



# Smoking and dementia

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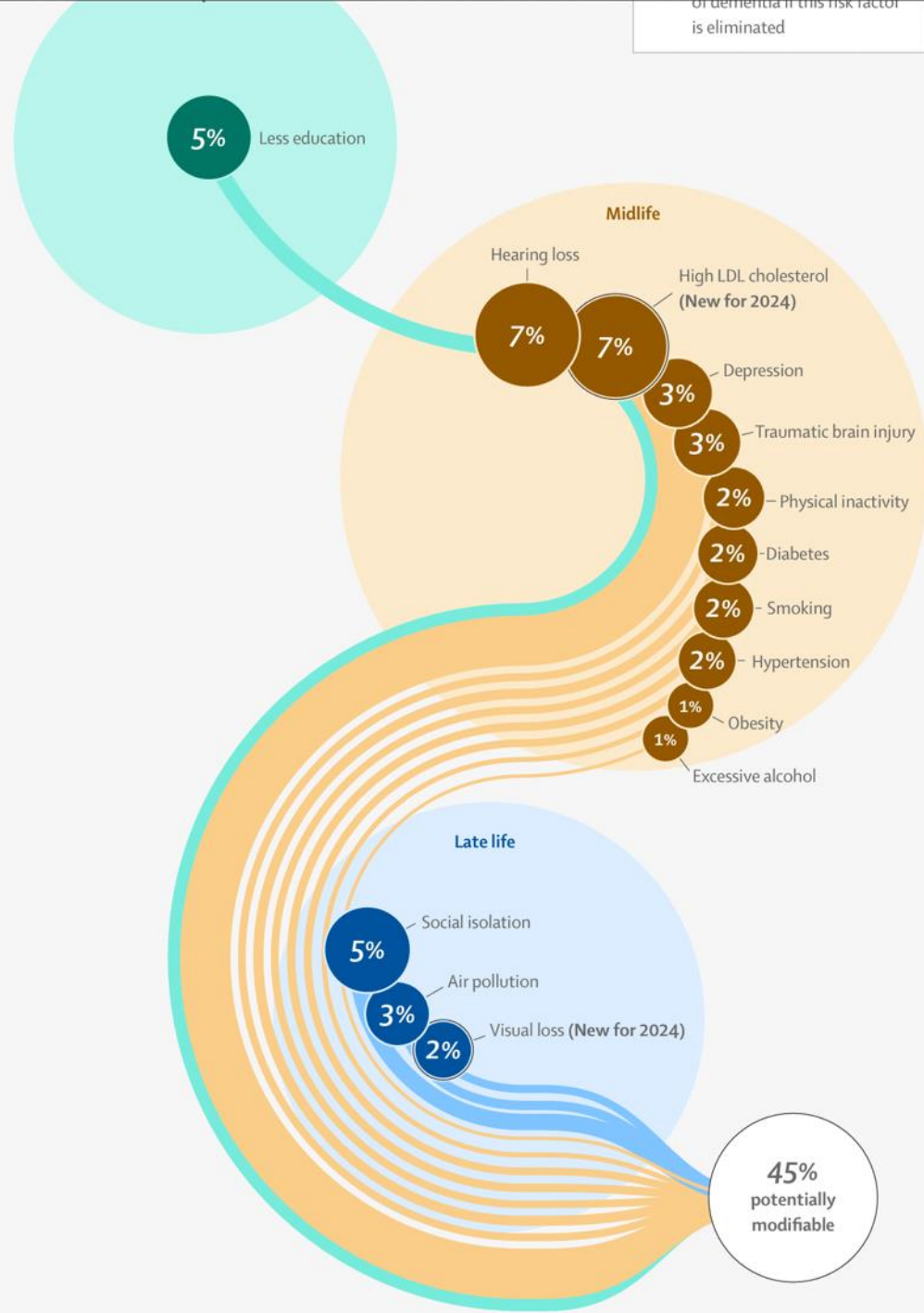
Lismore Base Hospital

# Demographics

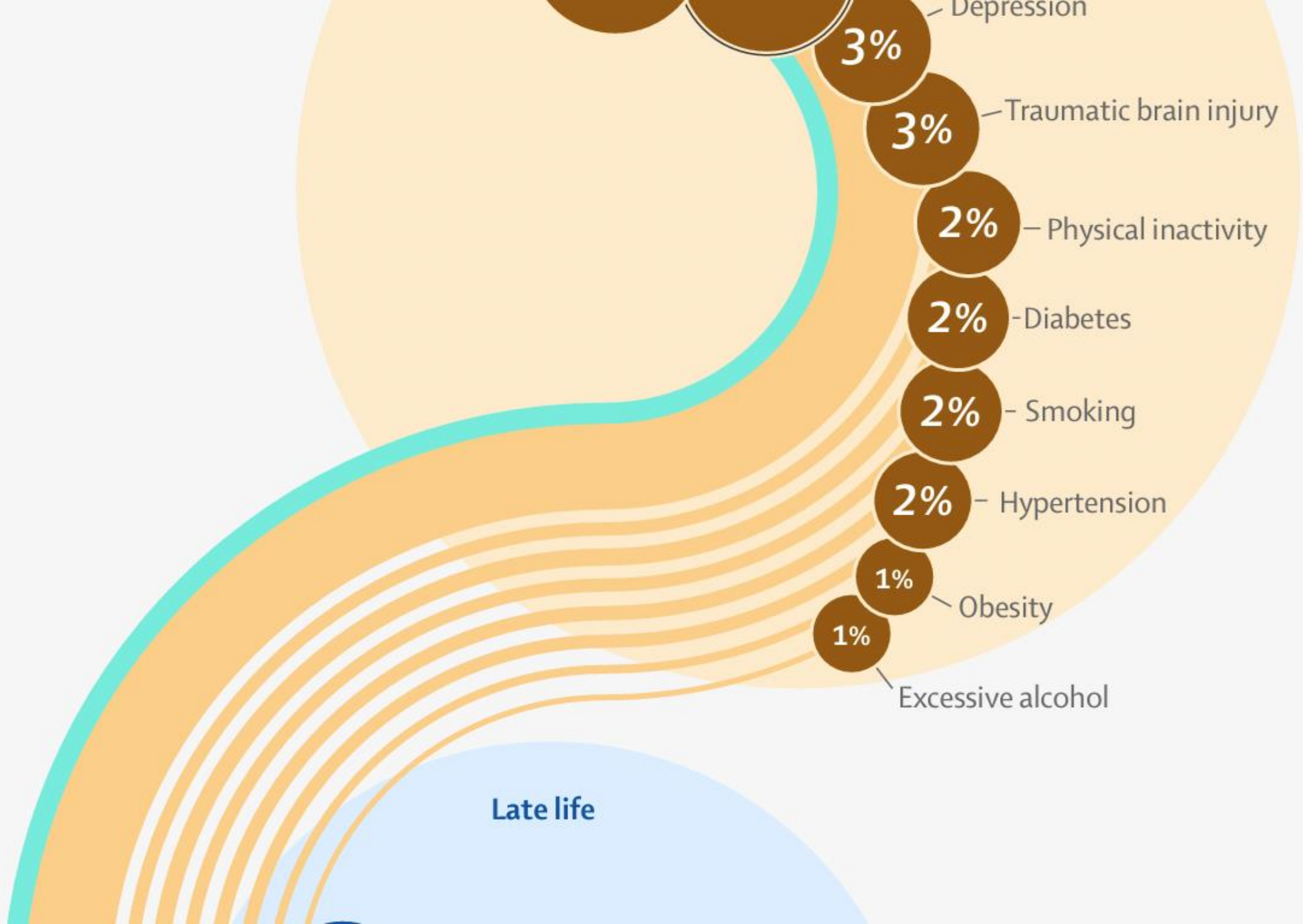
- Overall, smoking accounts for 8.6% of the total burden of disease in Australia.
- 35% of people aged over 70 in 2022-2023 were ex-smokers
- 4.9% of people aged over 70 were daily smokers
- The older people get, the less likely they are to quit smoking
- Percentages increase with increasing remoteness



of dementia if this risk factor is eliminated



45% potentially modifiable





# Smoking

- Midlife smoking is a major risk factor for Alzheimer's dementia: Smokers now live long enough to get dementia.
- Relative risk of 1.7 based on UK biobank and cohort studies.
- Some suggestion of a dose-response relationship
- Smokers with dementia also die sooner



