Understanding and addressing occupational disease risks in key industries

An in-depth look at disease surveillance and prevention

October 2, 2024

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workplacesafetynorth.ca

Welcome!

- Thank you for joining us! The webinar starts at **10:30 am ET**.
- Please use **Q&A** at the bottom of your screen for speaker questions and we will answer them at the end of the webinar.
- Please use **chatbox** for commentary or technical questions.
- A link to the webinar recording, a copy of the presentation slides, and reference material will be emailed to all registrants within a few days.

Webinar hosts

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Understanding and Addressing Occupational Disease Risks in Key Industries

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Ontario

Occupational Cancer Research Centre

Ontario Health

Occupational disease risks in key industries: Protecting workers' health

- There were 40,185 allowed occupational disease claims in 2022, according to the Ontario Workplace Safety and Insurance Board (WSIB). Occupational illness claims totaled $82.5 million in 2022 according to the WSIB.
- Workers' compensation claims data may not show the complete picture. Many occupational diseases go unrecognized because they have multiple causes and/or take years to develop.
- We developed the Occupational Disease Surveillance System to get a more complete picture in Ontario.

Occupational Disease Surveillance System

2.4 Million Ontario Workers (from WSIB records)

300+ Industries &

500+ Occupations

INFORMATION SOURCES

Cancer Records
Ontario Cancer Registry

Hospital Records
Discharge Abstract Database

Emergency Department Visits
National Ambulatory Care Reporting System

Doctor Visits
Ontario Health Insurance Plan

Lab Test Results
Ontario Laboratories Information System

Key Occupational Diseases in Mining to Target for Prevention Purposes

- Lung Cancer
- Carpal Tunnel Syndrome
- Chronic Obstructive Pulmonary Disease (COPD)
- Raynaud's Syndrome
- Silicosis and Idiopathic Pulmonary Fibrosis (IPF)
- Acute Myocardial Infarction

Noise-induced hearing loss (top disease based on approved WSIB claims, but not included in ODSS data)

Key Occupational Diseases in Pulp and Paper to Target for Prevention Purposes

Asbestosis
Mostly in pulp and paper mills

Idiopathic Pulmonary Fibrosis (IPF)
Mostly in pulp and paper mills

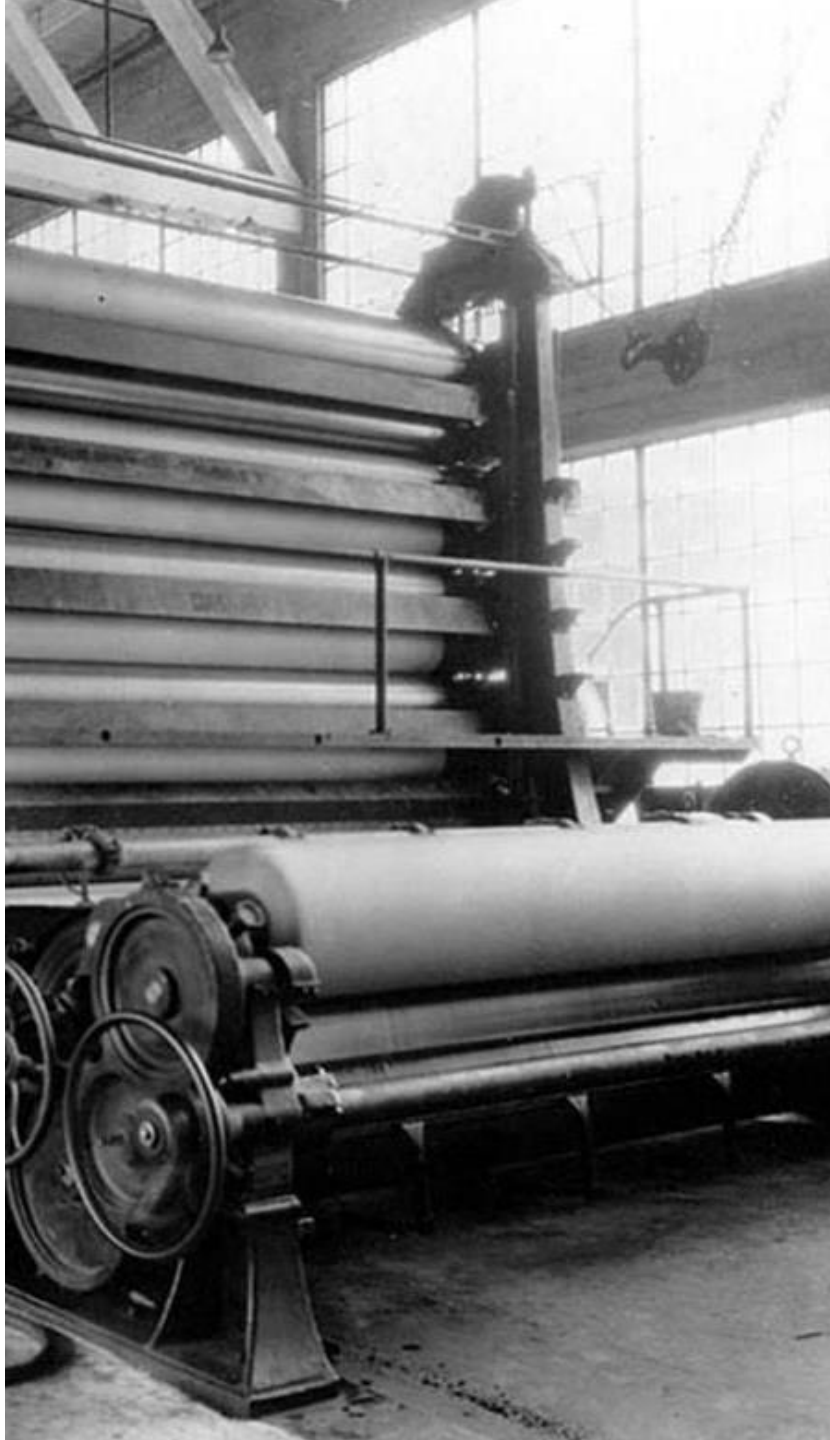
Chronic Obstructive Pulmonary Disease (COPD)

Carpal Tunnel Syndrome

Raynaud's Syndrome

Acute Myocardial Infarction

Noise-induced hearing loss
(top disease based on approved WSIB claims, but not included in ODSS data)



Key Occupational Diseases in Forest Industry to Target for Prevention

- Lung Cancer
- Chronic Obstructive Pulmonary Disease (COPD)
- Acute Myocardial Infarction
- Carpal Tunnel Syndrome
- Raynaud's Syndrome

Noise-induced hearing loss (top disease based on approved WSIB claims, but not included in ODSS data)

