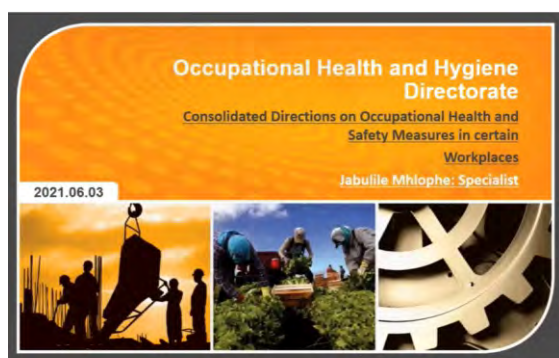
For more information on Quality Assurance or accreditation systems at the NIOH, please contact the QA Department at 011 712 6521 or info@nioh.ac.za

The NIOH has continued to carry out various COVID-19 and discipline specific training sessions for various industries and related professions, in both the formal and informal sectors, over the past quarter. These training sessions were developed in modules based on topics and specific to sectors and the needs of the NIOH stakeholders. In terms of continuous professional development (CPD) accreditation, the following professional bodies have approved our training sessions for COVID19: HPCSA medical and dental board approved | SADA approved | SAIOH approved | SAIOSH approved | StellMed/SANC approved (Occupational Nurse Practitioners)



TRAINING CONDUCTED

Global stats: **84** webinars **49'137** attendees



COVID-19 Webinar: Basic ventilation requirements: COVID-19 directions and Nat. Building Regulations & other guidelines (3rd June 2021)

▶ <https://youtu.be/02FTUB7Mu18>

This is the 76th COVID-19 session implemented in the NIOH's webinar series. The webinar was opened by Dr Tanusha Singh, the chairperson of the NIOH's COVID-19 Occupational Health Outbreak Response Team (OHORT). The Department of Employment and Labour's (DoEL) Ms

Jabulile Mhlophe presented on "COVID-19 directions & basic ventilation requirements", the CSIR's Mr Tobias van Reenen presented on "Ventilation guidance for COVID-19", and the NIOH Occupational Hygiene Section's Mr Moses Mokone presented on "Ventilation during COVID-19 pandemic: Occupational; Hygiene perspective".

712 attendees joined this popular online session.



Working from home: OHS policy and reasonable accommodation during COVID-19 (1st July 2021)

▶ <https://youtu.be/ODOGzDSvaNo>

The context of the COVID-19 3rd wave and the Level 4 lockdown restrictions had placed new emphasis on and increased interest in this topic. In this webinar the legal, medico-legal and compensation aspects were covered. Mr George Kahn of Richard Spoor Inc. Attorneys, with the support of his colleague PhD-candidate Mr G. Mudimu, presented on "Introduction to the working-from-home (WFH) – regulatory framework and case law", Mr Tibor Szana (Chief Inspector, Department of Employment & Labour) and Ms Milly Ruiters (Chief Director: Medical Services, Compensation Fund) presented on "Compensation – Injury on duty when working-form-home", and Dr Jan Lapere (Occupational medicine Doctor/OHS Consultant) presented on "Employer/employee duties with regard to OHS in working-form-home".

776 attendees joined this popular online session.



COVID-19 Webinar: “Long Covid” and the workplace – an update (8th July 2021)

📺 <https://youtu.be/kOURZE-jBZc>

This “Long Covid” webinar was an update session augmenting the previous webinar on the same topic done on 22nd April 2021. It was targeted at Occupational Medical and Occupational Nursing Practitioners and the broader OHS community. Dr Murray Dryden (NICD Medical officer, Emergency Outbreak Response Unit &

member of DATCOV Hospital Surveillance Team) presented on behalf of the NICD research team on “Post COVID-19 Condition - Early findings from a longitudinal cohort of hospitalized COVID-19 patients in South Africa”. Dr Rubeshan Perumal (Pulmonologist and Post-COVID-19 Lung Disease service and research lead, Groote Schuur Hospital and UCT) presented on “Long COVID-19 –The Tsunami after the waves”. Associate Prof. Shahieda Adams (Occupational Medicine Specialist; Division of Occupational Medicine, School of Public Health and Family Medicine at UCT) presented on “Long COVID and the occupational health implications”. And Prof Romy Parker (Director: Pain Management, Department of Anaesthesia and Perioperative Medicine, UCT) presented on “Rehabilitation for Long Covid”.