# Mechanisms

- Blood vessel damage - including via stroke and cardiovascular disease
- Smoking increases the risk of stroke and heart disease by three-to-four fold
- Oxidative stress



# Challenges

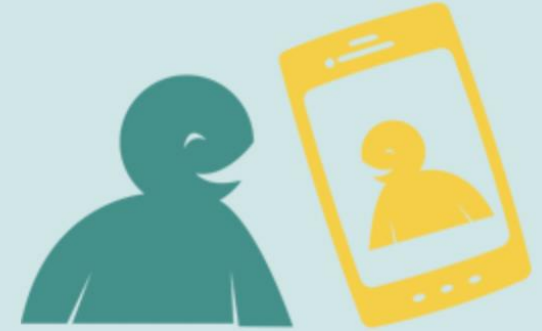
- Smokers die earlier, and therefore miss out on dementia
- Survivorship bias - Smokers who survive to an age where they can get dementia are likely to have better genetics than those who don't survive that long.
- There are many chemicals in cigarettes. Many culprits - The actual nicotine was thought to help cognition at one stage.
- No association in lower/middle income countries (China, Mexico)

# What to do?

- Quitting sooner is better
- 10 years after quitting, cognition matches that of people who never smoked
- It's never too late
- E-cigarettes are **LIKELY** to be less harmful







[Quit.org.au](http://Quit.org.au)

[My\\_QuitBuddy](#)

## 5 A's Model

A	ASK	Do you smoke?
A	ADVISE	Quitting
A	ASSESS	Readiness to quit
A	ASSIST	Help to quit
A	ARRANGE	For follow-up

## 5 R's Model

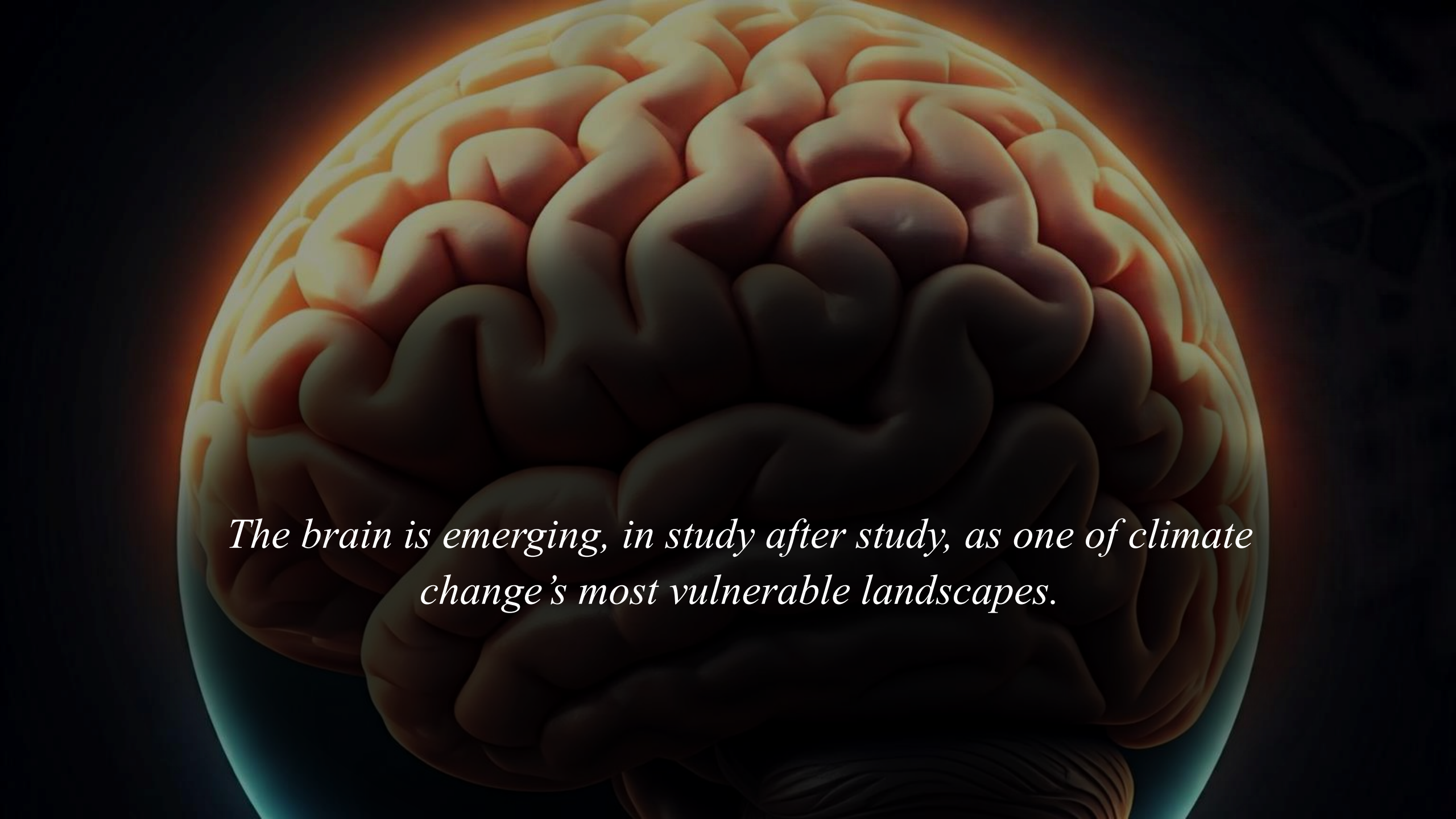
R	RELEVANCE	Why is quitting important?
R	RISKS	Negative consequences
R	REWARDS	Benefits of quitting
R	ROADBLOCKS	Barriers to success
R	REPETITION	Repeat intervention

# Global change, air quality and dementia

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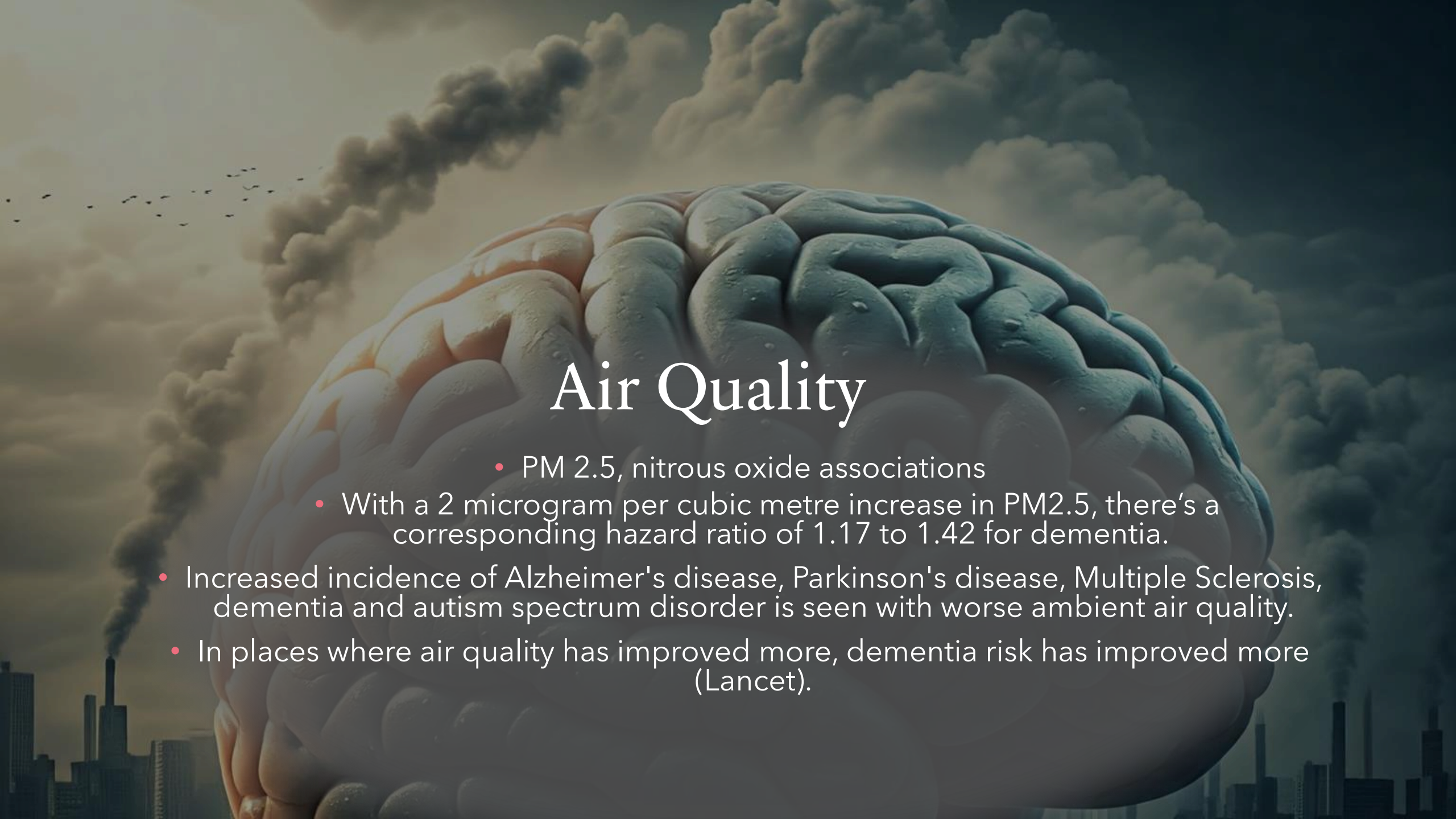


*The brain is emerging, in study after study, as one of climate change's most vulnerable landscapes.*



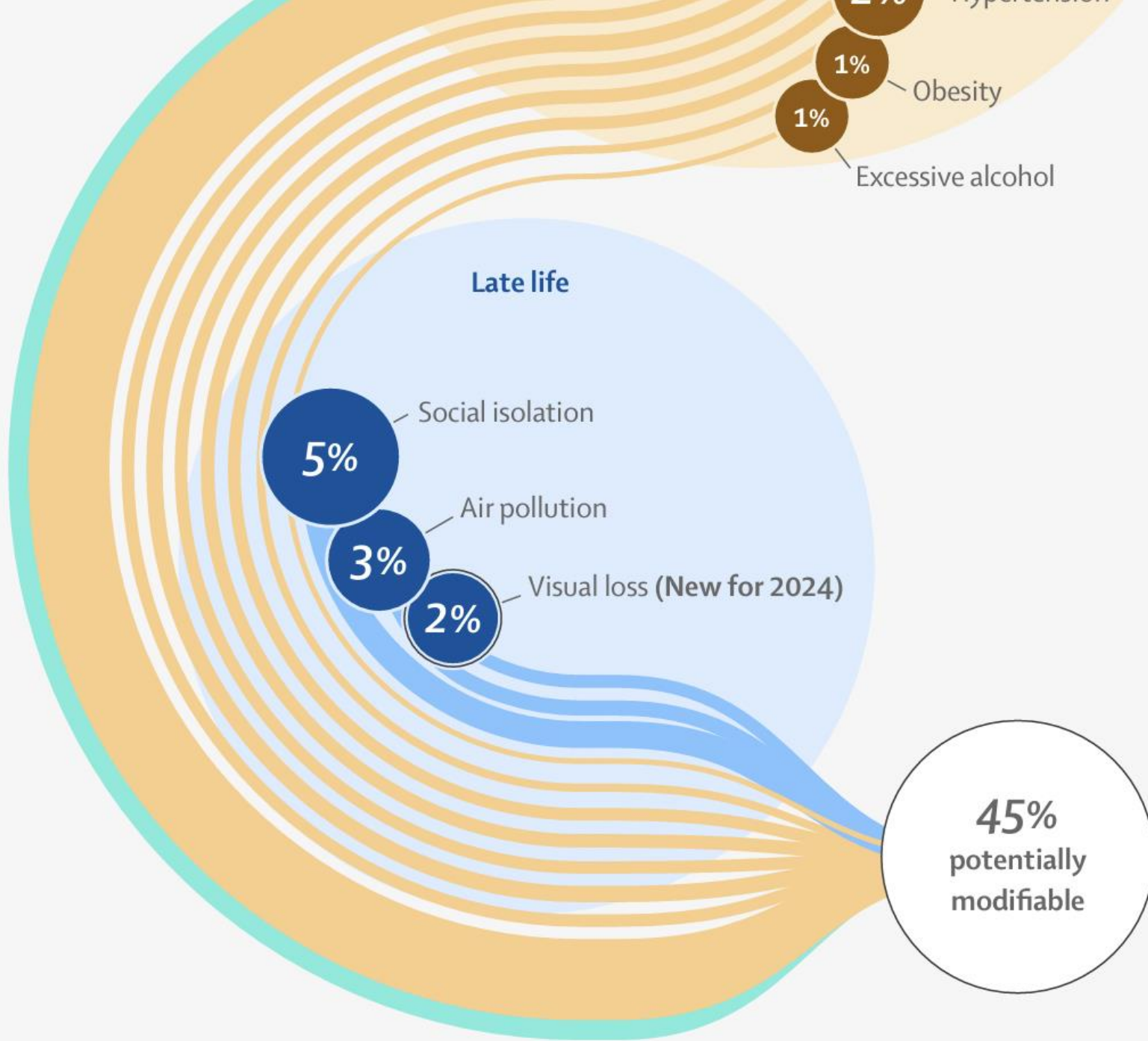
# Global change and human health

- Human activities have led to climate warming by 1.1°C from 1900 to 2020. This causes not just direct impacts on health via temperature changes, but also via indirect effects such as an increase in natural disasters, and population displacement from sea level rise.
- Forecasts: Accelerating dementia prevalence where climate change impacts are greatest
- Aerosol emissions, like smoking, have direct impacts on human health
- Other forms of global change include land use change, with resulting biodiversity loss, desertification, water table depletion. These increase the risk of zoonotic diseases, conflict, malnutrition, non-communicable diseases.



# Air Quality

- PM 2.5, nitrous oxide associations
  - With a 2 microgram per cubic metre increase in PM2.5, there's a corresponding hazard ratio of 1.17 to 1.42 for dementia.
- Increased incidence of Alzheimer's disease, Parkinson's disease, Multiple Sclerosis, dementia and autism spectrum disorder is seen with worse ambient air quality.
- In places where air quality has improved more, dementia risk has improved more (Lancet).





# Air Quality: Examples

- For example, people living within 50m of a main road confers 12% higher risk of dementia.
- in Mexico City, with its extremely poor air quality, Alzheimer's pathology has been found on autopsy in 99 per cent of those under the age of 30.
- Not just outdoor exposure: Solid fuel burning in low-middle income countries is associated with increased dementia risk

# Air Quality: What are the impacts?

- Increased long-term PM2.5 can be associated with faster decline in working memory, grey matter atrophy in Alzheimers-affected areas of the brain, increased risk of admission for or mortality from dementia, especially Alzheimer's disease.
- However, post-mortem analyses failed to find a link between degree of Alzheimers progression and degree of PM2.5 exposure.

# Air Quality impacts: Mechanisms

- Population study in Sweden: **vascular impacts**.
- Also via impacts on **stroke risk**
- Compromise of the **nasal epithelial barrier**, and cross into the systemic circulation.
- Finer particulates PM0.1 can cross the blood brain barrier, causing inflammatory and **oxidative damage**, and glial activation, glutamatergic excitotoxicity, and further compromise of the blood brain barrier.
- In mouse models, particulate exposure drove increased amyloid beta plaque deposition and inflammatory cytokine levels.
- May cause synapse loss through microglia activation as happens in dementia.



# Higher Temperatures

- People with dementia have impaired thermoregulation.
- Especially in Parkinson's disease and similar disorders, and those taking antipsychotics.
- Extreme temperatures are associated with impaired memory and executive function
- Reduce hippocampal blood flow, may cause neuroinflammation, impair sleep, increase agitation in dementia, increase hospital admissions.
- Places with higher degrees of climate warming have greater increases in Parkinson's disease prevalence.
- Between 2030 and 2050; predicted 38,000 excess deaths due to heat exposure in older adults.

# Natural Disasters

- Immediate effects on cognition
- Depression, anxiety and PTSD
  - All of these are associated with increased risk of Alzheimer's Disease and related disorders.
- Increase hospital admissions,
  - With delirium, cognition and function then deteriorating, mortality increasing.





A photograph showing a rhinoceros and a gorilla behind metal bars. The rhinoceros is on the left, and the gorilla is on the right. The text "Zoonotic diseases" is overlaid in white serif font in the upper center.

# Zoonotic diseases

- There is a recognition of the role of infectious disease in the aetiology of dementias, for example HSV-1 and VZV.
- Evidence is emerging of the impact of COVID on dementia risk
- Poorer outcomes for those with dementia during the COVID-19 pandemic, especially when infected by COVID-19



# Indirect effects

- Global change disproportionately affects the vulnerable populations such as older adults, and is already intensifying health disparities, in part due to intersecting threats.
- Global change will change how dementia is experienced, through its impacts on social, physical and environmental stressors.

# Social isolation and breakdown of support systems

- Cognition deteriorates faster in years with too much rain: Isolation, stress, changed health behaviours.
- In dysfunctional neighbourhoods, poorer cognitive function and more rapid cognitive decline
- Climate change affects funding priorities and financial stability of individuals and communities (crisis mode).
- Carer impacts:
  - Less able to care for those with dementia when unwell themselves
  - Unstable connections with loved ones can provoke behavioural and psychological symptoms.

# Food insecurity

- A lack of consistent access to enough food for a healthy, active lifestyle.
- Climate change threatens food security, especially in Sub-Saharan Africa, South and Southeast Asia
- Lower nutrient intake, leading to increased cardiovascular and metabolic diseases, increased stress and depression, and increased dementia risk.
- In the USA, those experiencing low food security compared to food secure individuals have Odds Ratio 1.37 for developing dementia.





# Population displacement

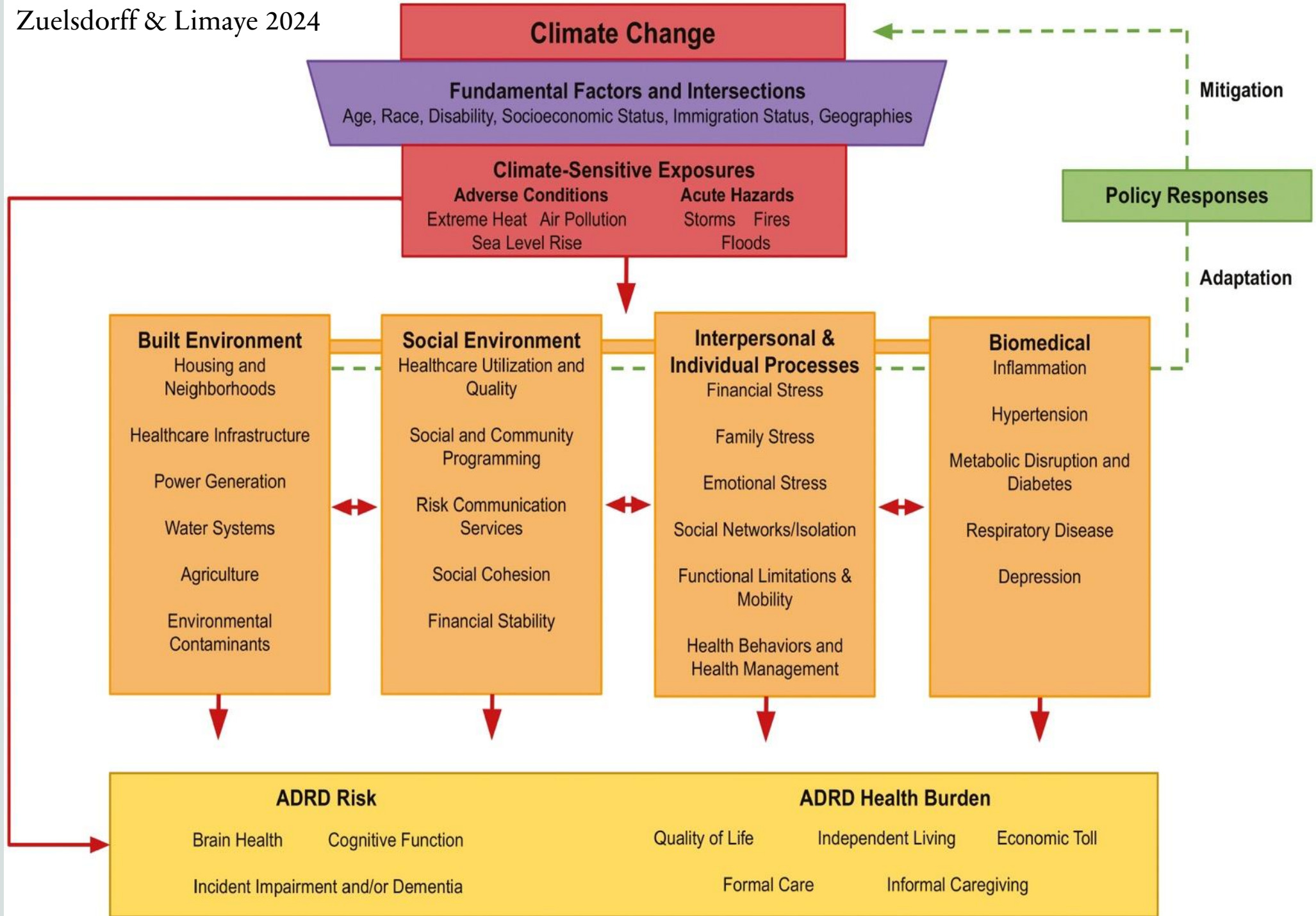
- Psychological trauma due to the displacement (and the situation they flee) and the initial social isolation once migrants arrive in a new country are both risk factors for further cognitive impairment.
- Refugees in Australia are 30% more likely to self-report dementia than the general population (but formal diagnosis likely to be higher!)



# Environmental toxins

- Increasing awareness of links to neurodegenerative diseases, for example Parkinson's disease risk is increased in those with pesticide exposure







# What to do?

- To protect yourself
  - Air pollution: Choose environments with better air quality
  - Temperature: Live in well-designed houses with better insulation / temperature control (i.e. have more money)
  - Natural disasters: Prepare, and
  - Social factors: Maintain your support networks
  - Ecohealth: Vaccinate against, for example, COVID

# What to do?

- To protect others
  - Be community minded
  - Minimise carbon emissions
  - Lobby government into policy change
    - eg coal,
    - urban planning including green belts,
    - relocating emission sources,
    - clean energy transportation.

# Protective factors in our region

- Good air quality
- Resilience to natural disasters
- Community
- Oceanic climate

