# Tuberculosis in the South African mining industry – a view from global occupational health

Rodney Ehrlich, Centre for Occupational and Environmental Health Research, University of Cape Town

# The background

- In 1930 the Chamber of Mines and the International Labour office held a conference on silicosis in Johannesburg.


- The disease “Miner’s Phthisis”

(silicosis and tuberculosis) was discussed in depth.
It was agreed that silicosis was in independent disease.
ILO added silicosis to its list of occupational diseases
in 1934.

- By the 1970s some industry commentators where arguing that tuberculosis was not a mining related disease but a community disease afflicting miners which was just better diagnosed by intensive in service screening.

# The background II

- Research by Cowie and Hnizdo in the 1990s proved that the risk of pulmonary TB increased in linear fashion with silica exposure and silicosis severity.

- In the 2010s the Southern African public health community awakened to the public health disaster that was mining related TB (and HIV), resulting in the 2012 SADC Declaration.

- On 3 June 2018, the gold mining industry settled class action suits for silicosis and tuberculosis.

- *Can the mining industry recover the plot?*

International Commission on Occupational Health

*Founded in 1906 as Permanent Commission*

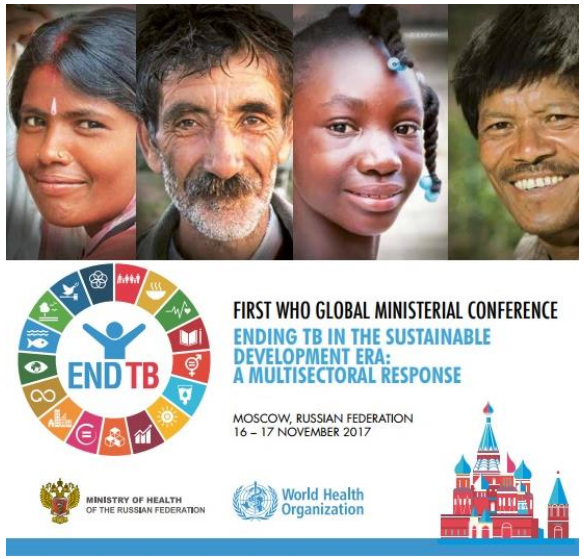
# United National High Level Meeting on TB (September 2018)

ICOH has sought recognition of two major occupational groups at increased risk for TB because of their occupation and the need for special prevention measures

1. Workers exposed to silica dust inhalation (with our without radiological silicosis)

2. Health workers

# Moscow Declaration to end TB (Nov. 2017)




Preamble: "….exposure to silica dust… increase(s) the risk of TB".

Par 1)
".. Affirm our commitment to end the epidemic by 2030"

We commit to: … Scaling up TB prevention, diagnosis, treatment and care.

Prioritizing, high-risk groups and populations in vulnerable situations such as …health care workers, … migrants, … miners, without which TB elimination will not be possible.

Par 3)
Research on …(b) on environmental and social determinants of TB and effective intervention strategies

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# ICOH Statement on Silica-TB: April 28, 2018

## *Preventing Tuberculosis Among Silica Dust Exposed Workers*

- Global problem – estimated 250 million workers exposed, including mining, construction, small-scale and informal.

- Encourages governments, businesses, and global health funders *to invest in control measures* to prevent TB among silica-exposed workers

- Evidence that such investments have favourable cost-benefit ratios, relative to treatment programmes.

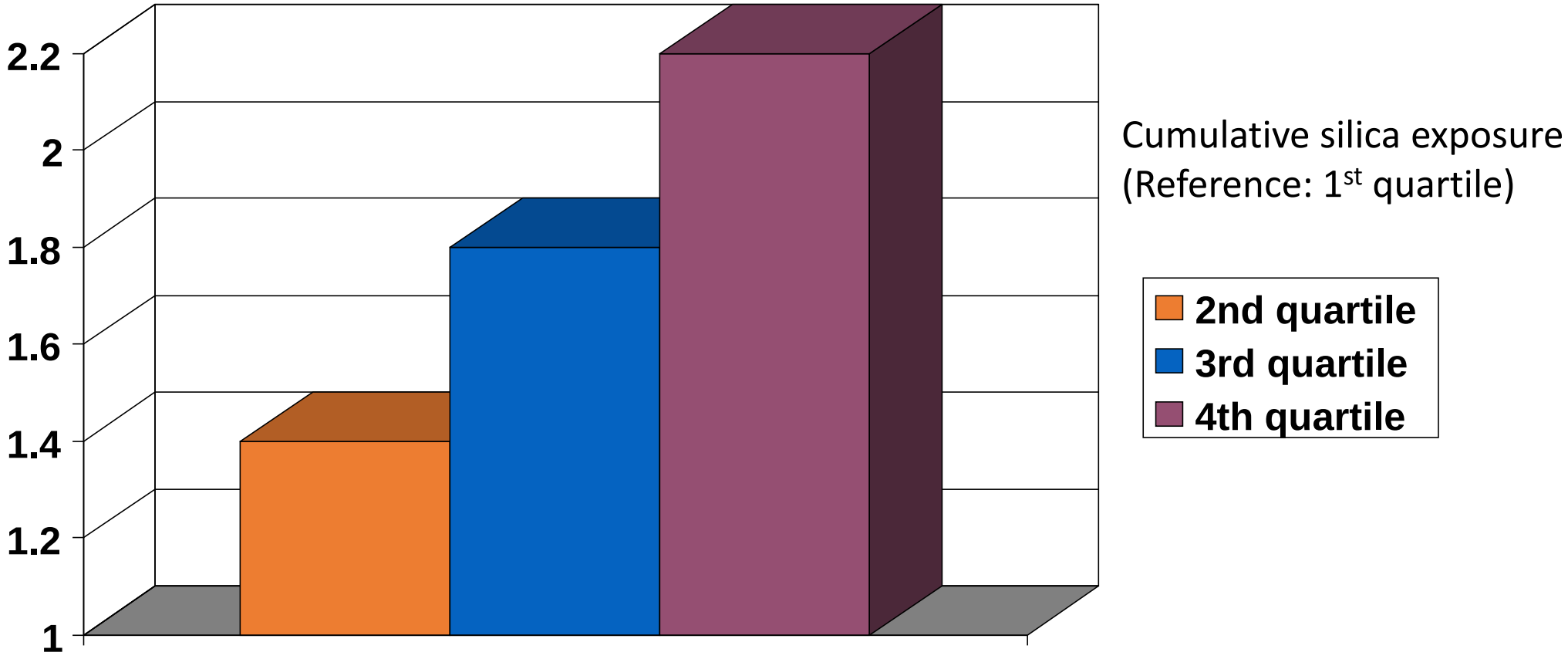
# New York, June 2018: Language for inclusion in UN Declaration

PP9 (high risk population) : "..miners and others *exposed to silica..*" instead of "affected by silicosis".

OP10bis: (Support TB control in low income countries) ".. *including workplace primary prevention actions in high-risk occupations by reducing silica dust in mining, construction and other dusty workplaces, and providing worker TB surveillance and infection prevention and control in healthcare settings*".

# What is the relationship between silica, silicosis and tuberculosis?

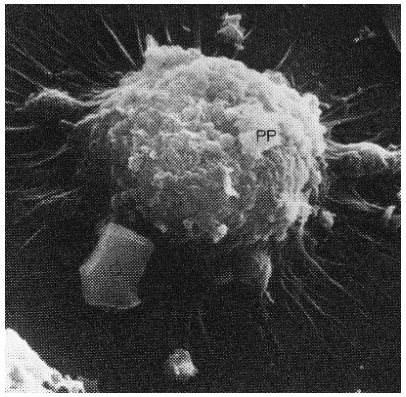
# Epidemiology: Relative risk of pulmonary tuberculosis by cumulative quartile of silica dust exposure, controlling for silicosis




Hnizdo 1998

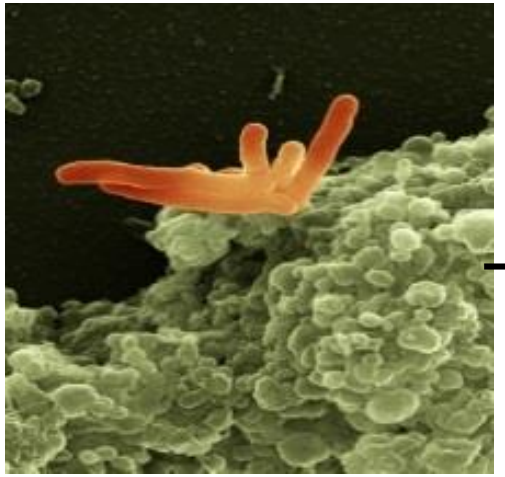
# A bit of biology: Silica and Mycobacterium TB (lab. and life)

Lung macrophage and silica particle



Silica form and dose

Macrophage *and MTB*

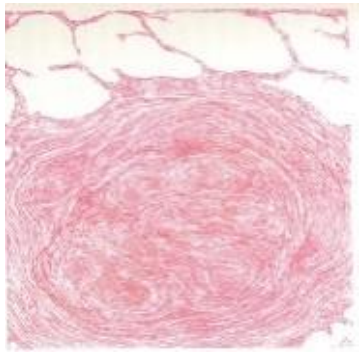


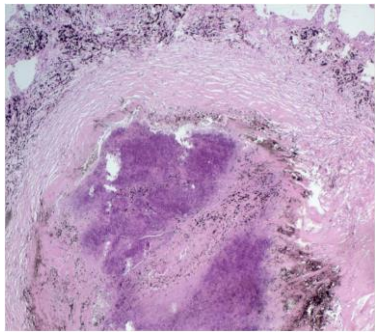
**Macrophage death or impairment**

Proliferation of MTB

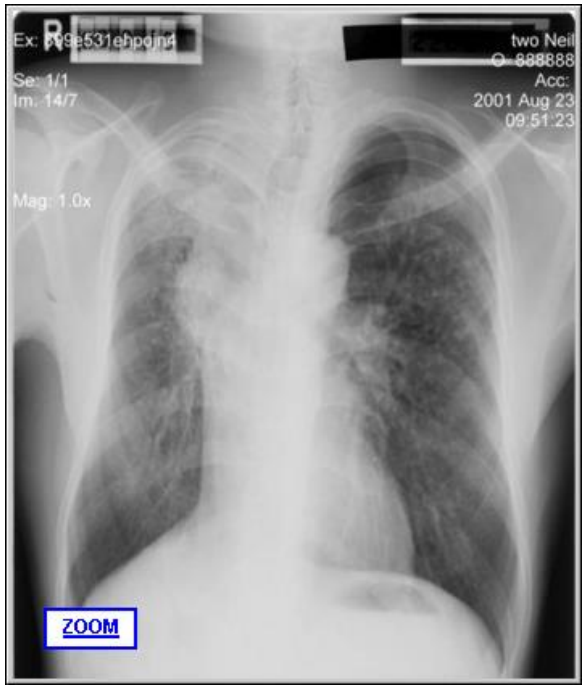
Active TB

Lung fibrosis silicosis)





# Silica and silicosis contribute to the chronicity of PTB disease in miners




- Lung fibrosis
- Lung function loss
- Risk of TB recurrence
- Mortality risk,  during TB treatment and delayed.
- Risk of other lung disease, e.g. other mycobacteria

→ *A TB diagnosis in a silica exposed miner may be  a lifelong diagnosis*

# Opportunities for the SA mining industry

- *Re-take the global lead* in:
  - Accepting and publicising the association between silica and TB.
  - Promoting best practices not only in treatment, prophylaxis and health system provision for TB but also in *primary prevention* of the conditions conducive to infection and progression to active disease:
    - silica inhalation and
    - transmission in congregate settings.

# Opportunities for the SA mining industry II

- *Support arm's length research:*

E.g.

- Structural and occupational determinants of TB in mining
- Biological association between silica (and other inorganic particles) and TB.
- Occupational risk of TB in health workers employed in the mining system.

References available on request.

Rodney.Ehrlich@uct.ac.za