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Do your little bit of good where you are; it's those little bits of good put together that overwhelm the world.

Desmond Tutu



MESSAGE FROM

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MESSAGE FROM THE EDITOR

Seasons' greetings and best wishes for 2022. May it be a healthy, happy, safe and productive year for all. 2021 certainly wasn't an easy year by any means, but there was plenty of brightness if you knew where to look. For me things like vaccines, spending quality time with friends and family more often and the simple things like perfect summer days, a delicious meal and hugs from my dog lit up my year. If I focus on the positives, I can honestly say that all is bright.

Currently, there is a hopeful spirit in the air that shines forth in the triumph of scientific research, collaborative partnerships and discovery that have underpinned much of the past 2 years during the Covid-19 pandemic - ultimately resulting in COVID-19 vaccines. The year ahead is assured to be another busy one at the NIOH in an effort to ensure that workers and workplaces are adequately prepared in keeping healthy and safe.

As we continue to work together to address the various occupational health challenges related to the pandemic, we share with you the various activities the institute carried out in the previous quarter, some of which were collaborative efforts with various stakeholders. In this edition, we outline our research activities with a special focus on a study that looks at the organizational factors associated with health worker protection during COVID-19 in four South African provinces. We also showcase the scientific publications produced by our researchers during this period and profile one of our emerging researchers, an Occupational Hygienist working in the NIOH's Occupational Hygiene Section. As part of surveillance of occupational exposures and health outcomes, which is an essential function of the NIOH, this edition looks at the summary of the latest COVD-19 Healthcare Workers Hospital Admission Surveillance (DAT-COV) Report. In addition, we highlight the specialized Occupational Health and Safety Information System (OHASIS) that the NIOH SHE Department o ers. Lastly, we detail the training conducted during the quarter, including COVID-19 themed training sessions conducted for various industries.

NEWSLETTER

This new year may you rise above all challenges, defy the odds and take advantage of the many opportunities that come about as a result of these

challenging times so that your efforts turn into great achievements. More importantly, stay safe and take care of yourselves and those around you. In conclusion, I would like to thank our newsletter editorial team for their valuable time and expertise in producing and maintaining this high quality publication. I would also like to thank the authors for their valuable contribution to the newsletter. We remain grateful also to our health care providers and all frontline workers who go above and beyond the call of duty to serve our communities worldwide.

Shanaz Hampson

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MESSAGE FROM THE RESEARCH COMMITTEE CHAIR



Recently, the National Institute for Occupational Safety and Health (NIOSH), celebrated its 50th anniversary. NIOSH is the United States federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. It was created by the Occupational Safety and Health (OSH) Act of 1970, which established the Occupational Safety and Health Administration (OSHA). NIOSH is part of the Centres for Disease Control and Prevention (CDC) and mirrors the duties that NIOH performs here in South Africa. A short YouTube video that highlights NIOSH's accomplishments, such as the pocket guide to chemical hazards mobile App, can be viewed at https://www.youtube.com/ watch?v=TkLeTSI3uJI.

We are currently renewing the MoU between NIOH and NIOSH, which forms the foundation for collaborative work. For example, the Sunshine Education and Research Centre (ERC) supported by NIOSH provides small seed grant funding to support pilot research projects in Occupational and Environmental Safety and Health each year. The Pilot Project Research Training (PPRT) grant program is designed to increase research opportunities in the field of Occupational Health, Safety and Wellness (OHSW) for young investigators, or experienced investigators proposing innovative work. Projects should follow the annual solicitation themes and relate to one or more of the current National Occupational Research Agenda (NORA) priority themes. The NIOSH Research Program Portfolio supports NORA through its 10 sector programs and seven cross-sector programs. The Portfolio also has core and specialty programs that represent core activities, mandates, special emphasis areas, and methodological approaches. NIOSH uses the Burden, Need and Impact (BNI) method to identify its research priorities. In addition to conducting research, NIOSH offers grant funding to advance research beyond the Institute's current staff. Although this funding is prioritised for American citizens, international projects are accommodated when these are aligned to their scope and slot in with existing focus areas. The NIOSH Program Portfolio can be viewed at: https://www.cdc.gov/ niosh/programs/default.html . The NIOSH Priority Goals for Extramural Research fill research gaps that are currently not being addressed by NIOSH intramural or internal research and can be viewed at https://www.cdc.gov/niosh/programs/prioritygoals. html

The extramural research goals below should be considered as options when new research projects are being developed, i.e.:

- Reduce occupational cancer, cardiovascular disease, adverse reproductive outcomes, and other chronic diseases.
- Reduce occupational hearing loss.
- Reduce occupational immune, infectious, and dermal disease.
- Reduce occupational musculoskeletal disorders.
- Reduce occupational respiratory disease.
- Improve workplace safety to reduce traumatic injuries.
- Promote safe and healthy work design and well-being.

The research focus section in this edition is an example of the current need to protect specifically health workers, in relation to the last three points listed above, i.e. to reduce occupational respiratory disease, improve workplace safety, and promote safe and healthy work design. In addition, the awards and recognition section herein highlights a lifetime of contributions made by our resident Toxicology expert, Prof Mary Gulumian, where she is well known for assessing occupational risks associated with engineered nanomaterials.

As the new year starts, we strive to bring our readers research updates that are relevant to the world of occupational health, as well as encouragement to pursue all your research interests. New opportunities are available to you and we wish you a successful 2022!

Dr Natasha Sanabria

RESEARCH

RESEARCH FOCUS

ORGANIZATIONAL FACTORS ASSOCIATED WITH HEALTH WORKER PROTECTION DURING THE COVID-19 PANDEMIC IN FOUR PROVINCES OF SOUTH AFRICA

Muzimkhulu Zungu^{1,2*}, Kuku Voyi², Nosimilo Mlangeni¹, Saiendhra Vasudevan Moodley², Jonathan Ramodike^{1,2}, Nico Claassen^{2,3}, Elizabeth Wilcox⁴, Nkululeko Thunzi^{1,5}, Annalee Yassi⁴, Jerry Spiegel⁴ and Molebogeng Malotle¹

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Health workers (HWs), in short supply in many lowand-middle-income countries, are at increased risk of SARS-CoV-2 infection. In the COVID-19 health facility preparedness, the NIOH has been working with the Gauteng, Limpopo, Mpumalanga, and North West PDoH on the implementation of a HealthWISE tool to improve OHS and Infection Prevention and Control.

This was a cross-sectional study design applying participatory action research at health facilities in four provinces of South Africa. A semi-structured questionnaire and a qualitative observational HealthWISE walkthrough risk assessment was carried out to collect data on occupational safety and health (OSH) systems to identify factors associated with HW protection. Adapting the International Labour Organization and World Health Organization HealthWISE tool, we compiled compliance scores via walkthrough surveys. We used logistic regression to analyze the relationship between readiness indicators and the actual implementation of protective measures.

All provinces had SARS-CoV-2 plans for the general population but no comprehensive OSH plan for HWs. Provincial Departments of Health (PDoH) varied in how they were organized to respond: Provinces A and D had an OSH SARS-CoV-2 provincial coordinating team and a budget for occupational health; Province A had an occupational health doctor and nurse; while Province B had an occupational health nurse; Province A and D PDoHs had functional OSH committees: and Province D had conducted some health risk assessments specific to SARS-CoV-2. However, none of the assessed facilities had an acceptable HealthWISE compliance score due to poor ventilation and inadequate administrative control measures. While the supply of personal protective equipment (PPE) was adeguate, it was often inadequately worn. Our study found that having an OSH SARS-CoV-2 policy was significantly associated with higher PPE and ventilation scores. Moreover, our analysis showed that facilities with higher compliance scores had significantly lower infection rates.

Despite some initial preparedness, greater effort to protect HWs is still warranted. Low-and-middle-income countries may need to pay more attention to OSH systems and consider using the HealthWISE tool to protect HWs.

For the full text article search the following citation: BMC Health Services Research (2021) 21:1080. https://doi.org/10.1186/s12913-021-07077-w

PUBLICATIONS

Title: Asthma Phenotypes and Host Risk Factors Associated With Various Asthma-Related Outcomes in Health Workers

Author(s): HH Mwanga, R Baatjies, **T Singh** and MF Jeebhay Source: Frontiers in Allergy. October 2021 | Volume 2 | Article 747566.

Background: Work-related asthma phenotypes in health workers (HWs) exposed to cleaning agents have not been investigated extensively as other occupational exposures. This study aimed to describe asthma phenotypes and to identify important host risk factors associated with various asthma-related outcomes.

Methods: A cross-sectional study of 699 HWs was conducted in two large tertiary hospitals. A total of 697 HWs completed guestionnaire interviews. Sera collected from 682 HWs were analyzed for atopy (Phadiatop) and IgE to occupational allergens (NRL-Hev b5, Hev b6.02; chlorhexidine and ortho-phthalaldehyde—OPA). Methacholine (MCT), bronchodilator challenge (BDR) and fractional exhaled nitric oxide (FeNO) were performed. An asthma symptom score (ASS) used five asthma-related symptoms reported in the past 12 months. Current asthma was based on use of asthma medication or an asthma attack or being woken up by an attack of shortness of breath in the past 12 months. Nonspecific bronchial hyperresponsiveness (NSBH) was defined as having either a positive MCT or a significant bronchodilator response. Two continuous indices of NSBH [continuous index of responsiveness (CIR) and dose-response slope (DRS)] were calculated.

Results: The prevalence of current asthma was 10%, atopic asthma (6%) and non-atopic asthma (4%). Overall, 2% of subjects had work-related asthma. There was a weak positive association between NSBH and FeNO [CIR: Beta coefficient () = 0.12; CI: 0.03–0.22 and DRS: = 0.07; CI: 0.03–0.12]. Combining FeNO \geq 50 ppb with a BDR [mean ratio (MR) = 5.89; CI: 1.02–34.14] or with NSBH (MR = 4.62; CI: 1.16–18.46) correlated better with ASS than FeNO alone (MR = 2.23; CI: 1.30–3.85). HWs with current asthma were twice as likely to be a topic. FeNO was positively associated with atopy (OR = 3.19; CI: 1.59–6.39) but negatively associated with smoking status (GMR = 0.76; CI: 0.62–0.94). Most HWs sensitized to occupational allergens were atopic.

Conclusion: Atopic asthma was more prevalent than non-atopic asthma in HWs. Most asthma-related outcomes were positively associated with allergic predictors suggesting a dominant role for IgE mechanisms for work-related symptoms and asthma associated with sensitization to OPA or chlorhexidine.

Keywords: Asthma prevalence, Work-related asthma, Asthma phenotypes, Host risk factors, Occupational allergy



Objective: To investigate gender differences in health in informal waste pickers affected by poverty and multiple environmental and work hazards. Methods: A cross-sectional descriptive study was

conducted at two major landfill sites in a large city. Information on health, work hazards and health care access as well as blood pressure, blood glucose, cholesterol and BMI were measured. **Results:** A total of 361 waste pickers participated in the survey. The women interviewed earned on average 22% less per month than the men waste pickers. The women presented with worse chronic health outcomes (OR 2.69 95% CI 1.51–4.78) and signs of chronic disease (OR 1.73 95% CI 1.02–2.96) compared to men despite showing greater health-seeking behaviours.

Conclusion: Women waste pickers suffer worse health outcomes, such as lifestyle diseases and HIV. Further research is needed to identify the factors involved. Responsive programs supporting health care, improved working conditions and income for waste pickers may also improve their health.

Keywords Women: Waste picker, Health, Landfill Chronic disease, Informal

Title: Organizational factors associated with health worker
protection during the COVID- 19 pandemic in four
provinces of South AfricaAuthor(s): M Zungu, K Voyi, N Mlangeni, SV Moodley,
J Ramodike, N Claassen, E Wilcox, N Thunzi, A Yassi, J Spiegel and M MalotleSource: BMC Health Services Research (2021) 21:1080.
https://doi.org/10.1186/s12913-021-07077-w

Background: Health workers, in short supply in many low-and-middle-income countries, are at increased risk of SARS-CoV-2 infection. This study aimed to assess how South Africa, prepared to protect its health workers from SARS-CoV-2 infection.

Methods: This was a cross-sectional study design applying participatory action research in four provinces of South Africa. A semi-structured questionnaire and a qualitative observational HealthWISE walkthrough risk assessment was carried out to collect data on occupational safety and health (OSH) systems in 45 hospitals across four provinces to identify factors associated with health worker protection. Adapting the International Labour Organization (ILO) and World Health Organization (WHO) HealthWISE tool, we compiled compliance scores through walkthrough surveys. We used logistic regression to analyze the relationship between readiness indicators and the actual implementation of protective measures.

Results: We found that health facilities in all four provinces had SARS-CoV-2 plans for the general population but no comprehensive OHS plan for health workers. Provincial Departments of Health (PDoH) varied in how they were organized to respond: Provinces A and D had an OSH SARS-CoV-2 provincial coordinating team and a dedicated

budget for occupational health; Province A had an occupational health doctor and nurse; while Province B had an occupational health nurse; Province A and D PDoHs had functional OSH committees; and Province D had conducted some health risk assessments specific to SARS-CoV-2. However, none of the assessed health facilities had an acceptable HealthWISE compliance score (≥ 75%) due to poor ventilation and inadequate administrative control measures. While the supply of personal protective equipment was adequate, it was often not worn properly. Our study found that having an OSH SARS-CoV-2 policy was significantly associated with higher personal protective equipment and ventilation scores. In addition, our analysis showed that hospitals with higher compliance scores had significantly lower infection rates (IRR 0.98; 95% CI: 0.97, 0.98).

Conclusions: Despite some initial preparedness, greater effort to protect health workers is still warranted. Low-and middle-income countries may need to pay more attention to OSH systems and consider using tools, such as ILO/WHO HealthWISE tool, to protect health workers' health.

Keywords: SARS-CoV-2, Occupational safety and health systems, HealthWISE

Title: Methods, Models, Mechanisms and Metadata: Introducing the Nanotoxicology Collection at F1000Research [version 1; peer review: not peer reviewed]

Author(s): I Lynch, P Nymark, P Doganis, M Gulumian, TH Yoon, DST Martinez, A Afantitis Source: F1000 Research 2021, 10:1196

Abstract: Nanotoxicology is a relatively new field of research concerning the study and application of nanomaterials to evaluate the potential for harmful effects in parallel with the development of applications. Nanotoxicology as a field spans materials synthesis and characterisation, assessment of fate and behaviour, exposure science, toxicology / ecotoxicology, molecular biology and toxicogenomics, epidemiology, safe and sustainable by design approaches, and chemoinformatics and nanoinformatics, thus requiring scientists to work collaboratively, often outside their core expertise area. This interdisciplinarity can lead to challenges in terms of interpretation and reporting, and calls for a platform for sharing of best-practice in nanotoxicology research. The F1000Research Nanotoxicology collection, introduced via this editorial, will provide a place to share accumulated best practice, via original research reports including no effects studies, protocols and methods papers, software reports and living systematic reviews, which can be updated as new knowledge emerges or as the domain of applicability of the method, model or software is expanded. This editorial introduces the Nanotoxicology Collection in F1000Research. The aim of the collection is to provide an open access platform for nanotoxicology researchers, to support an improved culture of data sharing and documentation of evolving protocols, biological and computational models, software tools and datasets, that can be applied and built upon to develop predictive models and move towards in silico nanotoxicology and nanoinformatics. Submissions will be assessed for fit to the collection and subjected to the F1000Research open peer review process.

Keywords: Nanomaterials, Nanosafety, Exposure, toxicity, Risk assessment, Mode of action, Toxicogenomics, Bio-nano interface, Nanoinformatics, FAIR data, Standardisation, Regulation, Green and sustainable nanomaterials, Safe-by-design, Environmental fate and behaviour



Title: Characterizing Inflammatory Cell Asthma Associated Phenotypes in Dental Health Workers Using Cytokine Profiling

Author(s):): T Singh, B Bello and MF Jeebhay Source: Frontiers in Allergy. November 2021 | Volume 2. Doi:10.3389/falgy.2021.747591

Background: Cytokines elicit a pro-inflammatory response by modifying the airway microenvironment in patients with acute or chronic asthma. The expression pattern of several distinct cytokines could be a useful discriminator in asthma.

Methods: This study aimed to identify asthma subject groupings based on common inflammatory patterns and to determine the relationship between these identified patterns and asthma-associated clinical indices.

Results: A sub-group of 76 dental healthcare workers (HCWs) identified from a larger cross-sectional study of 454 dental HCWs in five dental institutions were evaluated further. A self-administered questionnaire elicited the health and employment history of subjects. Sera were analyzed for atopic sta-

tus, latex sensitization, and 12 cytokines (IL-1b, 3, 4, 5, 6, 7, 8, 10, 12p70, eotaxin, GM-CSF, TNF-a). Pre and post-bronchodilator spirometry was performed on all HCWs. Data clustering and factor analysis were used to identify inflammatory cluster patterns of cytokines. Associations between the cytokine cluster groupings and relevant asthma-associated clinical indices were determined using multivariate logistic regression. The classification of asthma subtype based on cytokine patterns demonstrated both eosinophilic and neutrophilic inflammatory responses. Four phenotypically distinct subgroups relating to the severity of inflammation (acute or chronic) of the cell types were identified. Cytokine determinants for the neutrophilic subtype included IL-1b, 6, 8, 10, 12p70, and TNF- a whereas for the eosinophilic subtype these included IL-3, 4, 5, 7, eotaxin, and GM-CSF. The multivariate models showed a significant association between work-related chest symptoms and all four inflammatory patterns. However, stronger associations were observed for the acute neutrophilic (OR = 6.00, p < 0.05) compared to acute and chronic eosinophilic responses (OR = 4.30, p < 0.05; OR = 4.93, p < 0.05), respectively. Subjects with airway obstruction were more likely to have a mixed cellular infiltrate. The odds of work-exacerbated asthma were increased in acute or chronic eosinophilia (OR = 7.75 and 8.12; p < 0.05), respectively as well as with acute neutrophilia (OR = 6) sub-type.

Conclusion: This study demonstrated that neutrophilic inflammatory cell asthma phenotypes coexist with eosinophilic inflammatory phenotypes suggesting a possible dual pathway for asthma in dental health workers, probably due to mixed exposures to high molecular weight (e.g., latex) and low molecular weight (e.g., acrylates) agents.

Keywords: Neutrophilic asthma, Eosinophilic asthma, Cytokines, Work-related asthma, Phenotypes, Endotypes

The Use of HRM Shifts in qPCR to Investigate a Much Neglected Aspect of Interference by Intracellular Nanoparticles

Author(s): NM Sanabria and M Gulumian Source: PLOS ONE | https://doi.org/10.1371/journal.pone.0260207 December 7, 2021

Background: Genetic molecular studies used to understand potential risks of engineered nanomaterials (ENMs) are incomplete. Intracellular residual ENMs present in biological samples may cause assay interference.

Methods: This report applies the high-resolution melt (HRM) feature of RTqPCR to detect shifts caused by the presence of gold nanoparticles (AuNPs). A universal RNA standard (untreated control) sample was spiked with known amounts of AuNPs and reverse transcribed, where 10 reference genes were amplified.

Results: The amplification plots, dissociation assay (melt) profiles, electrophoretic profiles and HRM difference curves were analysed and detected interference caused by AuNPs, which differed according to the amount of AuNP present (i.e. semi-quantitative). Whether or not the assay interference was specific to the reverse transcription or the PCR amplification step was tested. The study was extended to a target gene-of-interest (GOI), Caspase 7. Also, the effect on in vitro cellular samples was assessed (for reference genes and Caspase 7). This method can screen for the presence of AuNPs in RNA samples, which were isolated from biological material in contact with the nanomaterials, i.e., during exposure and risk assessment studies.

Conclusion: This is an important quality control procedure to be implemented when quantifying the expression of a GOI from samples that have been in contact with various ENMs. It is recommended to further examine 18S, PPIA and TBP since these were the most reliable for detecting shifts in the difference curves, irrespective of the source of the RNA, or, the point at which the different AuNPs interacted with the assay.

Keywords: High resolution melt (HRM), Gene expression, RT-qPCR, Nanoparticle (NP), Nanomaterials (ENMs), Toxicology



Title: Using the Isalos platform to develop a (Q)SAR model the predicts metal oxide toxicity utilizing facet based electronic, image analysis based, and periodic table derived properties as descriptors

Author(s): MM Thwala, A Afantitis, AG Papadiamantis, A Tsoumanis, G Melagraki, et al.

Source: Structural Chemistry https://doi.org/10.1007/s11224-021-01869-w

Abstract: Abstract Engineered nanoparticles (NPs) are being studied for their potential to harm humans and the environment. Biological activity, toxicity, physicochemical properties, fate, and transport of NPs must all be evaluated and/or predicted. In this

work, we explored the influence of metal oxide nanoparticle facets on their toxicity towards bronchial epithelial (BEAS-2B), Murine myeloid (RAW 264.7), and E. coli cell lines. To estimate the toxicity of metal oxide nanoparticles grown to a low facet index, a quantitative structure–activity relationship ((Q) SAR) approach was used. The novel model employs theoretical (density functional theory calculations) and experimental studies (transmission electron microscopy images from which several particle descriptors are extracted and toxicity data extracted from the literature) to investigate the properties of faceted metal oxides, which are then utilized to construct a toxicity model. The classification mode of the k-nearest neighbour algorithm (EnaloskNN, Enalos Chem/Nanoinformatics) was used to create the presented model for metal oxide cytotoxicity. Four descriptors were identified as significant: core

size, chemical potential, enthalpy of formation, and electronegativity count of metal oxides. The relationship between these descriptors and metal oxide facets is discussed to provide insights into the relative toxicities of the nanoparticle. The model and the underpinning dataset are freely available on the NanoSolveIT project cloud platform and the NanoPharos database, respectively.

Keywords: Cytotoxicity, Nano-(Q)SAR, Facets, Descriptors, Nanotopography

HIV and TB Workplace Program for Street Vendors: A Situational Analysis

Author(s): N. Mlangeni, K. Du Preez, M. Mokone, M. Malotle, S. Kisting, J. Ramodike, M. Zungu Source: NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy 1–10

Abstract: In South Africa, 15 percent of informal economy workers are street vendors. The organization of occupational health services in the country, is fragmented and does not cover informal workers. Conditions of work make informal workers extremely vulnerable to human immunodeficiency virus (HIV) and tuberculosis (TB) exposure. In this study, a qualitative risk assessment was conducted among street vendors, followed by focus group discussions. Interpretation of data was according to major themes extracted from discussions. Workers are exposed to several occupational health hazards identified during the risk assessment. There is a lack of workplace HIV and TB services and overall poor access to healthcare. Street vendors, especially females, are at higher risk of HIV, due to gender inequalities. Comprehensive gender-sensitive training on occupational health and safety, HIV, and TB should be prioritized. To reach Universal Health Coverage and achieve the Sustainable Developmental Goals' targets, the health system should improve services for informal economy workers.

Keywords: Occupational health and safety, HIV and TB workplace program, Street vendors, Informal workers, Access to occupational health services, Worker's health



IN THE SPOTLIGHT



Karen du Preez

Occupational Hygienist & Technical Signatory (SANAS 17020), Occupational Hygiene Section

Why did you choose this career and research path?

I am passionate about occupational hygiene as the primary mandate of the profession is to protect the health and safety of employees from workplace hazards and their environment. I find it fulfilling to see my professional roles and responsibilities having a direct positive impact on employee wellbeing by contributing in safeguarding their wellbeing and increase their DALYS.

What training and qualifications did you undergo and where?

I obtained my BSc Physiology at NWU in 1994, a Certificate in Occupational Hygiene at TUT in 2006, and the Intermediate Certificate in Mine Environmental Control in 2012. I am currently studying towards a Master of Public Health: Environmental & Occupational Health (Occupational Hygiene) degree at UP. I am registered with the Southern African Institute for Occupational Hygiene (SAIOH) as an Occupational Hygienist since 2009.

What are the most enjoyable aspects of doing research?

To be involved in the process of better understanding topics related to occupational hygiene. Also to observe a unique outcome as a result of statistical analysis of data that wouldn't be processed the same using occupational hygiene tools.

What are your research highlights to date?

Although I've been working in the field of Occupational Hygiene for more than 17 years, this is my first experience of doing research as principal investigator and I am excited to begin the journey that will help align my technical experience with academic knowledge.

What are your career goals?

I want to further grow in the field of Occupational Hygiene, specifically with regard to academic studies including research. 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 a summary of the latest Covid-19 Healthcare Workers Hospital Admission Surveillance (DATCOV) Report.



HEALTHCARE WORKERS HOSPITAL ADMISSION SURVEILLANCE (DATCOV)

DATCOV is a national hospital surveillance database for COVID-19 hospital admissions. The surveillance was instituted on the 1 April 2020. Data from hospital admissions with COVID-19 are received from all private and public hospitals across South Africa. By 18 December 2021, 666 facilities were providing data.

METHODOLOGY

Data is either entered directly on the DAT-COV online platform or through the importing of electronic data. The data contains information on all individuals who have a positive RT-PCR test or a positive antigen test for SARS-CoV-2 and a hospital stay of at least one full day. Healthcare workers (HCW) were identified as anyone who worked in a health facility or provided health services.

Data were described as cases admitted, as well as incidence risk which was defined as the total number of new admissions with COVID-19 divided by the population at risk (Stats SA mid-year population for 2020). Waves were defined as the time from when the incidence risk reached 5 admissions per 100 000 people and remained until it returned to this level.

RESULTS

A total of 415497 hospital admissions were reported to the DATCOV database by 18 December 2021. Healthcare workers made up 2.4% (9901) of the admissions for COV-ID-19. A total of 30% of the HCWs provided detailed job titles. These consisted of 56% nurses, 24.3% porters and admin staff, 8.6% allied HCWs, 7.4% doctors, 2.3% paramedics and 1.3% laboratory scientists.

There were lower HCW admissions in the third wave compared to the first and second waves.

The median age of admitted HCWs was 49 years and 67.2% were females, although females make up a large proportion of employed HCWs. The prevalence of co-morbid conditions among admitted HCWs was 52.4% with hypertension the most prevalent at 35.7% followed by diabetes 22.8%. A total of 5.1% of HCWs were HIV positive and 4.9% were obese. supplemental oxygen and 34% required invasive mechanical ventilation. The average age of patients who received oxygen or ventilation (52.4yrs) was significantly older than those who did not require support (46.5yrs) (p<0.0001). Of the 9901 admitted HCW, 12.5% died giving a case fatality ratio of 12.7% (1233/9712) much lower compared to the case fatality ratio of non-HCWs 23.7%. The median age of those who died was 58yrs 10 years older than the rest of the patients. A total of 65.3% of those who died reported a comorbid disease.

SURVEILLANCE



Figure 1: Number of reported admissions among HCWs by epidemiologic week and health sector 5 March 2020 - 18 December 2021.

Table 1: Comparison of HCW outcomes in the three waves.

| | First Wave | Second Wave | Third Wave |
|-------------------------------|------------|-------------|------------|
| % HCW Admissions | 1.0% | 1.0% | 0.4% |
| % HCW Deaths | 0.4% | 0.7% | 0.3% |
| HCW Case fatality ratio | 9.2% | 15.6% | 14.2% |
| Non-HCW case fatality rate | 20.9% | 25.0% | 23.8% |

CONCLUSION

The number of HCW admissions was lower in the third wave compared to the first two waves possibly due to having received the vaccination and natural immunity from the first two waves (Table 1).

While in non-HCWs the admissions were higher in the second and third waves than the first wave. The case fatality rates for both HCWs and non-HCWs were higher in the second and third waves than in the first wave.

For comprehensive reports on HCW admissions – please see https://www.nioh.ac.za/covid-19oc-cupational-health-surveillance/

For more information on Occupational Health Surveillance at the NIOH please contact the Epidemiology and Surveillance Section at 011 712 6472 or info@nioh.ac.za

The NIOH continues to provides specialized, cost effective occupational health and safety services to national and provincial government departments, various industries and trade unions as well as support for occupational health and safety within the NHLS. In this issue, our service delivery input profiles a webbased programme, the Occupational Health and Safety Information System (OHASIS).



OCCUPATIONAL HEALTH AND SAFETY INFORMATION SYSTEM (OHASIS)

OHASIS is a comprehensive occupational health information programme that was developed by the University of British Columbia primarily for the health care industry, but can be utilised in many varied industries and occupational settings. During the development phase, OHASIS was piloted in developing countries including South Africa.

OHASIS is a web-based programme, which has the ability to control access to information of a confidential nature such as medical, personal and safety information. The NIOH refined OHASIS through multiple additional versions and customisations specifically for the South African setting. The NIOH subsequently purchased the IP for the software and has installed it at different institutions both within and outside of the South African borders.

The following modules have been developed in OHASIS, however additional modules can be developed and customised as required upon request.



| MODULE | DESCRIPTION |
|---------------------------|---|
| Incident Reporting | Records and tracks workplace incidents by: Exposure type Cause Contributing factors Effect Produces variety of relevant reports for health and safety committee managers, and senior executives, by occupation, department, etc. Emails notification for investigation to the identified person |
| Incident Investigation | Facilitates incident investigations, including recommended prevention measures Incorporates EPINet Needlestick and Sharp Object Injury and EPINet Blood – Body Fluid Exposure forms Tracks investigation to closeout |

DELIVERY SERVICE SPECIALIZED

| MODULE | DESCRIPTION |
|--|--|
| Employee Health | Manages individual employee health, via secure and confidential module: Occupational medical surveillance Health history: acute and chronic conditions Occupational history and risks Vaccinations: COVID-19, Hepatitis B, Influenza, MMR, and others Training received HIV: Counselling & testing, CD4 count, vial load, treatment TB: Symptoms, status, treatment HIV and TB modules linked for ease of treating co-infection Module only accessible to designated occupational health practitioners Provides reports of aggregate employee data |
| Vaccination and Immunity Status | Provides a record of vaccinations given to an employee Provides a record of immunity status of the employee Emails notification for due vaccination |
| Respirator Fit Testing and Predictor | Provides a record of the correct make and size of respirator for the identified employee Provides a tool to assist and predict a probable style and size for the identified individual |
| Workplace Assessment | Facilitates assessment of the workplace to identify hazards and models Allows risk assessments and prioritization of recommended controls and prevention measures Based on systematic and categorical workplace assessment checklist Provides reports on workplace hazards by location and type |
| Health & Safety Committee | (In development) Generates Health and Safety Committee Agendas Generates Health and Safety Committee Minutes Imports incidents into the Health and Safety Committee Agendas Captures routine checklists for safety inspections Imports checklists into Health and Safety Committee Agendas |
| Hazardous Waste | Facilitates the tracking of hazardous waste from pickup to treatment and final disposal. Provides reports on waste generated in kg, number and type of contain- ers used and outstanding consignments of waste sent for treatment where no proof of treatment and disposal has been received from the contracted company. |
| Audit | Facilitates a health and safety audit of facilities using set questions that are formulated by the client to determine level of compliance. Provides required actions to ensure correction in the event of non-compliance. Provides reports of findings and required corrective actions Generates and sends reports to identified stakeholders by email |
| Equipment Maintenance Tracking | Records routine and emergency maintenance of equipment Sends reminders prior to the next planned maintenance Uploads maintenance records Provides records of maintenance due and completed |

| MODULE | DESCRIPTION |
|----------------|--|
| Self-reporting | OHASIS has the facility to allow any employee, irrespective of them being a registered user or not to: Report an incident online Complete a TB cough questionnaire Complete a COVID-19 screening questionnaire Generates and sends an email to a designated Occupational Health Professional within the organisation if there is a positive screening. |

OHASIS supports surveillance and compliance with Occupational and Environmental Health and Safety (OEHS) legislation, and provides information for research. During 2021, OHASIS was extensively adapted to cater for new challenges posed by the COV-ID-19 pandemic, and further enhancements were made to cater for the unique needs posed by the NHLS' laboratory environment. The improved system includes adaptations to incorporate COVID-19 as a specific disease in the reporting section, the provision of an online screening platform for self-reporting by employees with COVID-19 symptoms and automatic email notifications to an identified health worker, the presentation of all COVID-19 related information on dashboards, a facility to record all COVID-19 vaccinations, tests and results, as well as the capability to capture COVID-19 healthcare waste. Beyond the NHLS, a number of local and international organisations have shown a keen interest in the system's rollout.

OHASIS has proved itself to be an agile and valuable health information system that the NIOH's IT Department has adapted to cater for COVID-19. It is valuable in that OHASIS provides weekly live statistics for the NHLS' EXCO and COVID-19 officers so that ongoing monitoring and management decisions can be taken.

The following updates have been done to OHASIS, specifically to cater for COVID-19:

- The inclusion of COVID-19 as a specific disease in the reporting section
- The provision of a platform for employees to screen for COVID-19 symptoms online
- Provision for the notification to an occupational health practitioner of any person who screens positive for any COVID-19 symptoms
- The presentation of a summary of COVID-19-related information in dashboards
- Provision for the recording of COVID-19 vaccinations
- Provision for the recording of COVID-19 tests and results
- Provision for the capturing of COVID-19 healthcare risk waste (as required by legislation)

For more information or a demo, contact: Mr David Jones | E-mail: ohasis.support@nhls.ac.za | Phone:+27-(0)11-712-6400



Since the outbreak of COVID-19 in South Africa in March 2020, the NIOH has carried out numerous training sessions for different industries in both the formal and informal sectors. Many of these sessions were training for essential services, government and frontline workers, the informal sector and private companies on COVID-19 related subjects. These training sessions covered updates on the virus and critical topics like national regulatory requirements; roles and responsibilities in the workplace; risk assessments; routes of transmission; preventative/ control measures; the proper usage of PPE and face masks; cleaning and decontamination processes; ventilation and vaccination; how to deal with positive cases in the workplace; potential sources of exposure and mental health. In keeping with social distancing, these online interactive sessions were held via Zoom conferencing where stakeholders across the country and beyond could log in, watch and participate. Videos, audio and presentations for these sessions were subsequently uploaded onto the NIOH website and sent out to all relevant stakeholders.

In the training sector, the goals of the NIOH with regard to impact are: a healthy and safe work environment; a healthy worker whose work ability is good; and a work community that supports health and well-being. In this issue, we look at the knowledge exchange and capacity building training activities undertaken by the NIOH during the last quarter of 2021.