628 attendees joined this popular online session.



COVID-19 Webinar: Occupational Health Surveillance System (OHSS) Update (14th July 2021)

📺 <https://youtu.be/rNkGoWPn9k0>

The NIOH Epidemiology and Surveillance Section delivered an update on the NIOH-run Occupational Health Surveillance System (OHSS), as required by the Department of Employment and Labour's (DoEL)

directive dated 28th September 2020. The webinar was targeted at OHSS platform users and employer representatives, mainly HR and administrative staff. The NIOH partnered with the Council for Scientific and Industrial Research (CSIR) to deliver the 2-hour webinar. Dr Nonhlanhla Tlotleng led the team and the programme development. The presenters included: Prof Nisha Naicker (NIOH) doing the “Overview of OHSS” and “Template changes”; Dr Jabu Mtsweni (CSIR) covered the “Registration process” and “Data confidentiality and security”; Mr Herman Le Roux (CSIR) dealt with the CMORE tool; Mr Monty Rambau (NIOH) covered the “New platform” and “API” tool; and Mr Rethabile Khutlang (CSIR) did an overview of the “Dashboard update” followed by the Q&A session.

429 participants attended the NIOH's 79th COVID-19 webinar.

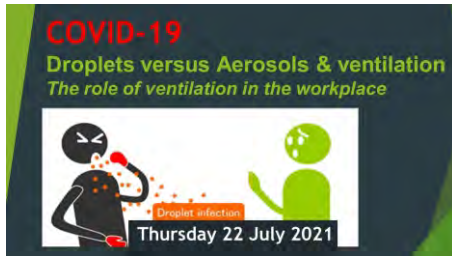


COVID-19 Webinar: Occupational skin diseases and COVID-19 in the workplace (15th July 2021)

📺 <https://youtu.be/InFWatGwPkM>

NIOH delivered its 80th webinar in the COVID-19 prevention and workplace preparedness webinar series on 15th July 2021. The “Occupational skin diseases and COVID-19 in the workplace” webinar was arranged by the Immunology and Microbiology Section.

Dr Naufal Raboobee (Dermatologist in private practice) covered the topic “Skin (cutaneous) manifestation in patients with SARS-COV-2 infection” and Anna Fourie (NIOH Immunology and Microbiology Section) addressed “Skin reactions to COVID preventative measures (cleansing agents & PPE) & alternatives to reduce the impact”. The presentations were followed by the Question and Answer (Q&A) session. **217 attendees joined this COVID-19 webinar.**



COVID-19 Webinar: Droplets versus aerosols and ventilation – The role of ventilation in the workplace (22nd July 2021)

📺 <https://youtu.be/Scsd1qtFu1Y>

This webinar topic “Droplets versus aerosols and ventilation – The role of ventilation in the workplace” focused on the “exposure science” and “exposure assessment”. The webinar drew on the expertise of an academic and exposure scientist, Prof Derk Brouwer (Professor of Occupational Hygiene & Health, School of

Public Health, WITS). Prof Brouwer presented on the topic “The historical basis of the aerosol-droplet discussion”. Mr Kevin Renton (Occupational Hygienist and visiting lecturer at School of Public Health, WITS) presented on the “Practical implications and the measurement of ventilation in room”.

198 participants attended the NIOH's 81st COVID-19 webinar.



COVID-19 Webinar: Occupational Health Services for COVID-19 in the health sector (29th July 2021)

📺 https://youtu.be/m mz_Nkg3kHM

This NIOH COVID-19 training webinar arose out of the research conducted by the NIOH's HIV TB in the Workplace Section. “Occupational Health Services for COVID-19 in the health sector”. Dr Nkululeko Thunzi (Public Health Medicine Registrar - NIOH & Sefako Makgatho Health Sciences University) presented on “Hospital COVID-19 OHS readiness for the 3rd wave in South

African health facilities”; Mr Jonathan Ramodike (Master of Public Health candidate-NIOH & School of Health Systems and Public Health, University of Pretoria) presented on “HealthWISE COVID-19 risk assessment for the 3rd wave in South African health facilities”; and Prof Muzimkhulu Zungu, (HOD HIV TB in the workplace, NIOH/NHLS & School of Health Systems and Public Health, University of Pretoria) presented on “Practical interventions for COVID-19 3rd wave in South African health facilities”.

796 participants joined the NIOH's 82nd COVID-19 webinar.

COVID-19 Webinar: COVID-19 Vaccines in the Workplace Unpacked - for Industrial Development Corporation (IDC) Staff (17th August 2021)

The NIOH Occupational Medicine Section contributed on the topic “COVID-19 Vaccines in the Workplace Unpacked” for the Industrial Development Corporation (IDC) online webinar. Dr Nompumelelo Ndaba (Acting head of the NIOH's Occupational Medicine Section) represented the NIOH as the speaker to the IDC event for staff members across South Africa.

311 participants attended the IDC staff webinar.



COVID-19 Webinar: Occupational Health Surveillance System (OHSS): CSV new platform & data submission demonstration (20th August 2021)

<https://youtu.be/xx69CXHaDus>

The NIOH provided another webinar update sharing the new features of the Occupational Health Surveillance System (OHSS). The “CSV new platform & data submission demonstration” webinar was conducted for 1.5 hours on Friday 20th August 2021. Dr

Nonhlanhla Tlotleng led the NIOH Epidemiology & Surveillance Section team in preparing for the webinar and Prof Nisha Naicker conducted the welcome to the introduction of the OHSS' new features. Ms Lesedi Monaiwa and Dr Tlotleng (Epidemiology & Surveillance Section team members)

presented on the "CSV platform user demonstration". This covered "How to log-in into the new CSV platform"; "Changing user password"; and "Completing data submission template" for the "COVID-19 positive cases", "Return to work", "Vulnerability", and the "Symptom screening" data categories. Mr Monty Rambau (NIOH Information & Technology Department) presented on "Trouble shooting during data submission - CSV user-guide".

20 participants attended the NIOH's 84th COVID-19 webinar.

NON COVID-19 RELATED TRAINING



SAFCEC: Ergonomics and Occupational Health in the Construction Sector (9th July 2021)

▶ https://youtu.be/OY_ljRnciK8

The NIOH partnered with the South African Forum of Civil Engineering Contractors (SAFCEC) to deliver this webinar. The session was targeted at SAFCEC members and OHS professionals and functionaries working in the Construction Sector, including occupational medical, occupational nursing, occupational hygiene and related practitioners. Dr Spo Kgalamono (NIOH Executive Director) did the welcome and introduced the NIOH and its services. The SAFCEC CEO, Mr Webster Mfebe, provided the opening remarks. The speakers included Mr Warren Mallon (DoEL) on "Occupational Health and Safety Act, 1993 and Ergonomics Regulations, 2019"; Mr Mduduzi Mthethwa (FEMA) on "Reporting and managing of Ergonomics Incidents within the Construction Sector"; Dr Busisiwe Nyantumbu-Mkhize (NIOH Occupational Medicine Section) on "Ergonomics in construction industry: Engineering perspective"; and Dr Izak Olivier on "Occupational Health Programme aligned to the new Ergonomics Regulations – roles & responsibilities".

712 participants attended this webinar.



Department of Employment and Labour (DoEL): A New Beginning - Launch of "The South African State of Occupational Health and Safety (OHS) Report" (30th July 2021)

▶ <https://www.youtube.com/watch?v=gSXZrsKg7Ok>

The NIOH provided support for the Department of Employment and Labour's (DoEL) virtual launch of "The South African State of Occupational Health and Safety (OHS) Report". The DoEL's 2-hour launch was conducted on the NIOH's Zoom platform on Friday 30th July 2021. Mr Tibor Szana (DoEL's Chief Inspector: OHS) facilitated the launch as the programme director. The DoEL Inspector General, Ms Aggy Moiloa, undertook the welcome on behalf of Mr Thobile Lamati (DoEL Director General). Dr Spo Kgalamono, NIOH Executive Director, presented a message of support on behalf of the NIOH. The stakeholder contributions were done by Ms D Penfold (BUSA); Mr G Mofokeng (BBCBE); Ms R Ajam (FEDUSA); and Mr S Phetoe (COSATU). The International Labour Organisation (ILO) was represented by Ms P Munkawa. The Compensation Commissioner, Mr V Mafata, presented on "Implications of a strong prevention arm for the Fund". The DoEL Inspector General, Ms Aggy Moiloa, presented on "A focussed OHS future where Decent Work is realised" on behalf of the DoEL Director General. The keynote address was presented by Ms B Moloi, the Deputy Minister of Employment and Labour. The launch was concluded with the vote of thanks by Ms B Huna (DoEL specialist: Occupational Health and Hygiene).

1'313 participants attended the DoEL's virtual launch.



SAIOH Webinar: "Regulations for Hazardous Chemical Agents/HCA" (25th August 2021)

The NIOH supported the Southern African Institute for Occupational Hygiene (SAIOH) and hosted the "Regulations for Hazardous Chemical Agents" webinar on the Zoom platform. Dr Hennie van der Westhuizen (SAIOH President) did the welcome.

The presentations included: Ms Bulelwa Huna (Dept. of Employment & Labour/DoEL) who presented on the "Background to the Regulations for Hazardous Chemical Agents 2021"; Ms Elize Lourens (DoEL) covered the "Regulation for Hazardous Chemical Agents (HCA)"; Mr Garth Hunter (Industrial Hygiene Specialist, Engen) presented on "Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as part of Product Stewardship & "Occupational Exposure Limit"; Dr Greg Kew (Member of DoEL's Technical Committee No. 7) covered "The Utilization of Biological Exposure Indices (BEI's) in a Medical Surveillance Programme & aligning it with the HCA Occupational Exposure Limit"; and Mr Jaco van Rensburg (Business Manager Gijima OHESL) covered "HCA implementation, an industry perspective". After the Q&A session, Mr G Hunter presented a summary and did the closure and thank you.

100 participants attended the NIOH's 84th COVID-19 webinar.

YouTube



SUBSCRIBE

Follow us on YouTube

<https://www.youtube.com/channel/UCA24Q1QQmshRuX-pKzVWtWA/videos>



The NIOH will continue to provide training on COVID-19 and for further info check the website for training updates at <http://www.nioh.ac.za/covid-19-presentations/>. If there is any specific training that the readers feel is important and should be done they can send a request to info@nioh.ac.za.

ACHIEVEMENTS



AWARDS AND RECOGNITION



Dr N Sanabria has been accepted as an Advisory Board member for the UNISA Institute for Nanotechnology and Water Sustainability (iNanoWS).

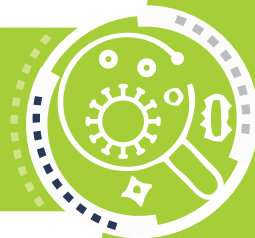
Dr N Sanabria



The South African Colleges of Medicine appointed Dr Ndaba to serve as an observer for the second semester 2021 final oral exams for the College of Public Health Medicine - Occupational Medicine

Dr N Ndaba





The National Institute of Occupational Health (NIOH) and its Outbreak Response Task Team has been actively involved in COVID-19 training sessions and public dissemination of information and educational material since early March 2020, when news of the first Coronavirus case was

The NIOH has been utilising several platforms to reach South Africans including Twitter, YouTube and its website (**which has been zero-rated***) to raise awareness on its training sessions, educational videos and audio, as well as presentations and posters.

This has so far been a resounding success and as Occupational Health and safety champions and ambassadors, we should all be utilising these training sessions and minute-long videos for our own health and safety and that of our colleagues, families and friends.

**The NIOH website is zero-rated by Vodacom, Telkom, MTN, Rain, MWeb & Internet Solutions. No data charges will therefore apply for users of these mobile network providers. All content and resources on this website can be downloaded and browsed for free, excluding YouTube viewing and downloading.*

PLEASE SEE BELOW LINKS TO THE TWITTER VIDEOS ONLINE THUS FAR:

1.COVID-19: Know the 3 C's and 3 W's – Prevention during the Winter Season
<https://www.nioh.ac.za/wp-content/uploads/2021/06/The-Three-Cs-and-Ws.mp4>

2.COVID-19: What employers need to consider for vulnerable workers
<https://www.nioh.ac.za/wp-content/uploads/2020/08/Vulnerable-workersUpload.mp4>

3.What every employer should do during COVID-19
https://www.nioh.ac.za/wp-content/uploads/2020/06/Twitter_03_What-every-workplace-needs-FINAL.mp4

4.What employers need to know about risk assessment
https://www.nioh.ac.za/wp-content/uploads/2020/06/Twitter_05_Risk-Assessment.FINAL-2.mp4.mp4

5.Steps employers can take when a worker is symptomatic or tests positive for Covid-19 at work
<https://www.nioh.ac.za/wp-content/uploads/2020/07/When-an-employee-tests-positive.mp4>

6.The importance of Medical Screening in the Workplace
<https://www.nioh.ac.za/wp-content/uploads/2020/08/The-importance-of-medical-screening-FINAL.mp4>

7.Working during lockdown? How to stay safe
https://www.nioh.ac.za/wp-content/uploads/2020/06/Twitter_01_Lockdown-workers-FINAL-3.mp4

8.What you need to know about donning & doffing surgical masks
<https://www.nioh.ac.za/wp-content/uploads/2020/07/Donning-and-doffing-surgical-mask.FINAL-2-mp4.mp4>

9.What you need to know about surgical masks
https://www.nioh.ac.za/wpcontent/uploads/2020/06/Twitter_04_Surgical-masks-FINAL-2-mp4

10.Step-by-step guide on donning and doffing of a Vflex N95 respirator
<https://www.nioh.ac.za/wpcontent/uploads/2020/07/Vflex-N95-respirator-FINAL.mp4>

11.Donning and doffing of cup shaped N95 respirator
<https://www.nioh.ac.za/wp-content/uploads/2020/07/Donning-and-doffing-of-cup-shaped-N95-respirator.mp4>

12.What you need to know when donning and doffing a Kimberly Clark respirator
<https://www.nioh.ac.za/wp-content/uploads/2020/08/Donning-and-doffing-a-Kimberly-Clark-respirator-FINAL-mp4>

13.The steps you need to know for donning gloves
<https://www.nioh.ac.za/wpcontent/uploads/2020/06/Donning-of-gloves.FINAL-3-mp4-1.mp4>

14.The steps you need to know for doffing gloves
https://www.nioh.ac.za/wpcontent/uploads/2020/07/Doffing-of-gloves-2_FINAL.mp4

15.Which workers require medical N95 respirators?
https://www.nioh.ac.za/wp-content/uploads/2020/06/Twitter_02_The-use-of-N95-respirators_final.mp4

16.A guide on how to doff gloves using the beak method
<https://www.nioh.ac.za/wp-content/uploads/2020/07/Doffing-gloves-beak-method-FINAL.mp4>



Follow us on Twitter

https://twitter.com/nioh_sa

Below is a link to posters as well as various factsheets that have been developed. These can be utilised in your respective workplaces and are print-ready (A3 size).
NIOH Factsheets & Posters <http://www.nioh.ac.za/covid-19/>

COVID-19 RELATED INFORMATION AND EDUCATION MATERIALS



COVID-19
Workplace Preparedness & Prevention

Workplace Hotline: 0800 2121 75
OHSS queries: OHSWorkplace@nioh.ac.za
OHSS hotline: 072 321 5503 | 071 398 1169

"Healthy, Safe, Happy & Sustainable Workplaces"



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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING.