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Health Surveillance and Health Information Systems:

Using data to protect the health of workers

Rajen Naidoo
Professor

Occupational and Environmental Health
University of KwaZulu-Natal

O·E·H
OCCUPATIONAL AND ENVIRONMENTAL HEALTH

Introduction

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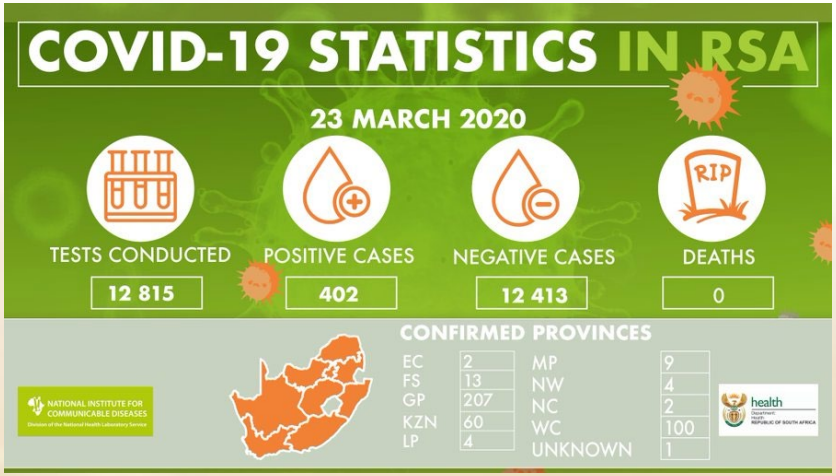
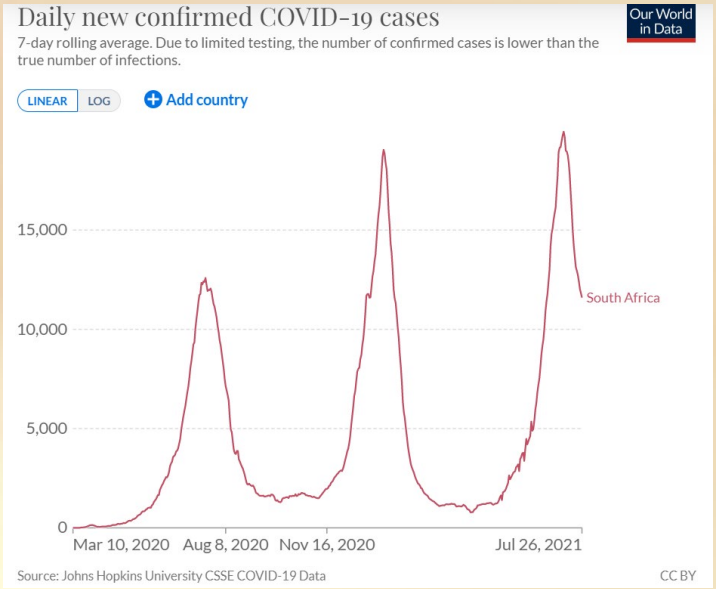


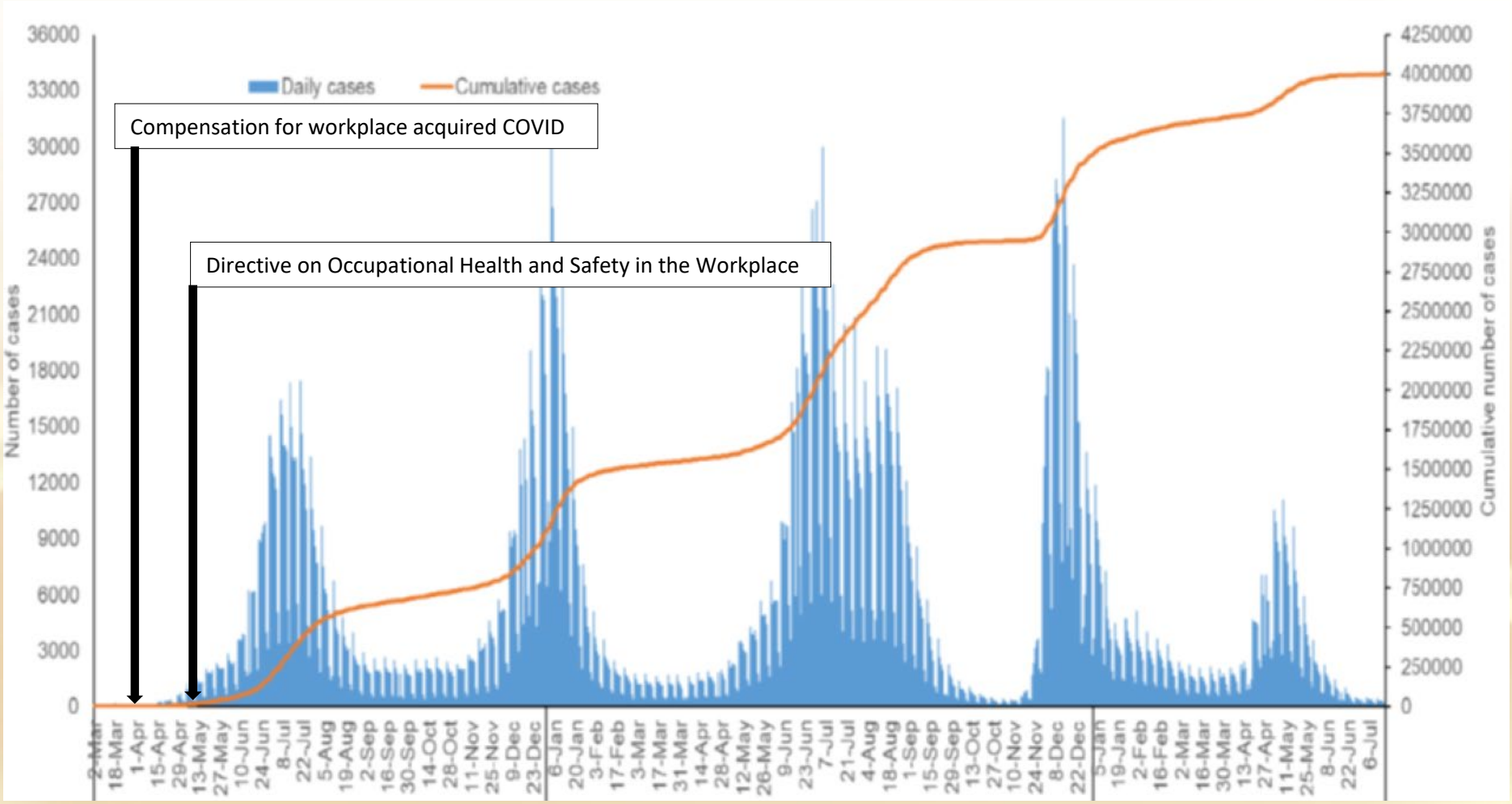


COVID-19 SA ACTIVE CASES

	2022.10.12	Total	Recoveries	Deaths	Active
1	Western Cape	705,021	680,999	22,359	1,663
2	Free State	216,735	207,466	7,895	1,374
3	Gauteng	1,333,367	1,311,426	21,053	888
4	Kwazulu-Natal	719,504	702,451	16,275	778
5	Mpumalanga	202,986	198,001	4,770	215
6	Northern Cape	115,489	112,040	3,249	200
7	Eastern Cape	365,086	347,992	16,907	187
8	Limpopo	160,229	155,467	4,678	84
9	North West	202,880	197,779	5,060	41
		4,021,297	**3,913,621**	**102,246**	**5,430**

OCCUPATIONAL AND ENVIRONMENTAL HEALTH

Introduction



Adapted from Naidoo et al., 2022

Occupational Disease Reporting Standardisation

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- “needed to standardise the reporting of all data related to OSH, from prevention, surveillance, treatment and compensation.”
- “CF, RMA, and FEM had different ways of reporting and integrating their reports due to the lack of standardization”

employment & labour
Department:
Employment and Labour
REPUBLIC OF SOUTH AFRICA

AGENDA

TCOID ILO WORKSHOP ON STANDARDISATION OF OCCUPATIONAL INJURIES AND DISEASES REPORTING
DATE: 02 June 2021
TIME: 08:30 – 16:00
ZOOM VIRTUAL PLATFORM
CHAIRPERSON: Dr T Balfour

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Occupational Disease Reporting Standardisation

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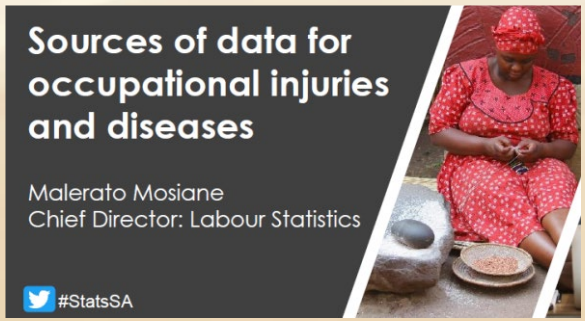

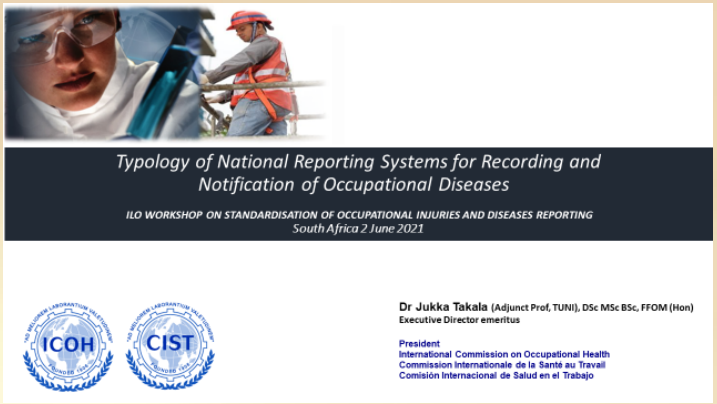

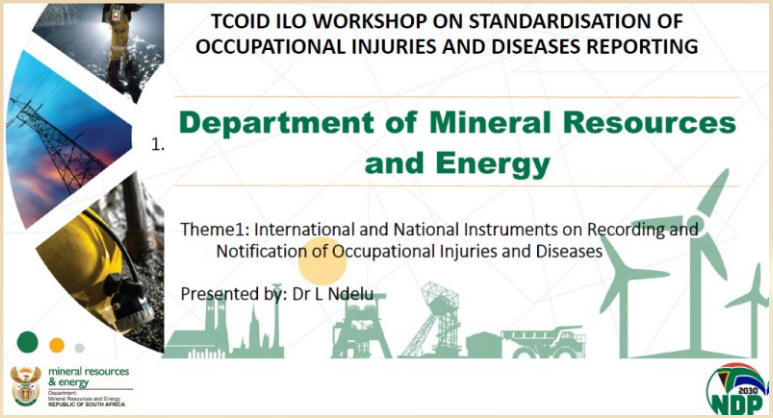

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Project Objectives

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- provide for ***surveillance of workers' health*** in relation to work and the collection and use of OSH ***data for preventive purposes***;
- provide for ***evidence-based regulatory framework*** for development of national policies, laws and regulations on the recording and notification of occupational injuries and diseases;
- provide for evidence-based, concrete, practical guidelines for establishing and operating a ***national system for recording and notification***; and
- enable effective use of OHS data in ***prevention and monitoring*** of occupational injuries and diseases.

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COVID-19 and Data

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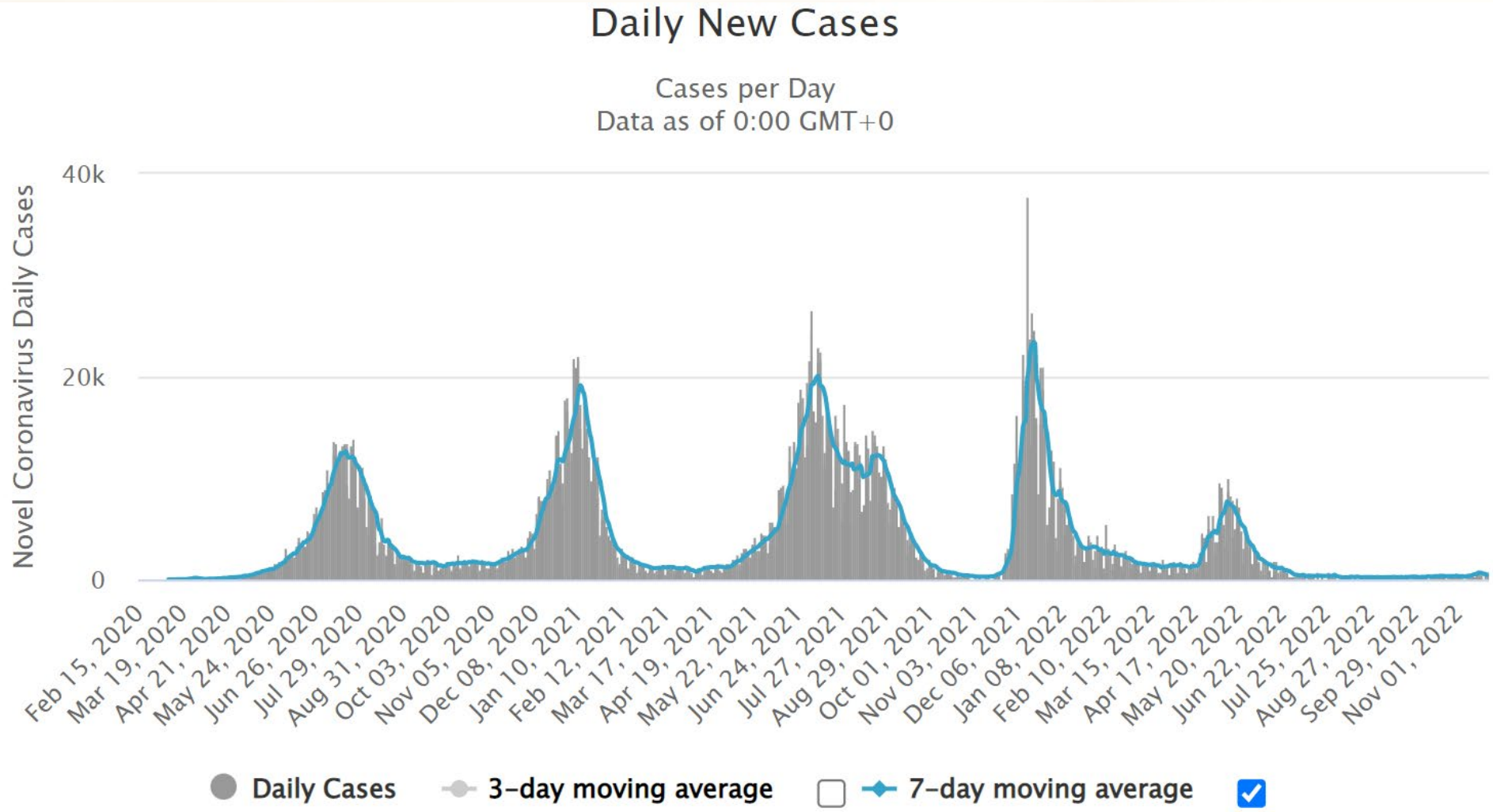

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COVID-19 and Big Data

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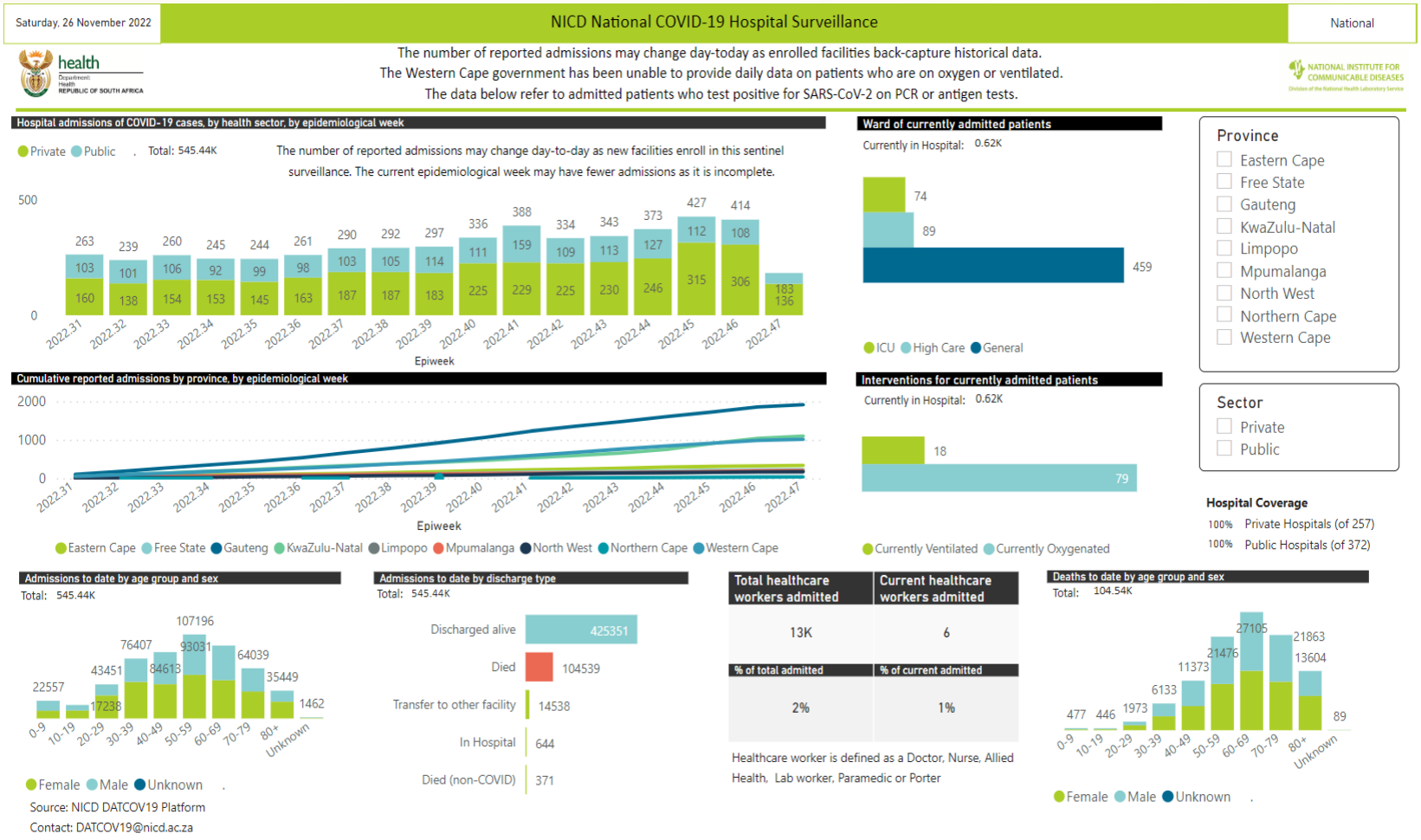

Go back | National Daily R... | 85%

Microsoft Power BI | 1 of 2

COVID-19 and Healthworkers

March 2020 – August 2022

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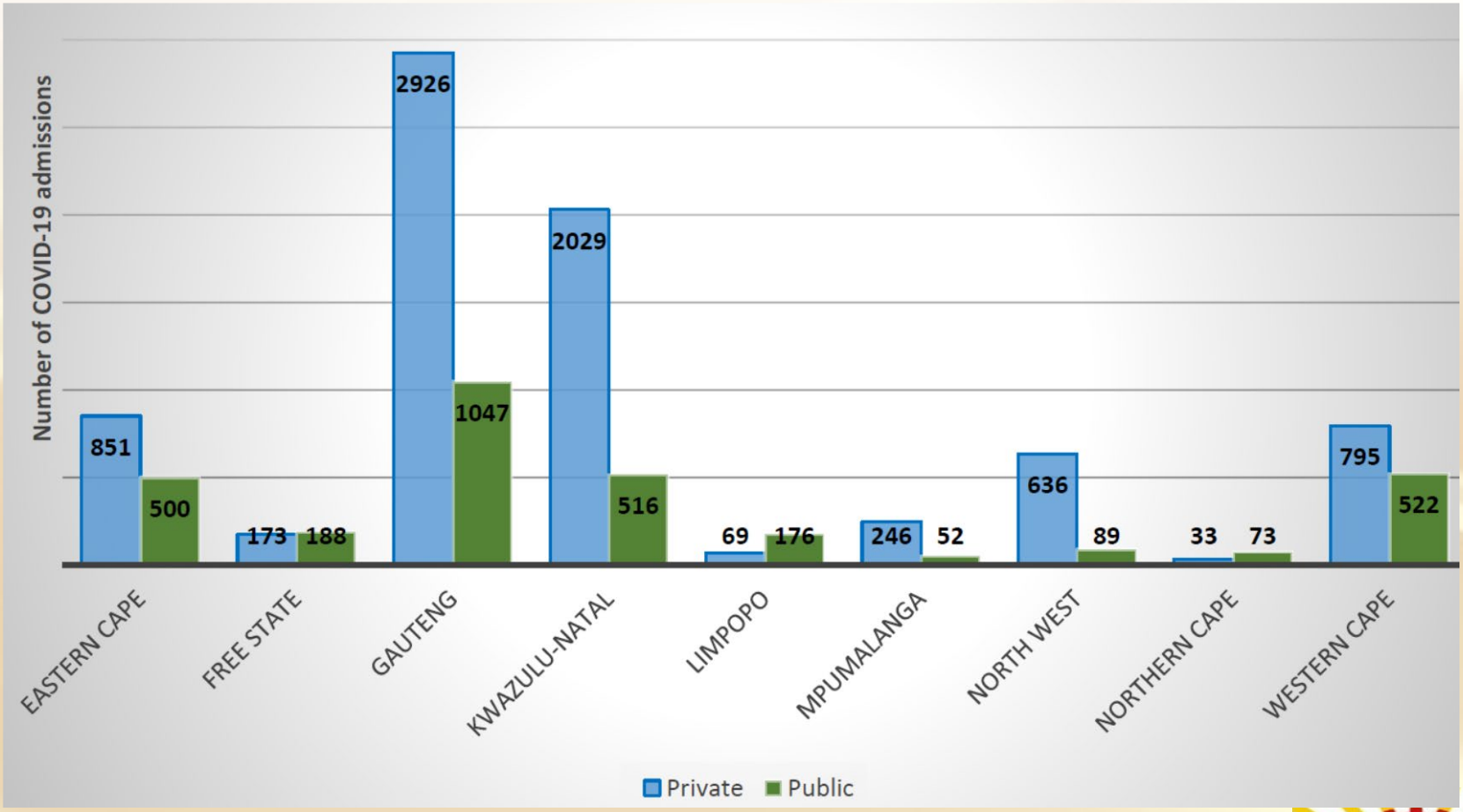

https://www.nioh.ac.za/covid-19-occupational-health-surveillance/

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COVID-19 DASHBOARD

MINERALS COUNCIL SOUTH AFRICA

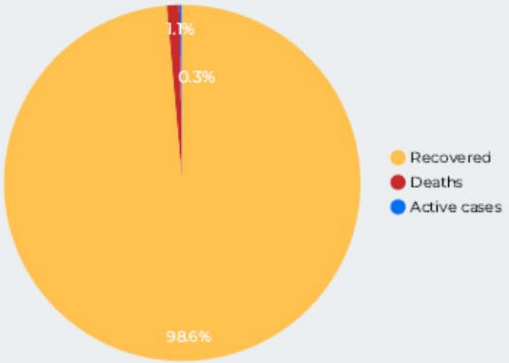
Mining cases and vaccination statistics

Total number of mines	385
Total employees	450,000
Total screening	436,733
Total tests	349,700
Total positive cases	66,113
Active cases	177
Deaths	750
Recovered	65,186
Total employee and contractor vaccinations	345,020
Vaccinated healthcare workers*	946

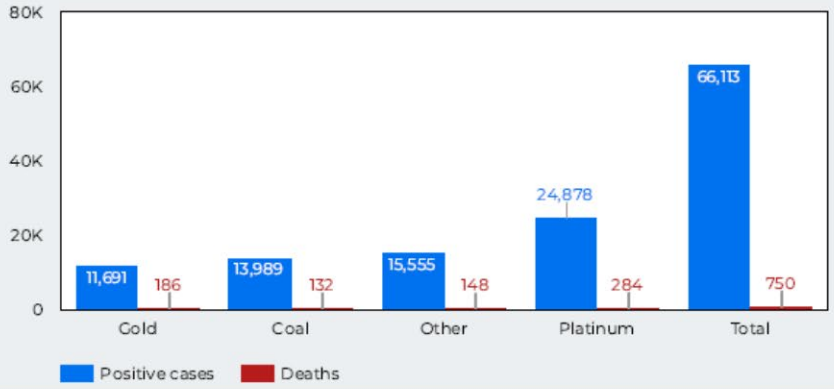
*Phase 1 vaccinations (Sisonke)

Global statistics	RSA statistics	Testing rates by population
Global cases 554,450,919	RSA cases 3,995,291	Global test rate 83.10%
Global deaths 6,361,548	RSA deaths 101,812	RSA test rate 42.37%
Global recovered 529,414,324	RSA recovered 3,883,889	Mining test rate 77.71%

Status of mining cases



Cases and deaths per commodity



Minerals Council position on COVID-19

4 July 2022

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Compensation Fund Statistics – June 2022

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ORGANISATION	TOTAL CLAIMS	LIABILITY ACCEPTED	LIABILITY REPUDIATED	DEATHS
Compensation Fund	27 386	17 988	6152	98
Rand Mutual	8 100	528	2,679	54
Federated Employers	1 057	462	377	14
TOTAL	36 543			

	Number of Incidents	Number of Fatalities	Fatality Rate
Workplace COVID-19	36 543	165	0.45%
Country COVID-19 Numbers	3 993 444	101 764	2.55%
Workplace COVID-19 as % Total Country Numbers	0.92%	0.16%	

Data provided by Compensation Fund. Updates from June 2022

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But what about workers in other sectors of the economy…..what were their risk profiles and infection incidence?

The OHSS in South Africa

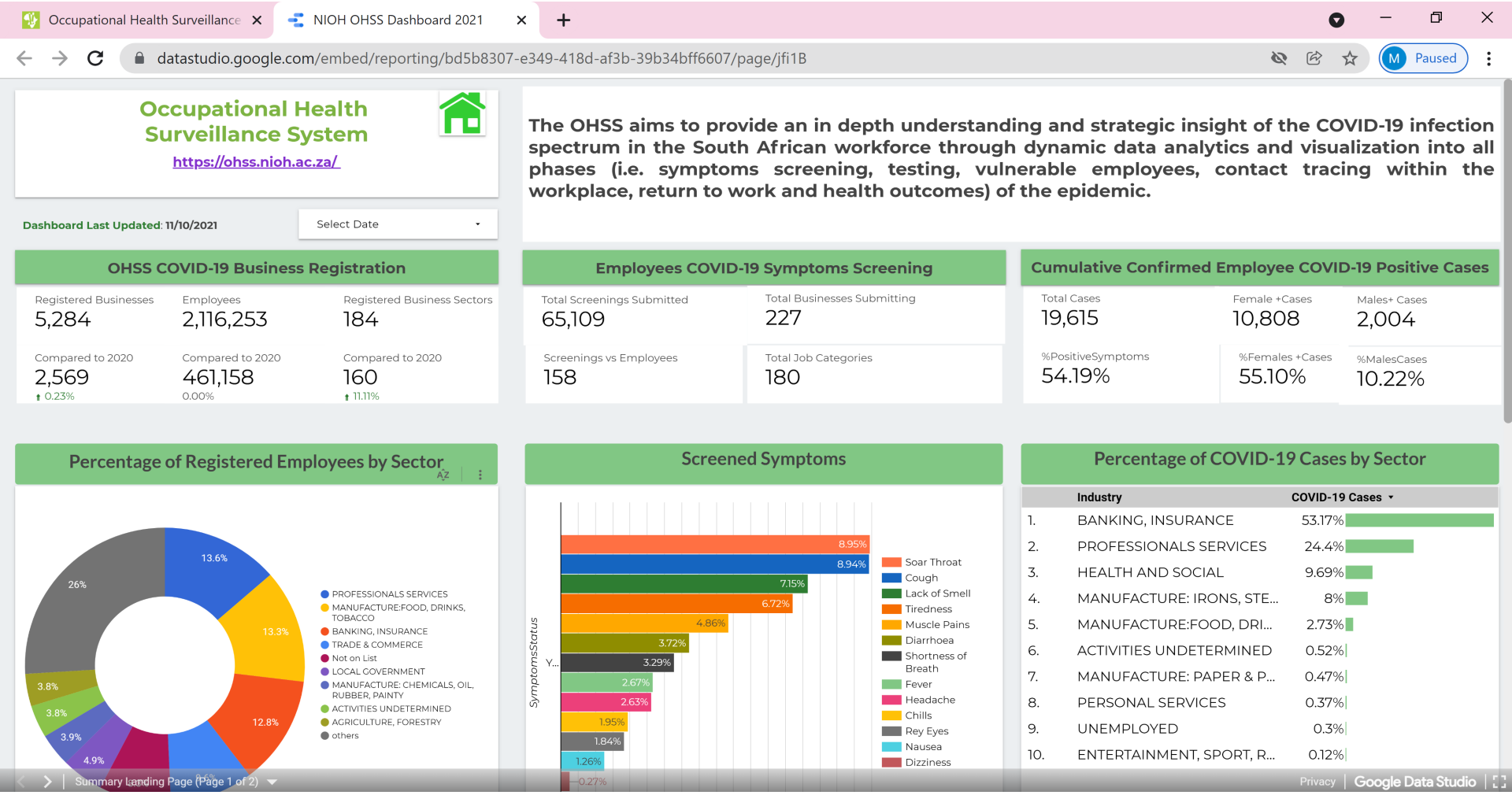

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Table 3. COVID-19 mortality odds ratio (MOR) for occupational groups. Source: Office of National Statistics..

Occupational classification	Adjusted for age, sex, deprivation, region, urban/rural and population density
	MOR (95% CI)
Non-essential workers	Ref
Healthcare professionals and associates	1.26 (1.14–1.39)
Medical support staff	1.44 (1.26–1.65)
Social care	1.42 (1.33–1.52)
Education	1.05 (0.95–1.17)
Food retail and distribution	1.31 (1.22–1.41)
Food production	1.24 (1.07–1.43)
Taxi and cab drivers	2.65 (2.37–2.95)
Bus and coach drivers	2.04 (1.73–2.4)
Van drivers	1.23 (1.08–1.4)
Other transport workers	1.26 (1.15–1.37)
Police and protective services	0.98 (0.84–1.14)
Sanitary workers	0.99 (0.89–1.1)
Missing	1.15 (1.1–1.21)

Cherrie et al., 2022
(N=136 567).

Office for National Statistics (ONS) mortality data for England and Wales

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Table 3. Risk of Covid-19 related hospital admission for 155 non-referent 4-digit DISCO-08 occupations with > 2000 employees across all industrial sectors. Incidence rate ratios (IRR) with 95% confidence limits relative to employees in all occupations with unlikely occupational exposure to SARS-

Occupation (descending fully adjusted IRR)	N Covid-19 admissions	IRR sex and age adjusted	IRR fully adjusted [b]	95% CI
Construction Managers	13	2.04	**2.22**	**1.28–3.85**
Medical Imaging and Equipment Operators	8	2.25	**2.20**	**1.09–4.42**
Bus and Tram Drivers	93	4.35	**2.13**	**1.64–2.77**
Chefs	10	2.21	**2.02**	**1.07–3.84**
Generalist Medical Practitioners	46	1.60	**1.93**	**1.28–2.91**
Psychologists	15	1.43	**1.90**	**1.11–3.26**
Human Resource Managers	9	1.87	1.90	0.98–3.68
Nursing Professionals	134	1.64	**1.87**	**1.51–2.33**
Dairy Products Makers	8	1.53	1.81	0.89–3.68
Social Work Associate Professionals	23	2.14	**1.77**	**1.14–2.76**
Health Professionals Not Elsewhere Classified	15	1.38	**1.77**	**1.02–3.05**
Healthcare Assistants	134	2.18	**1.72**	**1.35–2.18**
Medical and Pathology Laboratory Technicians	17	1.93	**1.68**	**1.00–2.83**
Packing, Bottling and Labelling Machine Operators	8	2.18	1.68	0.83–3.39
Process Control Technicians Not Elsewhere Classified	7	1.65	1.64	0.78–3.46
Software and Applications Developers and Analysts Not Elsewhere	12	1.63	1.59	0.89–2.82
Medical Secretaries	19	1.48	1.57	0.99–2.48
Receptionists (general)	8	1.77	1.56	0.77–3.18
Journalists	18	1.25	1.44	0.90–2.31
Home-based Personal Care Workers	247	2.18	**1.43**	**1.16–1.78**
Food and Related Products Machine Operators	57	1.98	**1.43**	**1.05–1.95**

Bonde et al., 2022
N=2 451 542, Statistics Denmark

Occupation and industry codes are primarily provided by employing companies but other sources of information such as tax records, trade union membership, and educational records are also used by Statistic Denmark.

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Data and Occupational Health

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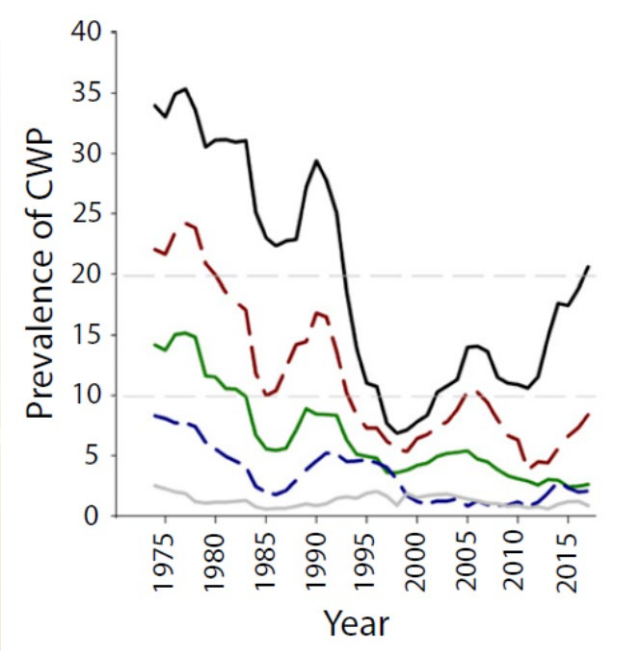
1. Identify new health risks due to new exposures/work processes (eg. nanoparticles)
2. Identify increasing incidence of known diseases with established exposures (CWP in the US; silica/silicosis in Turkey)
3. Identify workers at greatest risk for communicable diseases



Blackley et al., 2018

Premature Deaths Due to Silicosis in Turkey, 2006–2017: A Twelve-Year Longitudinal Study

Elif Altundaş Hatman[1], Duygu Acar Karagül[2], Eliz Kuman Oyman[2], Bahar Tüzün[3], Kadir Onur Şimşek[2], Zeki Kılıçaslan[4]

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Health Surveillance

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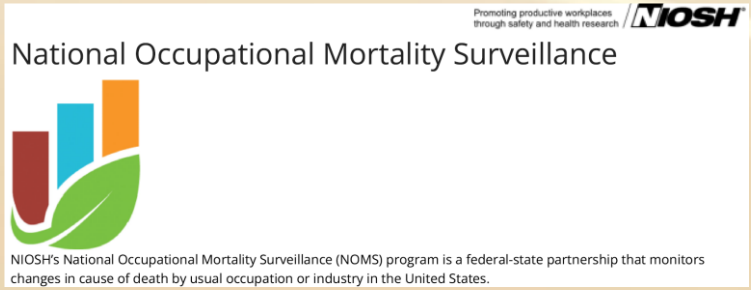
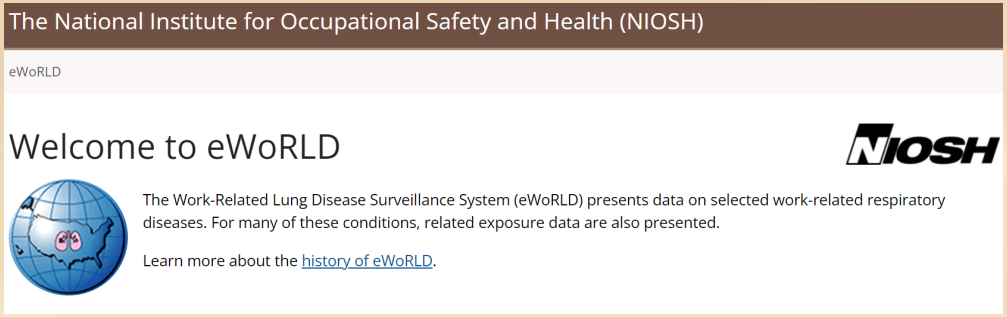
- Occupational health surveillance is the ***ongoing systematic collection, analysis, interpretation and dissemination of data*** for the purpose of ***prevention of ill-health*** caused by work





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Occupational Health Surveillance in South Africa

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- Workplace Medical Surveillance vs National Health Surveillance
- Mine Health and Safety Act requirements
  - Annual Medical Report
- ODMWA Benefit Examinations ??
- Gaps:
  - Mineworker data (from AMR and Benefit Exams) should be continuously analysed to determine trends across time and exposure/commodity
  - Annual Medical Reporting should be included under the OHSAct

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Health Information Systems

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"a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services." (UNDP)

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Western Cape Government
FOR YOU

Provincial Health Data Centre

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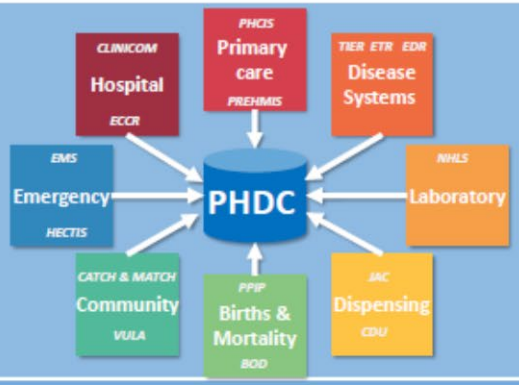
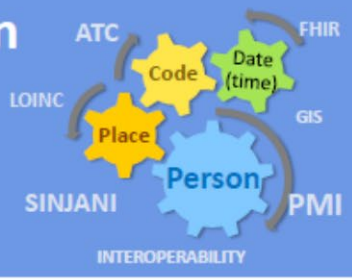
Data **Harmonisation**

Bringing **patient-level data** together into **one place** from **routine information systems** using the **folder number.**



Data **Curation**

Cleaning and **mapping** data to **common concepts.**



Data **Beneficiation**

Inferring health conditions, visits and registers.

Data **Presentation**

Making data **available** and **actionable** for **clinicians** and **information managers** through **reports** and **apps.**

- **Management Reports**
- **Patient-level line listings**
- **Single Patient Viewer**
- **Administrative Reports**
- **Alerts**

Data **Governance**

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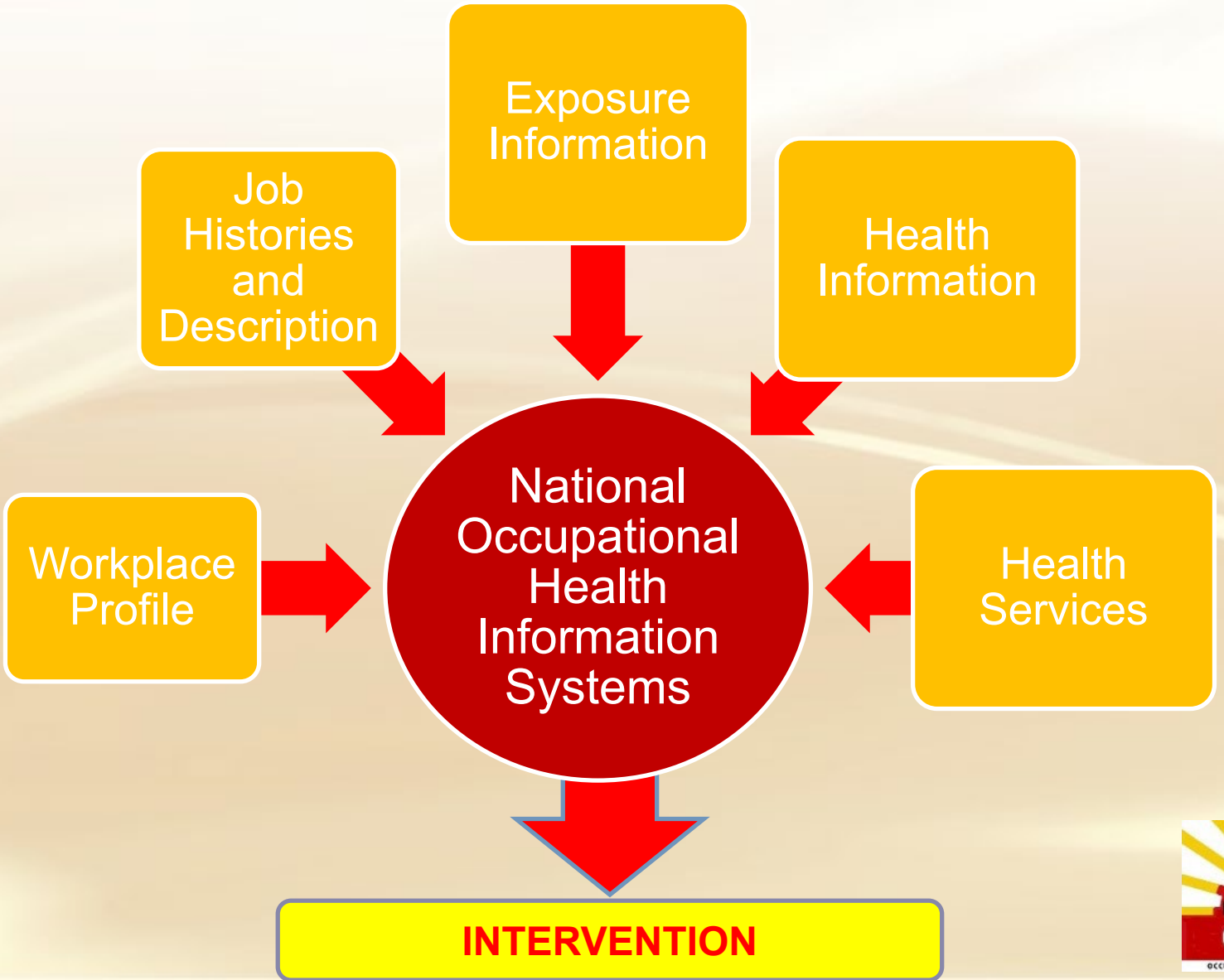
HIS for Occupational Health




Address and Employment Data, MSHA
Black Lung Benefit Awards, SSA and DOL
Coal Workers' Health Surveillance Program, NIOSH
Integrated Management Information System (IMIS), OSHA
eWoRLD
Metal/Nonmetal Mine Data, MSHA
Multiple Cause-of-Death Data, NCHS
National Health Interview Survey, NCHS
Population Data Estimates, BoC and CDC
Respirable Coal Mine Dust Data, MSHA
State-Based Surveillance Case Data, NIOSH
NIOSH
Legislation
Policy
Exposure limits revision
Review of controls in workplaces
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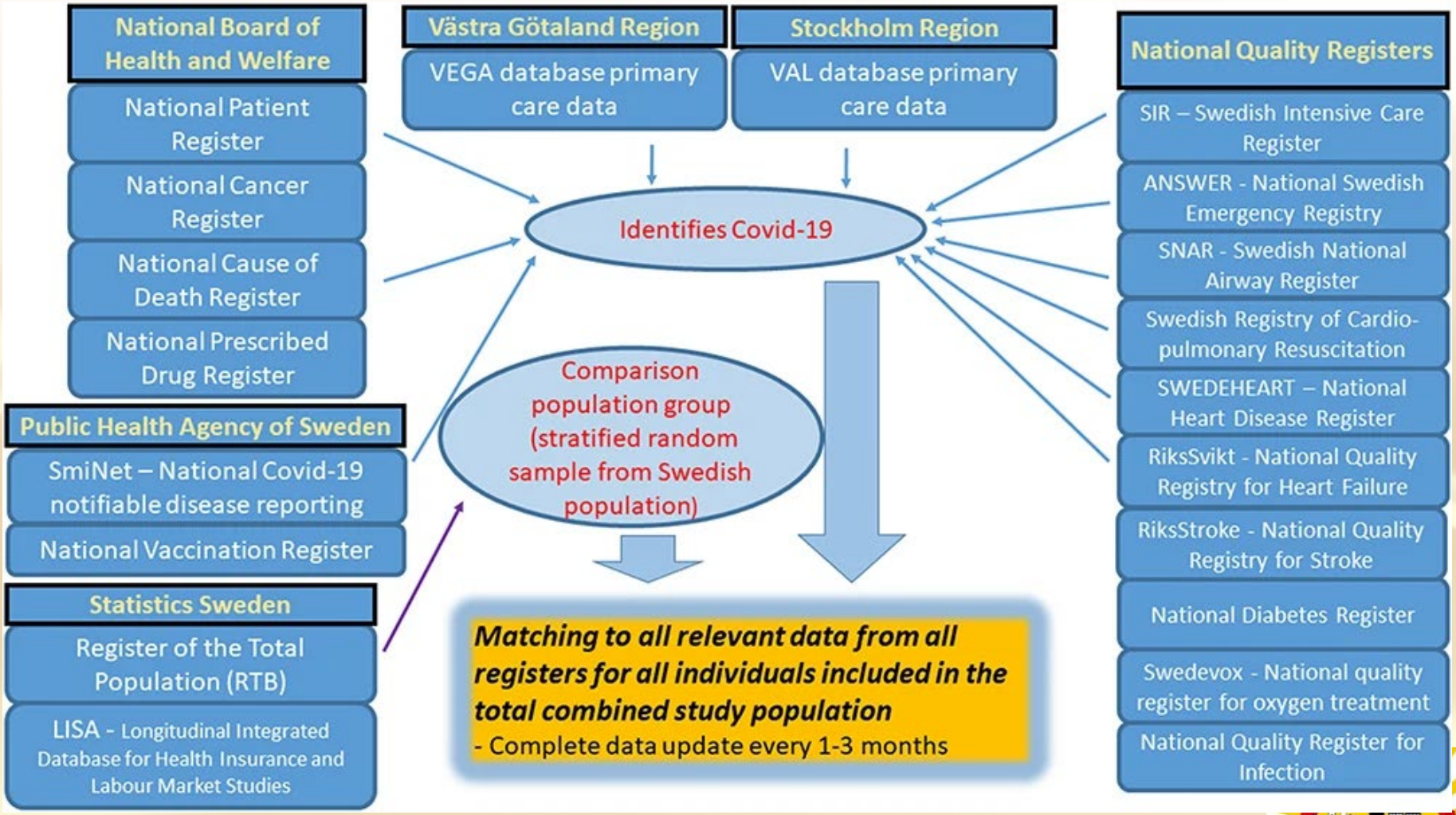
The Swedish Model



Emerging Occupational Diseases

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- Agricultural workers (n = 963,124)
- Taiwan's national Farmers Health Insurance
- Linked to the National Health Insurance Research Database
- Unusual outcomes
- Unexpected outcomes

Received: 3 August 2022 | Revised: 3 November 2022 | Accepted: 3 November 2022

DOI: 10.1002/ajim.23443

RESEARCH ARTICLE

AMERICAN JOURNAL OF INDUSTRIAL MEDICINE WILEY

Occupational health surveillance and detection of emerging occupational diseases among Taiwan farmers, through analysis of national-based farmers' and medico-administrative databases

Chung-Ching Wang MD, PhD[1,2] | Gwan-Ling Lin PhD[3] | Yu-Jen Lin MSc[4] | Wei-Liang Chen MD, PhD[1,2] | Wei-Te Wu PhD[4,5]

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South African Registries and Sources of Data

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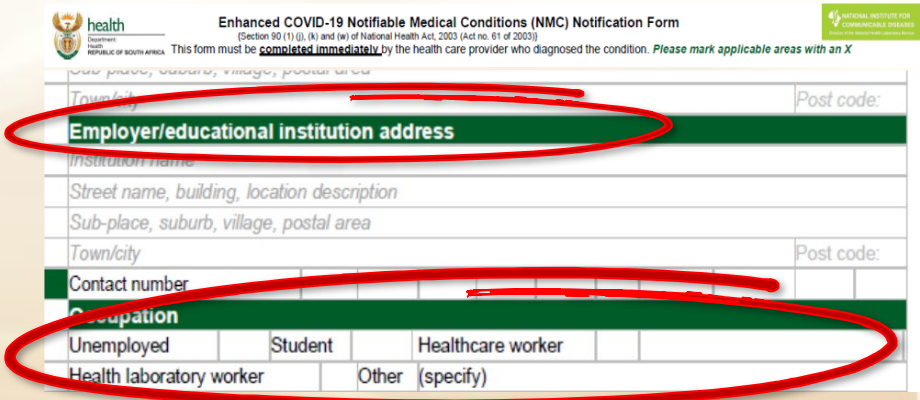
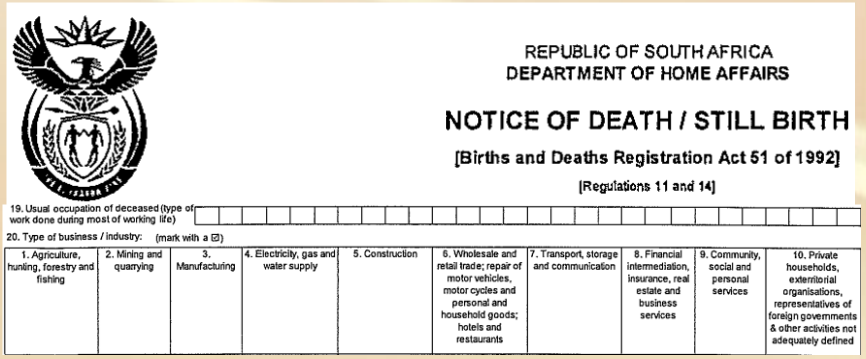
- Health Data
  - Notifiable Medical Conditions
  - COVID-19 Case Notification
  - Death Registrations
  - Compensable Diseases
  - DMRE Reporting


health
Department: Health
REPUBLIC OF SOUTH AFRICA

Enhanced COVID-19 Notifiable Medical Conditions (NMC) Notification Form
(Section 90 (1) (j), (k) and (w) of National Health Act, 2003 (Act no. 61 of 2003))
This form must be completed immediately by the health care provider who diagnosed the condition. *Please mark applicable areas with an X*

Post code:
Employer/educational institution address
Street name, building, location description
Sub-place, suburb, village, postal area
Town/city
Post code:
Contact number
Occupation
Unemployed | Student | Healthcare worker
Health laboratory worker | Other | (specify)


REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF HOME AFFAIRS

NOTICE OF DEATH / STILL BIRTH

[Births and Deaths Registration Act 51 of 1992]

[Regulations 11 and 14]

19. Usual occupation of deceased (type of work done during most of working life)

20. Type of business / industry: (mark with a ☑)

1. Agriculture, hunting, forestry and fishing	2. Mining and quarrying	3. Manufacturing	4. Electricity, gas and water supply	5. Construction	6. Wholesale and retail trade; repair of motor vehicles, motor cycles and personal and household goods; hotels and restaurants	7. Transport, storage and communication	8. Financial intermediation, insurance, real estate and business services	9. Community, social and personal services	10. Private households, exterritorial organisations, representatives of foreign governments & other activities not adequately defined

Groups of occupation of deceased (1997-2018)	
Managers	31 954 (2.10)
Professionals	81 686 (5.38)
Technicians and associate professionals	33 235 (2.19)
Clerical support workers	43 156 (2.84)
Service and sales workers and armed for	93 701 (6.17)
Skilled agricultural and fishery worker	42 243 (2.78)
Craft and related trade workers	98 403 (6.48)
Plant and machine operators and assembly	626 891 (41.28)
Elementary occupations	467 425 (30.78)
Total	**1 518 694 (100)**

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South African Registries and Sources of Data

- Exposure/Job Data
  - Unemployment Insurance Fund
  - Compensation Fund
  - Factory Inspectorate Reports
  - MHSA Occupational Hygiene Reports

Other Data Sources

- South African Demographic Health Survey
- General Household Survey

Table 3. Summary results of the two household surveys, 1988.

	Demographic and Health Survey		October Household Survey	
	n	%	*n*	%
Number of respondents	13 552	100.0	53 725	100.0
Number 'employed' *	4 761	35.1	18 744	34.9
Subjects who reported absence from work due to a work-related or work-aggravated condition	403	8.9	1 115	5.9
Disease or injury related to work	372	7.8	1 115	5.9
Disease or injury aggravated by work	265	5.6	–	–
No response to question	8	0.2	671	3.6

Kielkowski et al., 2004

Other Data Sources

- South African Demographic Health Survey
- General Household Survey

Table 10.8 Work-caused illness

Frequency of self-reported conditions caused by work in the past 12 months, South Africa 2003

Respondents by work status and conditions	Number	Percentage
Work status of respondents		
Worked[1]	2 557	31.5
Had not worked	5 536	68.2
Missing	22	0.3
Total	8 115	100.0
Any injury or health problem caused by work		
Yes	162	6.3
No	2 380	93.1
Missing	15	0.6
Total	2 557	100.0
Conditions related to work		
Disease	6	0.2
Injury	120	4.7
Unknown conditions[2]	36	1.4
Total		
Stay away from work?		
Yes	97	3.8
No	62	2.4
Missing	1	0.0
Total	160	6.2
	Mean	**SE**
How long?	15.1	2.8

[1]Respondents who earned money in the 12 months prior to survey.
[2]Unkown conditions are unspecified diseases or injuries, or missing data.

…according to StatsSA….

- The data translates into:
  - 730 800 instances where workers consult health services because of illness or problems caused by work.
  - approximately 440 000 individuals who stayed away from work, with an average duration of 15.1 (95% CI, 9.6-20.6) days absent from work.
  - This would result in approximately 6.6 million worker-days loss to the economy

System Gaps in SA

- Lack of appreciation of the need for work-related data in relevant data collecting systems
- Lack of regulatory systems to collect appropriate data
- Absence of engagement between custodians of information systems
- Failure to link systems to provide coherent worker health and exposure data

…in summary……

- **Real-time surveillance**, data sharing, collaboration and integration
- Employer **collection of ongoing real-time surveillance data** is crucial

(Jeebhay, April 2022)

Integrated Data Management for Workplace Intervention

Variety of Data Sources

- Private sector businesses
- Public sector
- NICD - NMC and sentinel hospital admissions database (DATCOV)
- NHLS laboratory testing data
- Private laboratory testing data
- Compensation Fund
- National Department of Health
- Department of Employment and Labour
- Mining Sector

New Data Approaches

- Recognise that work can be a key driver in transmission in infectious disease epidemics
- Collect appropriate work data
- Ensure case linkage across different databases to address key research/intervention questions
- Establish appropriate custodial arrangements over data management and access

Jeebhay, April 2022

The Road Ahead…..

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- Continue the NIOH/DoEL Occupational Disease Standardisation Project
- Annual Medical Reporting under OHS Act
- Identify all potential information systems and databases that could lend itself to linkages
- Establish mechanisms that bring together information custodians and curators
- Create linkages in existing publically collected data across different information platforms eg: UIF/CF worker registrations linked with Notifiable Diseases/Death Registration
- Recognise the need to identify new diseases and new exposures, not just “compensable diseases”
- Develop rapid real-time alert systems led by NIOH

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Thank you!

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