Lung Cancer in Mining and Wood Industries

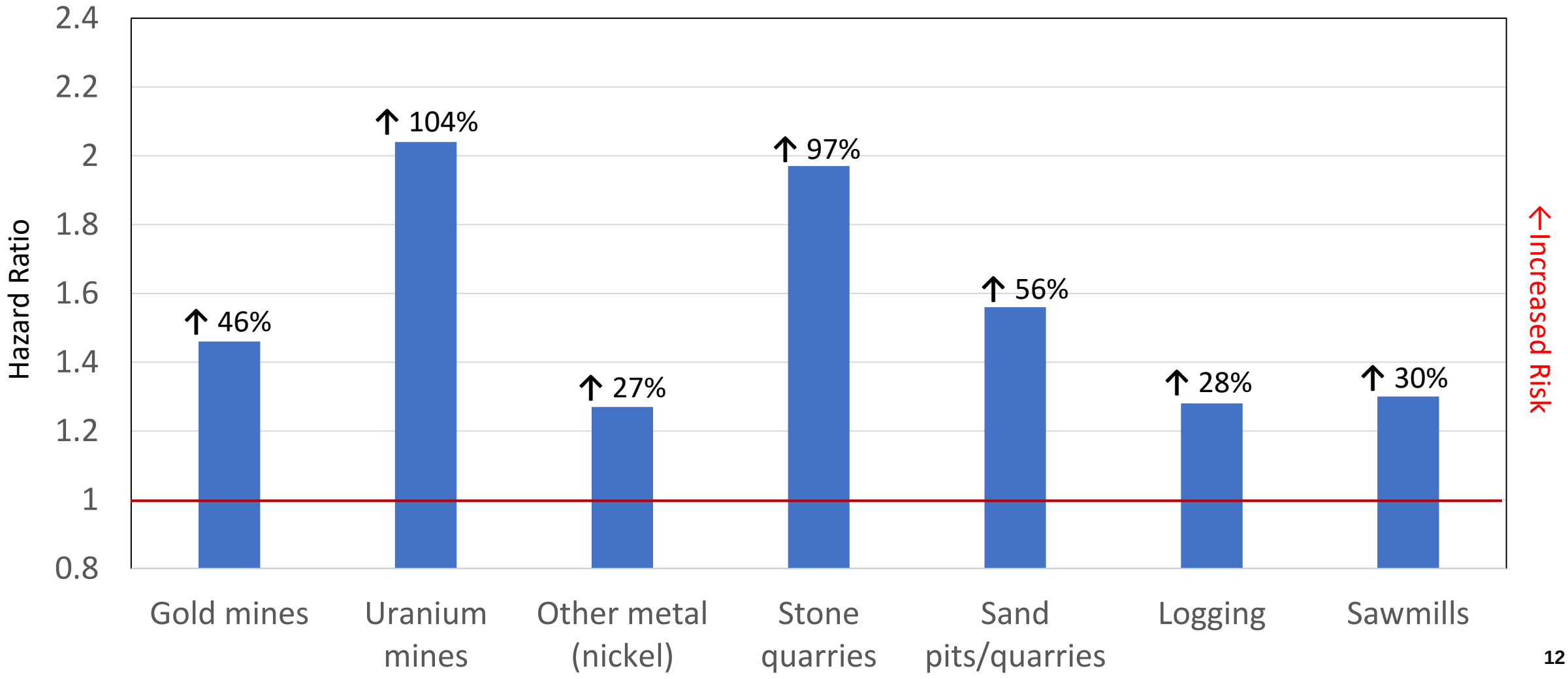
- Lung cancer is the most common fatal cancer. Approximately 15% of all lung cancers in Canada are due to workplace exposures. These include:
  - Diesel engine exhaust from heavy equipment used in mines and forestry
  - Respirable crystalline silica is common at mines and quarries
  - Nickel from mining and processing
  - Radon was high in uranium mines and may still occur in other mines
  - Ontario’s asbestos mines closed long ago, and it’s banned now, but it may still be found in some mines and in pulp and paper mills

Key Occupational Diseases in Mining to Target for Prevention Purposes

	HR (95% CI)
Lung Cancer	1.40 (1.31-1.51)
Chronic Obstructive Pulmonary Disease (COPD)	1.24 (1.13-1.35)
Silicosis	10.6 (6.98-16.1)
Idiopathic Pulmonary Fibrosis	1.84 (1.34-2.51)
Acute Myocardial Infarction (AMI)	1.15 (1.04-1.27)
Carpal Tunnel Syndrome (CTS)	1.59 (1.42-1.78)
Raynaud's Syndrome	1.18 (1.07-1.30)

HR = Hazard Ratio, CI = Confidence Interval

Risk of Lung Cancer by Mining and Forestry Sector



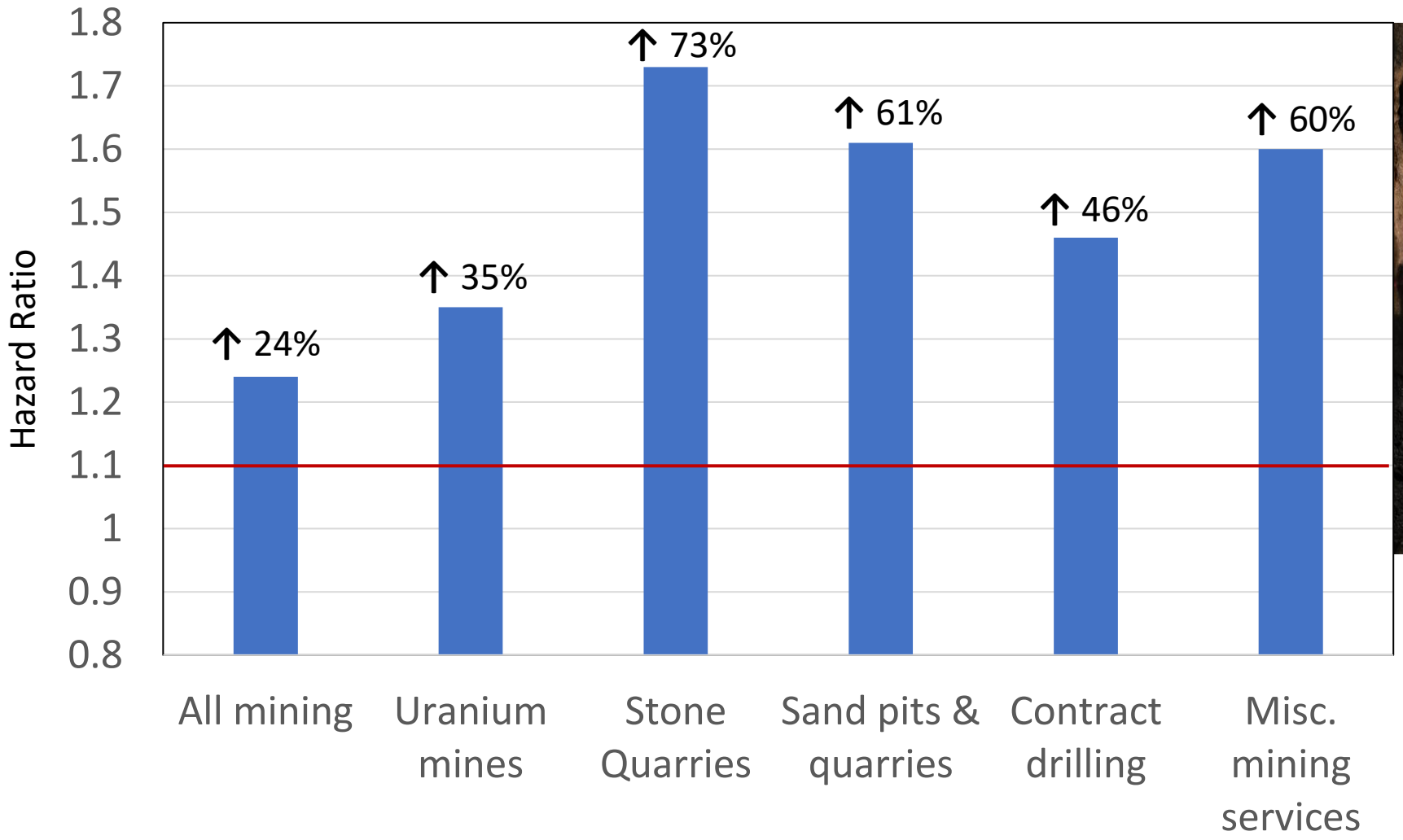
Other Cancer Risks

- Less is known about the causes of **larynx cancer**, but it is also increased in quarries and sand pits, logging, and sawmills and possibly elevated in gold and nickel mines.
- The risk of **mesothelioma** is very high among former asbestos miners.
- **Nasal cancer** is very rare, but there is an increased risk in nickel mines, based on very small numbers.

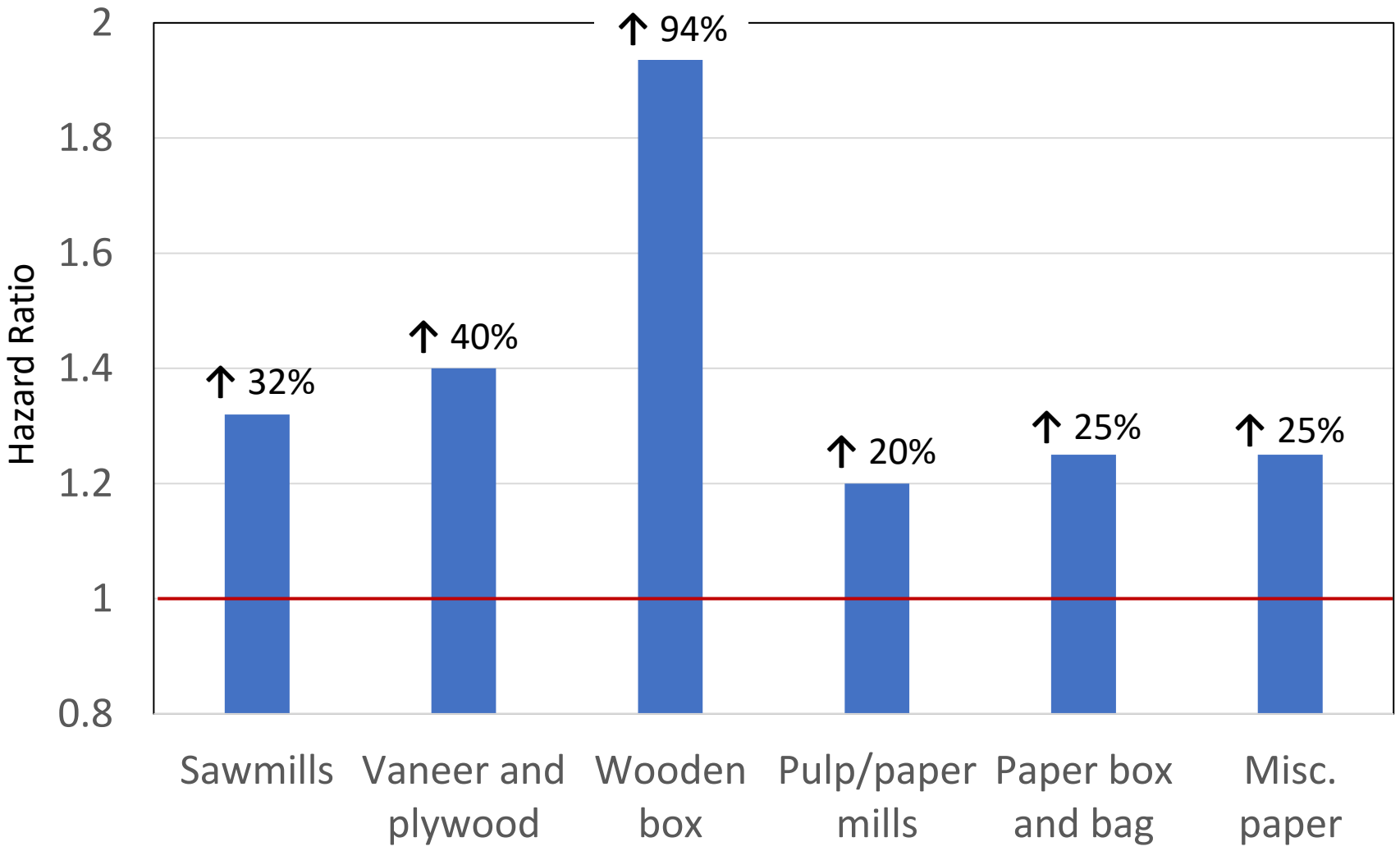
Chronic Obstructive Pulmonary Disease (COPD)

- COPD is the most common chronic respiratory disease in Canada and one of the leading causes of death.
- The American Thoracic Society (ATS) and European Respiratory Society (ERS) estimate that 14% of all COPD cases (31% for never smokers) are caused by workplace exposures to dusts, fibres, and fumes. Specific exposures include:
  - Mineral dusts, including silica and asbestos
  - Organic dusts, including wood and agricultural
  - Chemicals, including formaldehyde
  - Diesel engine exhaust

Risk of COPD by Major Mining Sectors



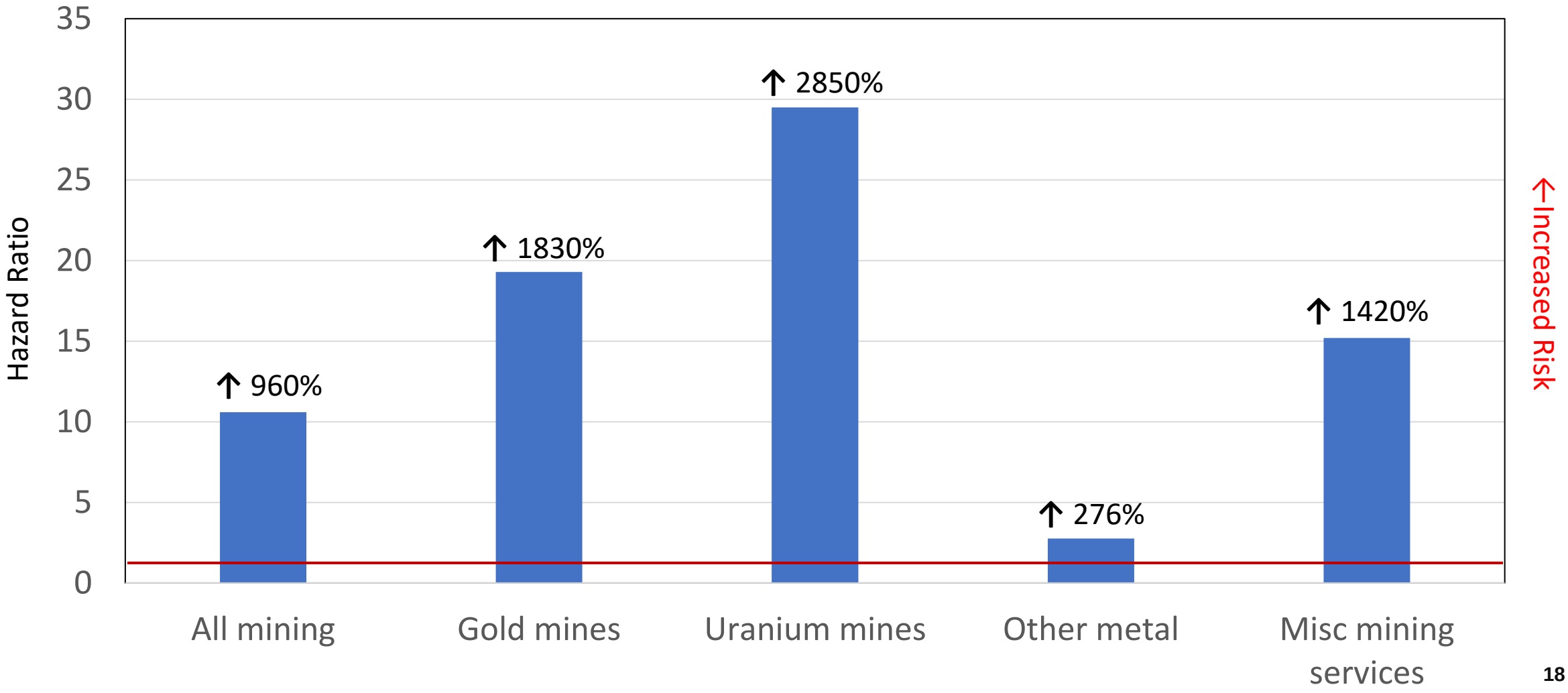
Risk of COPD by Forestry and Pulp and Paper Sectors



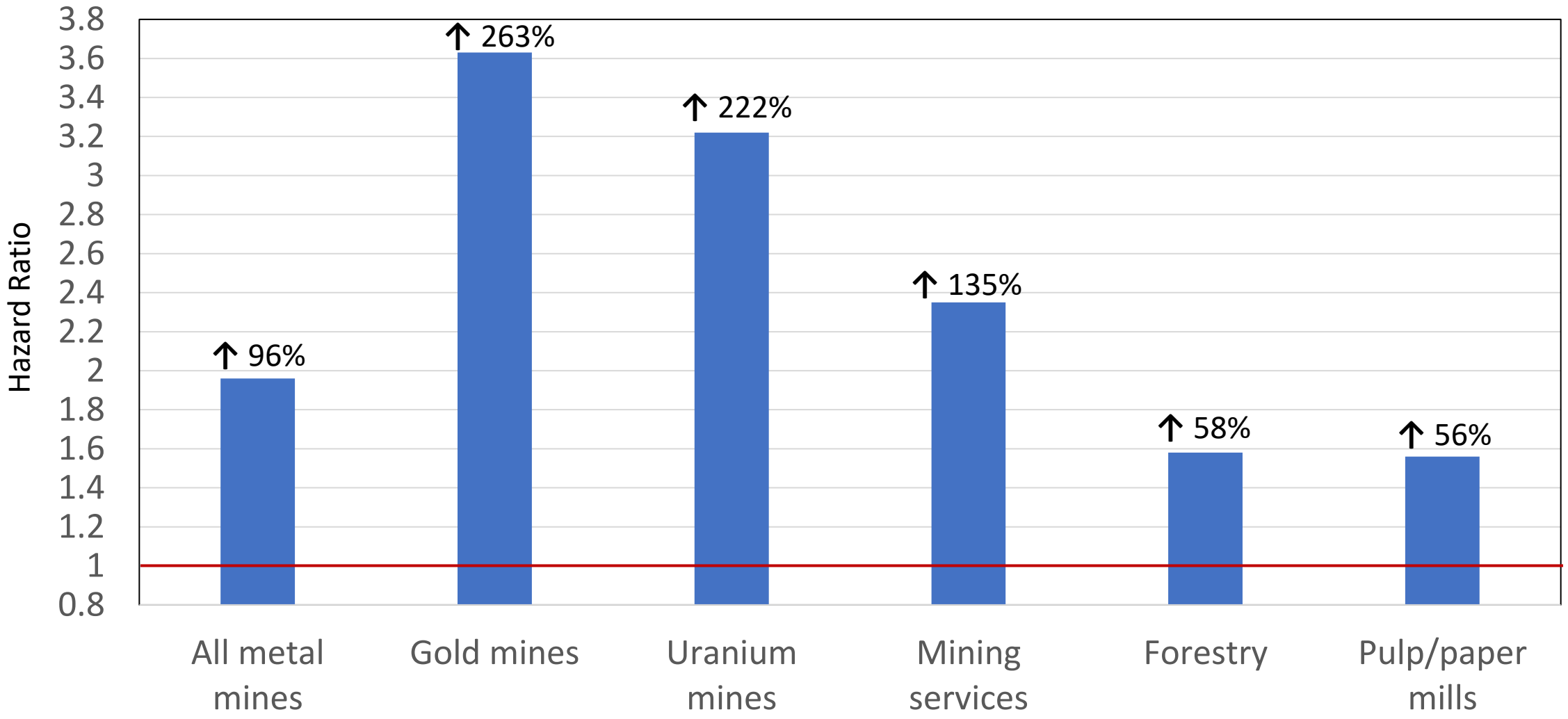
Silicosis, Asbestosis, & Idiopathic Pulmonary Fibrosis (IPF)

- Silicosis is scarring of the lungs caused by respirable crystalline silica, while asbestosis is caused by asbestos.
- Idiopathic pulmonary fibrosis (IPF) is a similar disease where the cause is not known. However, ATS and ERS estimate that 26% of all IPF cases are caused by workplace exposures. Specific exposures include:
  - Metal dust and mineral dusts, including crystalline silica
  - Organic dusts, including wood and mould
  - More broadly vapours, gases, dusts and fumes (similar to COPD)

Risk of Silicosis by Major Mining Sector



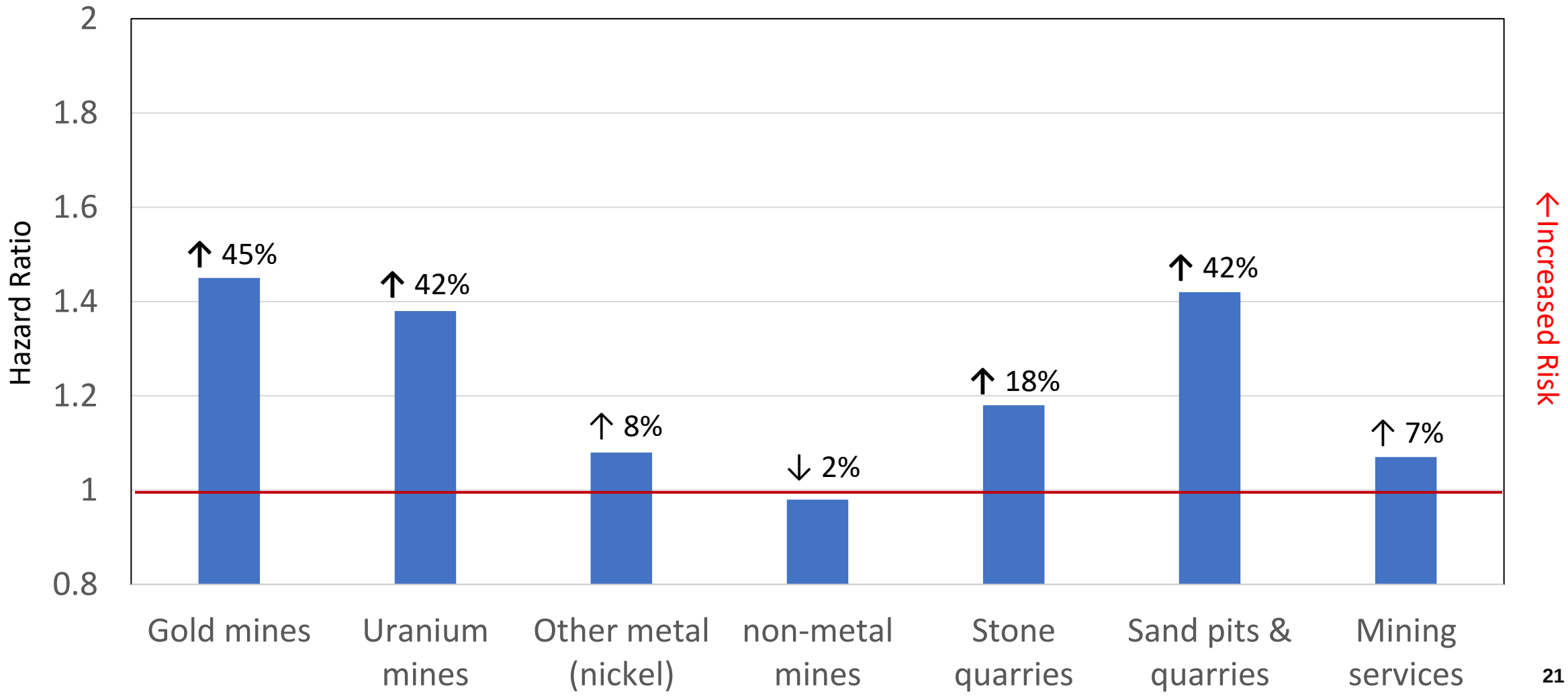
Risk of Idiopathic Pulmonary Fibrosis by Sector



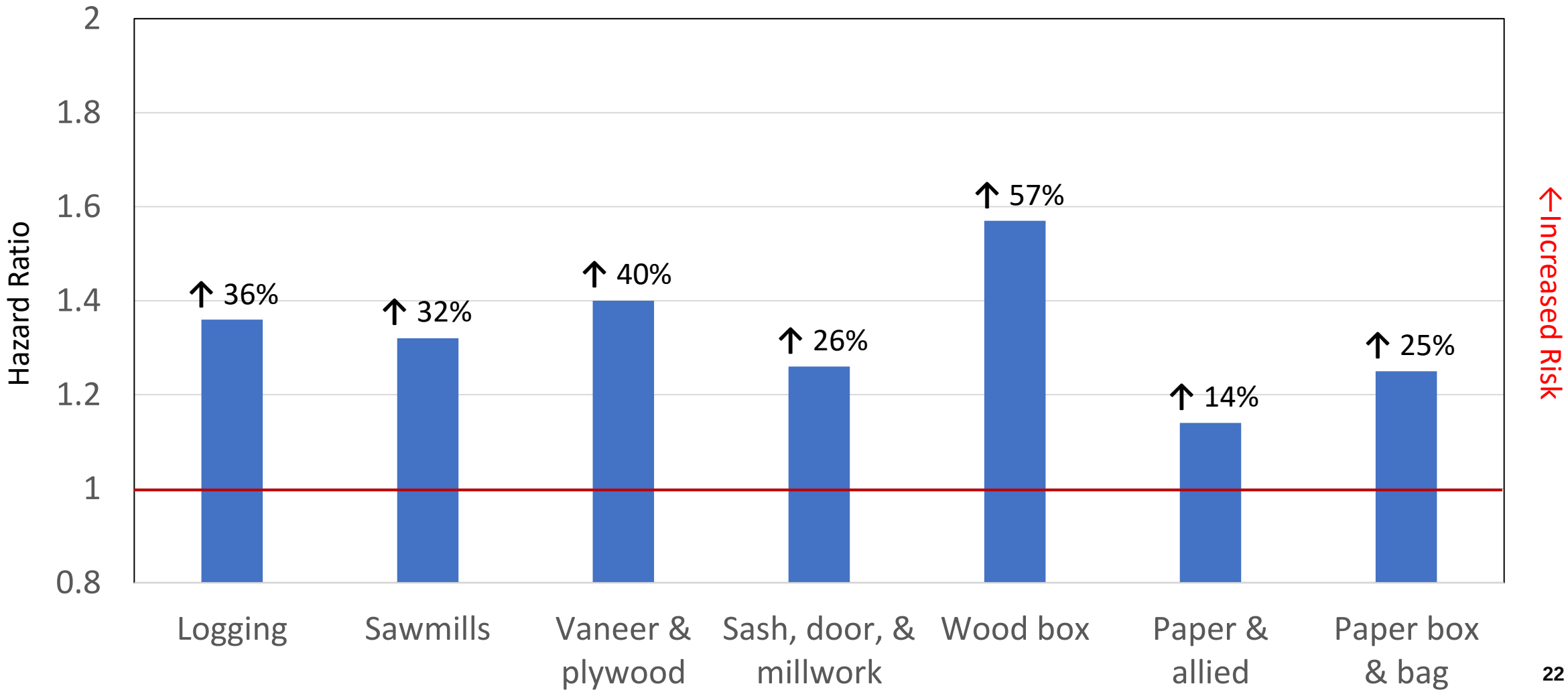
Risk of Acute Myocardial Infarction (AMI) by Sector

- Acute myocardial infarction, or **heart attacks**, have been associated with high exposures to:
  - Noise
  - Diesel engine exhausts
  - Fine dust and particles

Risk of Acute Myocardial Infarction by Mining Sector



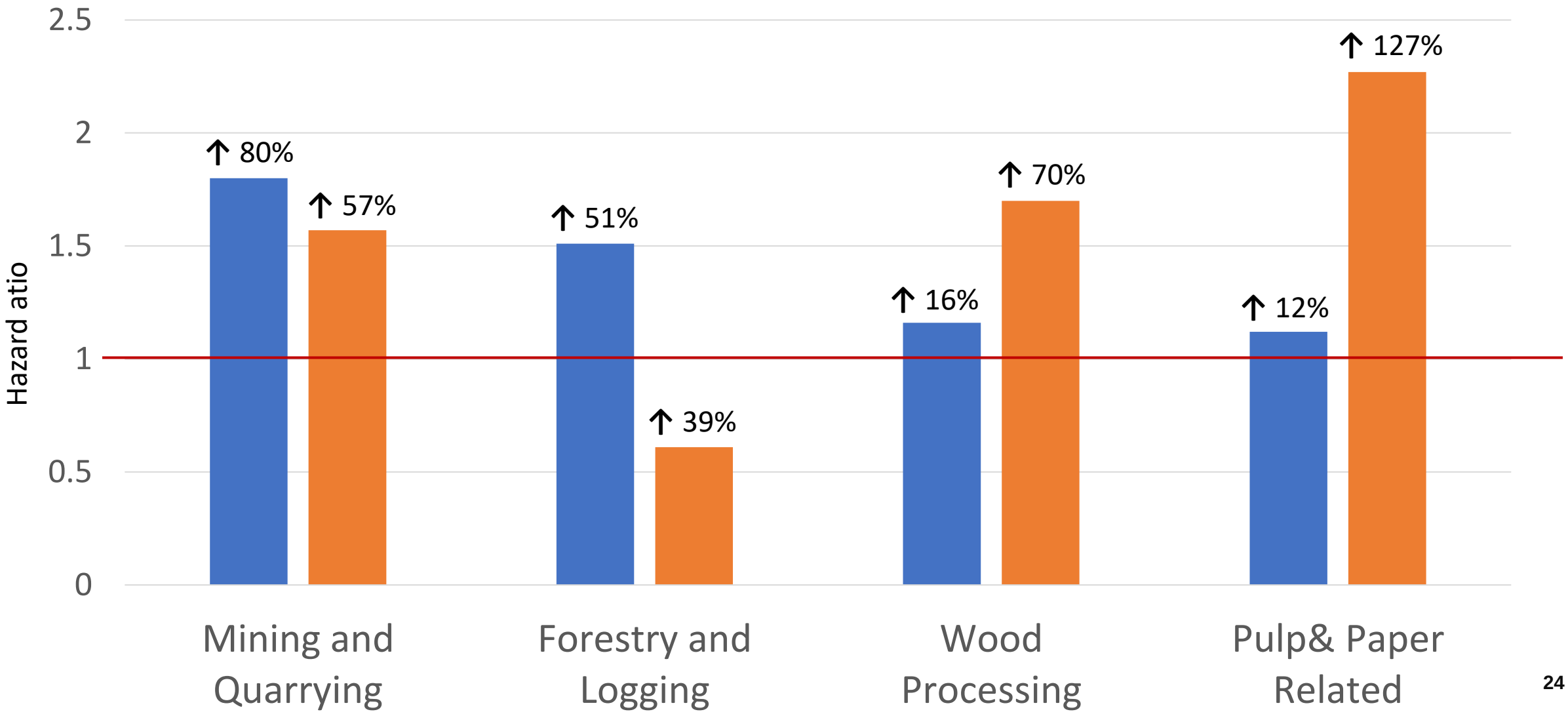
Risk of Acute Myocardial Infarction by Forestry Sector



Carpal Tunnel Syndrome and Raynaud's Syndrome

- Carpal tunnel syndrome is caused by compression of the median nerve at the wrist, which can cause numbness, tingling, and pain.
  - It can be caused by repetitive, awkward, and forceful hand movements, vibration from hand-held tools, or mechanical stress on the palm.
  - Note: in the ODSS we only capture severe cases.
- Raynaud's syndrome, some time called Raynaud's phenomenon or disease, or white finger is due to poor blood circulation in the fingers.
  - It can be caused by exposure to hand-arm vibration, such as from hand-held power tools or pneumatic rock drills. It can also be caused or exacerbated by cold.
  - Approximately 80% of all compensate Raynaud's cases are in mining.

Risk of Raynaud's Syndrome & CTS by Major Occupation

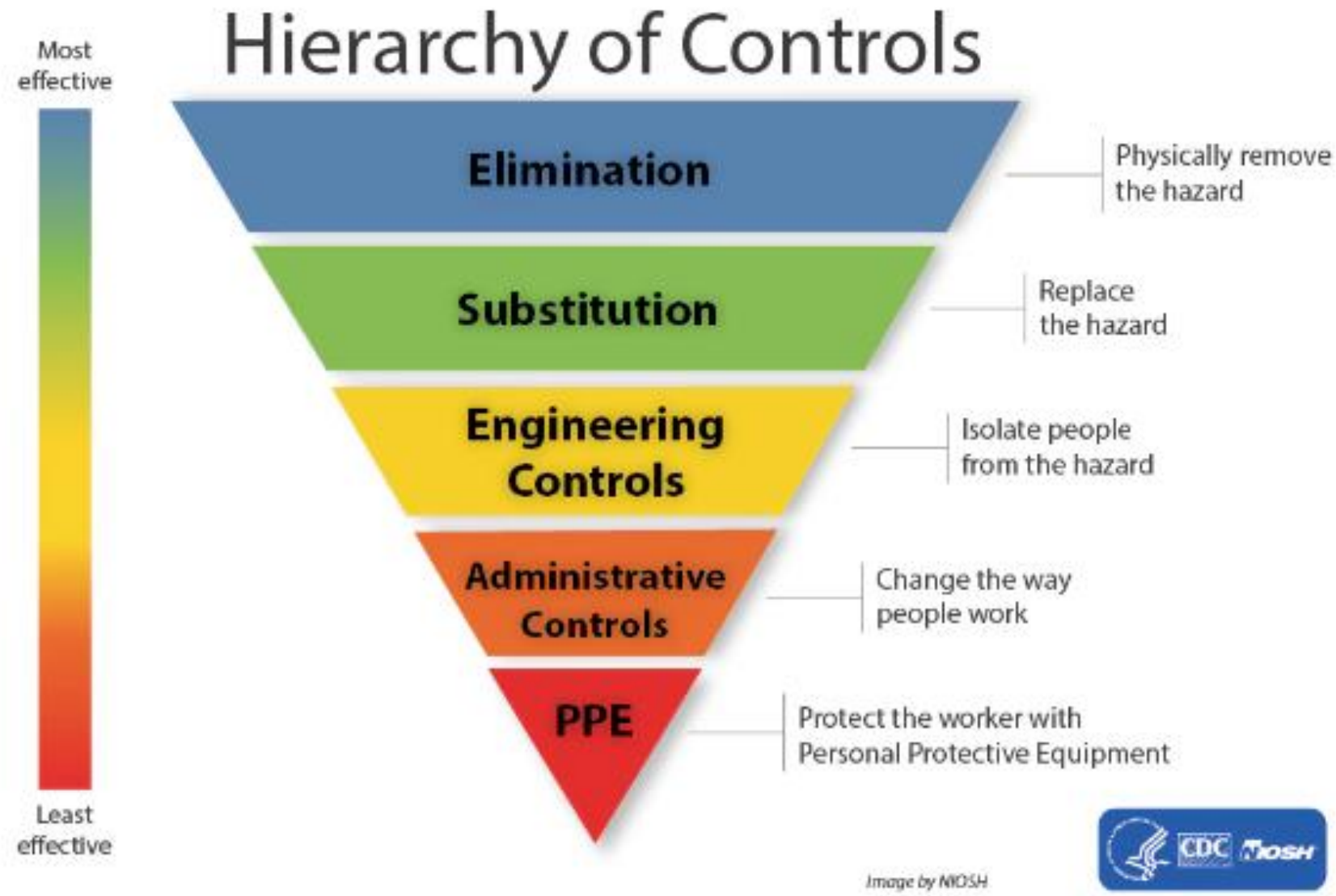


Respiratory Disease in the Mining Master File Compared to Ontario Provincial Rates

Northern Ontario Business Staff
May 26, 2021 9:00 AM

Lung Carcinogens	SIR (95% CI)
Lung cancer	1.5 (1.5-1.6)
Chronic Obstructive Pulmonary Disease	2.7 (2.6-2.7)
Silicosis	15.8 (13.2-18.6)
Idiopathic Pulmonary Fibrosis	2.7 (2.5-2.9)

SIR = Standardized Incidence Ratio, CI = Confidence Interval



The hierarchy of controls should be followed from top to bottom.

CONTROLLING DIESEL PARTICULATE MATTER IN UNDERGROUND MINES

More effective | ELIMINATION | SUBSTITUTION | ENGINEERING CONTROLS | ADMINISTRATIVE CONTROLS | PPE | Less effective

PROACTIVE CONTROLS

Reduce or eliminate diesel particulate emissions before they enter the workplace air

Replacing or repowering old equipment

Newer engines must meet much stricter emissions regulations. Replacing an engine or a piece of equipment with a newer model will significantly decrease emissions. The level of reduction depends on the old and replacement equipment.

Aftertreatment systems

A variety of different aftertreatment systems are available. Emissions reductions depend on the type of filter chosen, as well as the engine and load. Particulate reductions can range from 20-95%.

Preventive maintenance

Maintenance keeps all parts of the engine, as well as any emissions control systems, functioning optimally. Poorly maintained engines can produce significantly more emissions than an engine in good condition.

Alternative Energy

Involves replacing diesel equipment with alternatives such as electric.

Rebuilding engines

Manufacturers often offer upgrade kits that can be incorporated into an engine rebuild to improve emissions.

Idling technology

Idling technology works by automatically turning off the engine when the vehicle idles. The emissions reductions will be greater for equipment that spends a high proportion of time idling.

Idling policies

Idling increases both emissions and engine wear. Idling policies limit the amount of time an engine can be idled.

AVERAGE REDUCTIONS

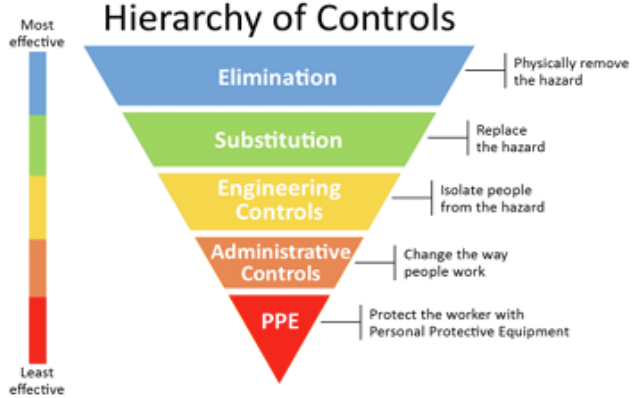
Average particulate matter exposure reductions based on published data

- <50%
- 50-85%
- 85-99%
- 100%
- Varied/Unknown:

Proactive controls — More effective

Reactive controls — Less effective

Hierarchy of Controls



General ventilation

General ventilation dilutes emissions by bringing clean air into the area. The reductions vary depending on the volume of air provided. It also helps reduce ambient air concentration of non-diesel hazards, as well as helping with temperature control.

Operator training

Training can include driving skills, how to recognize maintenance issues, proper use of diesel control technologies, and the health effects of diesel exhaust.

Respirators

PPE should be used as a last resort, and is not a replacement for other controls. The concentration of diesel exhaust in the air should still fall below the regulatory limit. When used, respirators should be fit-tested, and training should be provided to wearers.

Enclosed cabs

When properly functioning, enclosed cabs protect the operator, but do not protect the surrounding workers.

Scheduling and site planning

Control the number of diesel engines operating in an area. Schedule workers during times when fewer diesel engines are working.

Tele-operating

Tele-operation allows the operator to be in a safe location, such as a filtered control room on the surface. Reductions in exposure can be up to 100% if the operator is completely removed from the site. Other workers may still be exposed if they enter the work area, or if emissions circulate to other areas of the mine.

REACTIVE CONTROLS

Remove diesel particulate emissions from the workplace air, or reduce the likelihood that workers will inhale particulate emissions

Occupational Cancer Research Centre

Towards a cancer-free workplace

Examples of Control Measures

- Elimination and substitution can be challenging but are possible, such as replacing diesel equipment and vibrating tools.
- Engineering controls are often possible, such as increasing ventilation (general and at the point of operation) and redesign of workstations to reduce ergonomic hazards.
- Administrative controls have some limitations, but can also be effective, such as rules regarding cleanup up of dust, vehicle idling rules, and training.
- Personal protective equipment should be the last resort.

Conclusions

- The risks presented here are from surveillance and have some important limitations, but give us the ability to look beyond workers compensation statistics.
- Levels of many hazards have decreased over time, but an increased risk of occupational disease remains.
- These diseases are preventable and decreasing a single exposure can sometimes reduce risk of multiple diseases, for example:
  - Silica – lung cancer, silicosis, IPF, and COPD
  - Diesel engine exhaust – lung cancer, AMI, and COPD
  - Noise – hearing loss and AMI
  - Vibration – Raynaud's syndrome and carpal tunnel syndrome

Ontario

Newsroom

NEWS RELEASE

Ontario Strengthening Occupational Illness Protections

Occupational Exposure Registry, Leadership Table and new report will deliver improved protections for workers

October 10, 2023

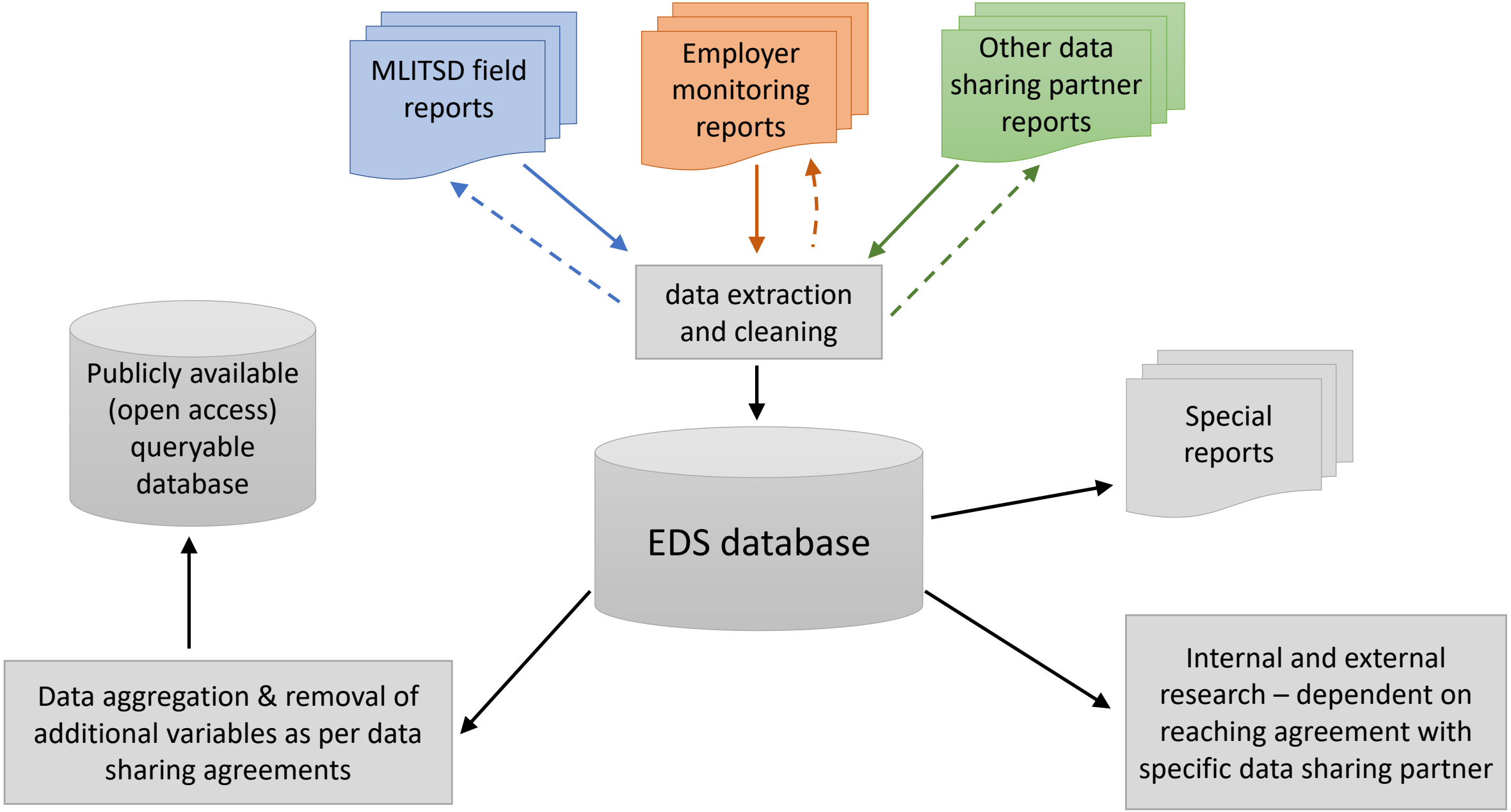
Labour, Immigration, Training and Skills Development

OCRC's Exposure Data System (EDS)

- Are exposure levels to hazards in mining, forestry, and pulp and paper low enough to prevent occupational diseases?
- Are exposure levels dropping?
- Are some groups still at high risk?
  - **How do we know?**

- OCRC has long advocated for the digitization of exposure measurement data to support prevention and policy development.

- OCRC has been working with the MLITSD to initiate the development of an *Exposure Data System,* beginning with data held by the Ministry.


MLITSD field reports
Employer monitoring reports
Other data sharing partner reports
data extraction and cleaning
Publicly available (open access) queryable database
EDS database
Special reports
Data aggregation & removal of additional variables as per data sharing agreements
Internal and external research – dependent on reaching agreement with specific data sharing partner

Resources

Free resources on occupational disease prevention

Industrial Hygiene Assessments

Occupational disease risks in key industries: Protecting workers' health

Poster: Top occupational disease risks in forestry sector

Poster: Top occupational disease risks in mining industry

Poster: Top occupational disease risks in pulp and paper sector

Silica Control Tool - OHCOW

Thank you for helping make workplaces safer

Questions?

For additional information, please contact:

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