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TRAINING CONDUCTED



COVID-19 Webinar: Information Session on COVID-19 Vaccines

This 2-hour session hosted by the NIOH Training Unit was held on 16 September 2021 and facilitated by the NIOH Occupational Medicine Section. The webinar was conducted for staff of the South African Social Security Agency (SASSA) Northern Cape Province. The target employees included frontline staff who administer social grants/pension applications daily, managers, senior managers and occupational health and safety (OHS) representatives and practitioners.

The webinar was opened by Mrs Emily Maluleke, Senior Manager: Human Capital Management for SASSA Northern Cape. The webinar was conducted within the context of increasing focus on the advantages of vaccine uptake. The presenters from the NIOH Occupational Medicine Section included Dr Odette Volmink who presented the "COVID-19 Update" and "COVID-19 workplace controls". Dr Courage Khoza presented on *"Immunology and COVID-19" and "COVID-19 Vaccine roll-out"*. The session recorded 145 SASSA staff members who joined the webinar.

COVID-19 Webinar: Preventing, Identification & management of infections in the COVID-19 work context

This training session was held on 1 October 2021 and was conducted for the staff of the Office of the Chief Justice (OCJ) at national and provincial levels. It had a special focus on Covid-19 vaccines in the workplace. The target employees included staff who have responsibilities as OHS practitioners. 38 participants were in attendance. The 2-hour webinar was hosted by the NIOH Training Unit and facilitated by the NIOH Occupational Medicine Section.

The webinar was opened for the OCJ by Ms Mapula Mpepele, Manager: Employee Wellness – Occupational Health and Safety. The NIOH presenters included Dr Hloniphile Maso (on "COVID-19, Background & Updates"), Dr Courage Khoza (on "COVID-19 workplace controls", and Dr Edward Sepirwa (on "Management of positive COVID-19 cases & contacts in the workplace").

COVID-19 Webinar: COVID-19 vaccine education for MSC Cruises Staff (Session 1 of 2)

Held on 4 October 2021, this session was hosted by the NIOH Training Unit and facilitated by the NIOH Occupational Medicine Section and was attended by 53 people who were employees of the MSC Cruises Call Centre. The webinar focused on the background and various aspects of the Covid-19 vaccine in the workplace The webinar was opened by Ms Meena Peter, Training & Development Manager, on behalf of MSC Cruises. The NIOH trainers included Dr Nompumelelo Ndaba (on "COVID-19 and the workplace update") and Dr Courage Khoza (on "Vaccines for Covid-19"). The session was chaired by Mr Ashraf Ryklief, NIOH National OHS Training Manager.

COVID-19 Webinar: COVID-19 vaccine education for MSC Cruises Staff (Session 2 of 2)

Held on 27 October 2021, this session was hosted by the NIOH Training Unit and facilitated by the NIOH Occupational Medicine Section. It was attended by 32 people who were employees of MSC Cruises (noncall centre staff). The webinar was opened by Ms Lisa Ferris on behalf of Ms Meena Peter, MSC Cruises Training & Development Manager. NIOH trainers included Dr Odette Volmink (on "COVID-19 and the workplace update") and Dr Courage Khoza (on "Vaccines for COVID-19"). Mr Ashraf Ryklief, NIOH National OHS Training Manager, facilitated the webinar programme.

COVID-19 Input: Background on COVID-19 and State of the Pandemic in SA. What does it mean during and post the pandemic?

The NIOH provided input on COVID-19 at this event, which was convened by the National Union of Mineworkers (NUM). The input to the NUM's National Health and Safety Committee 2021/2022 strategic session was conducted on 11 November 2021 and the session lasted for 2 hours. A total of 24 national office-bearers and officials participated. The NIOH input was delivered by Dr Nompumelelo Ndaba (Acting Head of NIOH's Occupational Medicine Section).

COVID-19 Webinar: COVID-19 prevention and vaccines in the workplace (Session 1 of 2)

This session took place on 18 November and was hosted by the NIOH Training Unit and facilitated by the NIOH Occupational Medicine Section for the Road Accident Fund (RAF). 227 RAF staff members attended. Ms Mannini Radebe, the RAF's Employee Wellness Manager, opened the webinar. NIOH trainers included Dr Hloniphile Maso (on "COVID-19 background and updates"), Dr Edward Sepirwa (on "COVID-19 workplace controls") and Dr Courage Khoza (on "Immunology and COVID-19 vaccines"). The webinar was coordinated and chaired by Mr Ashraf Ryklief, NIOH National OHS Training Manager.

NON COVID-19 RELATED TRAINING

Virtual tour of the NIOH Libraries – University of Limpopo

This online event was a collaboration between NIOH Information Services Section Department and the University of Limpopo's Information Studies Department and was conducted on 14 October 2021. The participants were students from the Information Services faculty. The session was opened by Ms Angel Mzoneli (NIOH Head of Section: Information Services) and Mr Amogelang Molaudzi, the university's Information Studies lecturer. NIOH trainers included Ms. Ntomboxolo Ndubandubane (NICD Library Supervisor) who provided an overview of the three NHLS Special Libraries, Mr Simphiwe Yako (NIOH/NHLS Archivist) who covered the archival functions and services provided, and Ms Talifhani Ramaliba (Professional Institutional Repository, Information Library) who provided insight into the institutional repository services. The students engaged with the speakers during the Q&A slot.

SAIOH 2021 Virtual Annual Scientific Conference (8 sessions)

The NIOH hosted the Southern African Institute for Occupational Hygiene (SAIOH) 2021 Virtual Annual Conference. These sessions were held from 18 October to 5 November 2021. It was attended by SAIOH members and organized and led by the SAIOH leadership. SAIOH's lead co-ordinator was Mr Deon Jansen van Vuuren. SAIOH speakers included international and South African experts in occupational hygiene and related fields. The session themes covered Global trends & envisioned futures that could affect the field of Occupational Hygiene; Toxicology and Hazardous Chemical Agents; Technical aspects relating to chemical and noise surveys; Guidance of analysts involved in asbestos work; Physical agents and Engineering controls; Ergonomics, psychosocial stressors, and occupational disease; the Mining Forum; and Ethics, communication and training. The eight (8) conference webinars amounted to a total online time of over 27 hours. Ashraf Ryklief, NIOH National OHS Training Manager chaired the sessions on the NIOH's Zoom platform, and provided support for the preparation and post-webinar records. The NIOH IT Department provided support with the platform's technical requirements.

Basic biochemical principles for bacterial testing and detection in different products workshop

This training workshop took place over three days f rom 9 to 11 November 2021 and was hosted by the NIOH Toxicology and Biochemistry Section on Zoom. Dr Natasha Sanabria, Head of the NIOH's Toxicology and Biochemistry Section, coordinated and led the training sessions that were customized for an external client. NIOH speakers were Dr Jitcy Joseph (Toxicology & Biochemistry Section), Ms Jeanneth Manganyi (Occupational Hygiene Section), Ms Dikeledi Matuka (Immunology and Microbiology Section) and Dr San-abria. The participants were supplied with a "Biochemical Principles Bacterial Testing Workshop Manual" that included 6 case studies. The course provided the attendees with relevant scientific journal articles, useful references and resources, and was conducted in an interactive manner.



SUBSCRIBE Follow us on YouTube https://www.youtube.com/channel/UCA24O1OQmshRuX-pKzVWtWA/videos



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

LIFETIME ACHIEVEMENT



Prof Mary Gulumian

After many years and many awards, publications, successful scientific meetings and student graduations, Prof Gulumian will be concluding her term of service at NIOH/NHLS. Over the years, she served as an honorary Professor in the Haematology and Molecular Medicine Department at WITS, where she presented courses on Health Risk Assessment (nanotechnologies) and supervised post graduate students. She is the founding member and previous President of the Society Free Radical Research South Africa (SFRR-SA). She is also the founding member and President of the Toxicology Society of South Africa (TOXSA). In this capacity, Prof Gulumian serves as a Council member of the South African Council for Natural Scientific Professions (SACNASP) and is involved in the registration of Toxicologists in South Africa. She also sets up curricula necessary for this registration.

Prof Gulumian also served in the Executive Committee 2013-2016 of the International Union of Toxicology (IUTOX) as Vice President. In this capacity, she was involved in the harmonization of registrations of toxicologists worldwide. She was a member of the final review board of WHO Concise International Chemical Assessment Documents (CI-CAD) publications on a number of toxic compounds. She diligently represents South Africa in the OECD Working Party on Manufactured Nanomaterials as well as on the Expert Technical Committee for WG3 of ISO/TC 229 on nanotechnologies. In addition, Prof Gulumian is a member of the Editorial Board of the journal of Human and Experimental Toxicology (HET) and also the journal Particle and Fibre Toxicology (PFT).

Throughout her working life, she has authored and co-authored numerous scientific publications, resulting in a total of 2189 Google Scholar Citations, an h-index of 23 and an i10-index of 40. All her achievements have culminated in her being the recipient of the 2021 Lifetime Achievement Award from IUTOX, where the Executive Committee created this award to honour "a distinguished scientist who has made lasting contributions to toxicology in countries where toxicology is underrepresented." Not only has Prof Gulumian taught others about the different aspects of Toxicology, but also research in general, where she often shares her knowledge and experiences. This is one of those cases where the shoes are too big to fill and the work will never be the same.

We would like to take this opportunity to express our words of appreciation, our deepest gratitude and utmost respect for Prof Gulumian and her impact on both the national and international scientific arena. We wish her all the best and great success in her new endeavours as she transitions into the next phase, and takes all of life's varied situations in her stride. Prof Gulumian is a toxicology legend and her impact will be felt for many years to come.

ACHIEVEMENTS





Mrs M Magogotya of the Toxicology and Biochemistry Section was appointed as member of the Advisory board of the Biotechnology and Food-Technology department at the Tshwane University of Technology on the 8th of October 2021 and recently completed her MTech in Biotechnology, graduating from the Tshwane University of Technology.

Mrs M Magogotya



Dr N Sanabria was successful in the NRF Competitive Support for Unrated Researchers (CSUR) grant award for 2022-2024 (15 Nov 2021).

Dr N Sanabria



Dr J Joseph was successful in the NRF Thuthuka grant award for 2022-2024 (3rd Dec).

Dr J Joseph

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 announced.

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/wpcontent/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/wpcontent/uploads/2020/08/VulnerableworkersUpload.mp4

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

4.What employers need to know about risk assessment https://www.nioh.ac.za/wpcontent/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/wpcontent/uploads/2020/07/When-an-employee-testspositive.mp4

6.The importance of Medical Screening in the Workplace https://www.nioh.ac.za/wpcontent/uploads/2020/08/The-importance-ofmedical-screening-FINAL.mp4

7.Working during lockdown? How to stay safe https://www.nioh.ac.za/wpcontent/uploads/2020/06/Twitter_01_Lockdownworkers-FINAL-3.mp4

8.What you need to know about donning & doffing surgical masks https://www.nioh.ac.za/wpcontent/uploads/2020/07/Donning-and-doffingsurgical-mask.FINAL-2-mp4.mp4 9.What you need to know about surgical masks https://www.nioh.ac.za/wpontent/uploads/2020/06/T witter_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/wpcontent/uploads/2020/07/Donning-and-doffing-ofcup-shaped-N95-respirator.mp4

12.What you need to know when donning and doffing a Kimberly Clark respirator https://www.nioh.ac.za/wpcontent/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/wpcontent/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-glovesbeak-method-FINAL.mp4



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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 <u>http://www.nioh.ac.za/covid-19/</u>

COVID-19 Ventilation & Vaccination Vital for workplace safety

In addition to the known non-pharmaceutical COVID-19 control measures, here are some other crucial precautions that can help.





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

"Healthy, Safe, Happy & Sustainable Workplaces"





PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING.