Explaining life expectancy gaps in New Zealand

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Introduction

- This analysis attempts to explain life expectancy gaps between ethnic population groups in New Zealand by sex for 2017-19, using “European and other” as the reference population
- It quantifies the contribution of likely causal factors, using a variety of methods
- The analysis informs ways to reduce health and well-being disparities

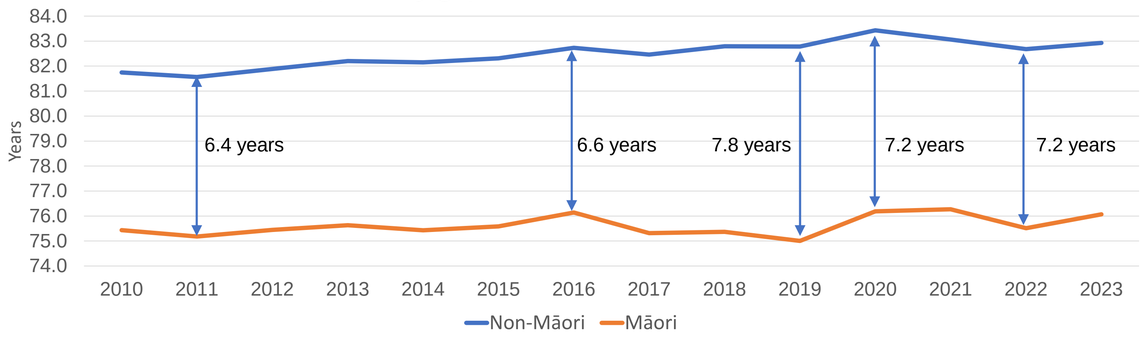
Takeaway

- Just 3 factors explain most of the life expectancy differences between ethnic populations:
- Smoking, high body mass index (BMI), and external causes of death

Context

- There are big gaps in life expectancy between population groups
- Prior to the pandemic, the gaps had been widening, for example…

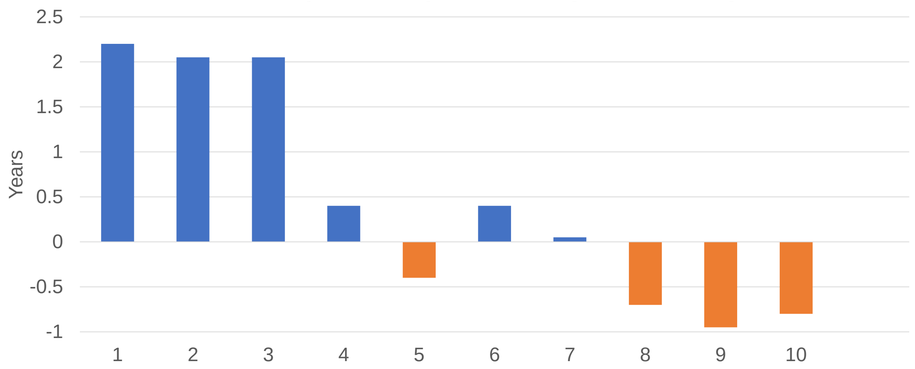
Non-Māori to Māori life expectancy gap from 2010 to 2023



Sources: Death and population data from Statistics NZ, author’s calculation of life expectancy based on standard techniques

- Māori life expectancy trended downwards between 2016 to 2019
- The life expectancy gap increased by 1.2 years

Change in life expectancy between 2012-14 and 2017-19 by decile of small area deprivation (1 = least deprived decile)



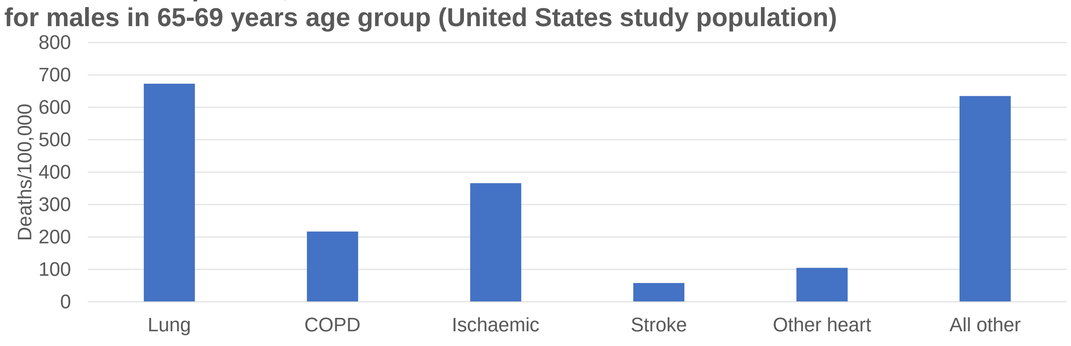
Source: Statistics NZ sub-national period life tables: 2017-2019

- Life expectancy for people in the 30% least deprived areas went up by over 2 years
- Life expectancy for people in the 30% most deprived areas went down

Methods

- Triangulation of multiple lines of evidence
- Use of estimates from mendelian randomisation studies (an instrumental variables method to infer causality, using DNA variants)
- Decomposition of life expectancy gaps by cause of death (Pollard method described by Suchindran)
- Inference from ratios of excess deaths between populations. See example for smoking below

Excess deaths per 100,000 smokers versus never smokers for males in 65-69 years age group (United States study population)



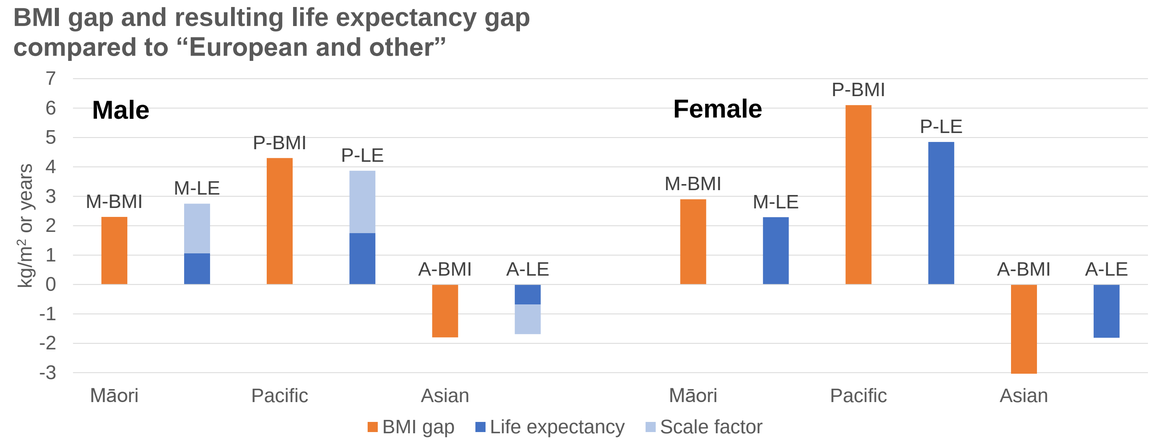
Sources: Thun 2013, supplementary appendix

- Life expectancy loss from lung cancer is likely a good reflection of the mortality burden from smoking – perhaps better than current smoking rates
- The life expectancy loss from lung cancer loss can be scaled up for other causes of death using the ratio relationships
- “All other” causes is large and its inclusion boosts the estimates significantly

Methods (cont)

- A mendelian randomisation study (Burgess 2024) showed an increase in mortality for each 1 unit increase of BMI (about 5kg) of around 7% for females and 6% for males
- Applying this relationship to BMI distributions, we can calculate the impact on mortality and so life expectancy
- Life expectancy gaps tend to follow BMI gaps as shown below

BMI gap and resulting life expectancy gap compared to “European and other”



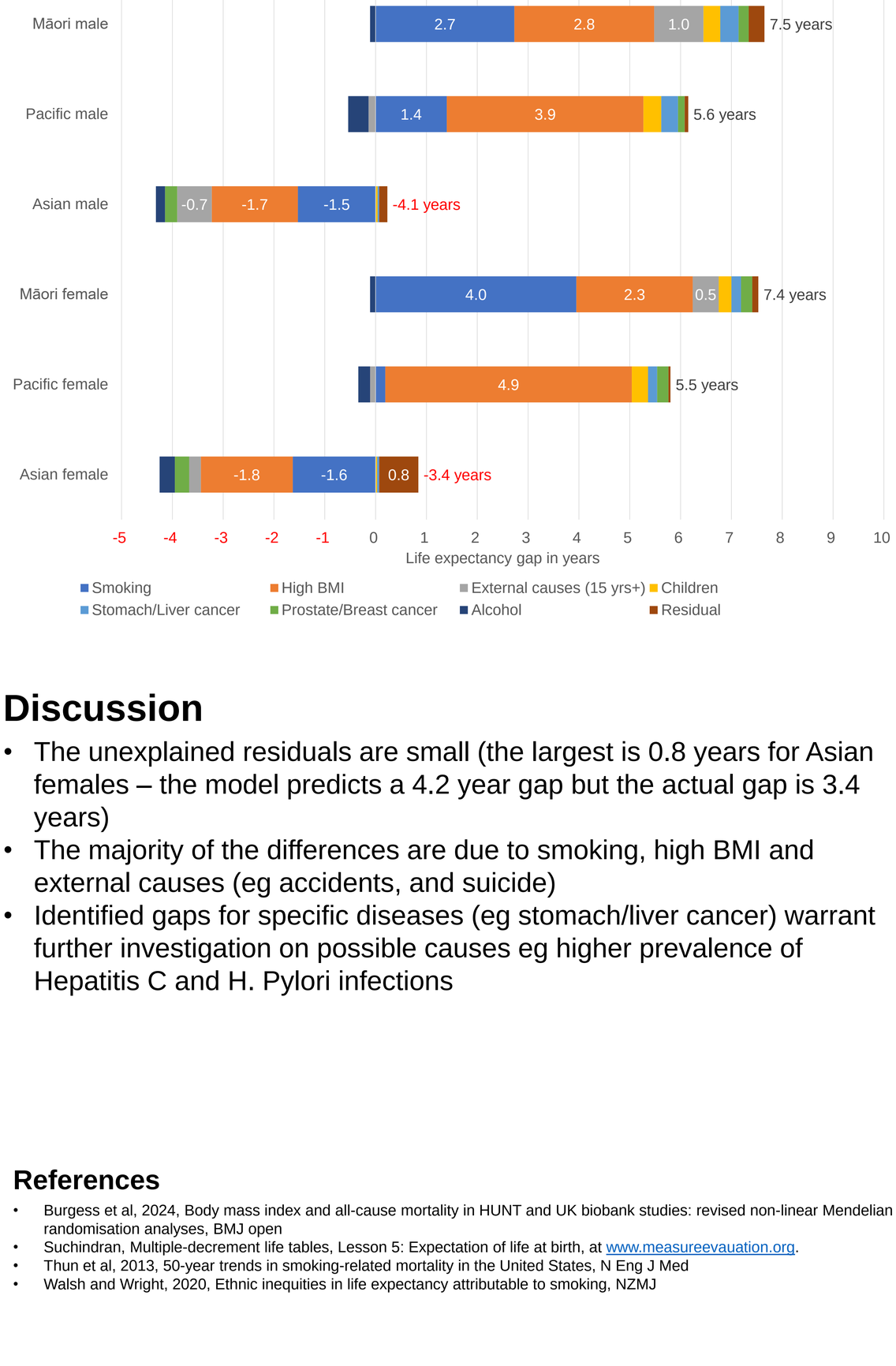
Sources: NZ Health Survey 2017/18 for body size data, graphs in Burgess 2024 for impact of higher BMI on mortality,

- Mendelian randomisation addresses reverse causation, confounders, and measurement error. For BMI, mortality estimates are about twice as high as estimates from observational studies.
- A scaling factor is introduced for males to raise the estimates. This gives greater consistency with other evidence eg that males have similar diabetes life expectancy loss to females

Results

- The chart below sets out contributions to life expectancy gaps. The values to the right of the bars give the actual (net) life expectancy gap.

Life Expectancy gap to “European and other” 2017-19



Discussion

- The unexplained residuals are small (the largest is 0.8 years for Asian females – the model predicts a 4.2 year gap but the actual gap is 3.4 years)
- The majority of the differences are due to smoking, high BMI and external causes (eg accidents, and suicide)
- Identified gaps for specific diseases (eg stomach/liver cancer) warrant further investigation on possible causes eg higher prevalence of Hepatitis C and H. Pylori infections

References

- Burgess et al, 2024, Body mass index and all-cause mortality in HUNT and UK biobank studies: revised non-linear Mendelian randomisation analyses, BMJ open
- Suchindran, Multiple-decrement life tables, Lesson 5: Expectation of life at birth, at www.measureevauation.org.
- Thun et al, 2013, 50-year trends in smoking-related mortality in the United States, N Eng J Med
- Walsh and Wright, 2020, Ethnic inequities in life expectancy attributable to smoking, NZMJ