

MOODY'S

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The Changing Landscape of Cardiovascular Diseases Mortality in Canada and the United Kingdom

Agenda

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Trends in all-cause and cause-specific mortality improvement

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Drivers of slowdown in cardiovascular disease mortality improvements

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Short-and long-term implications on longevity risk

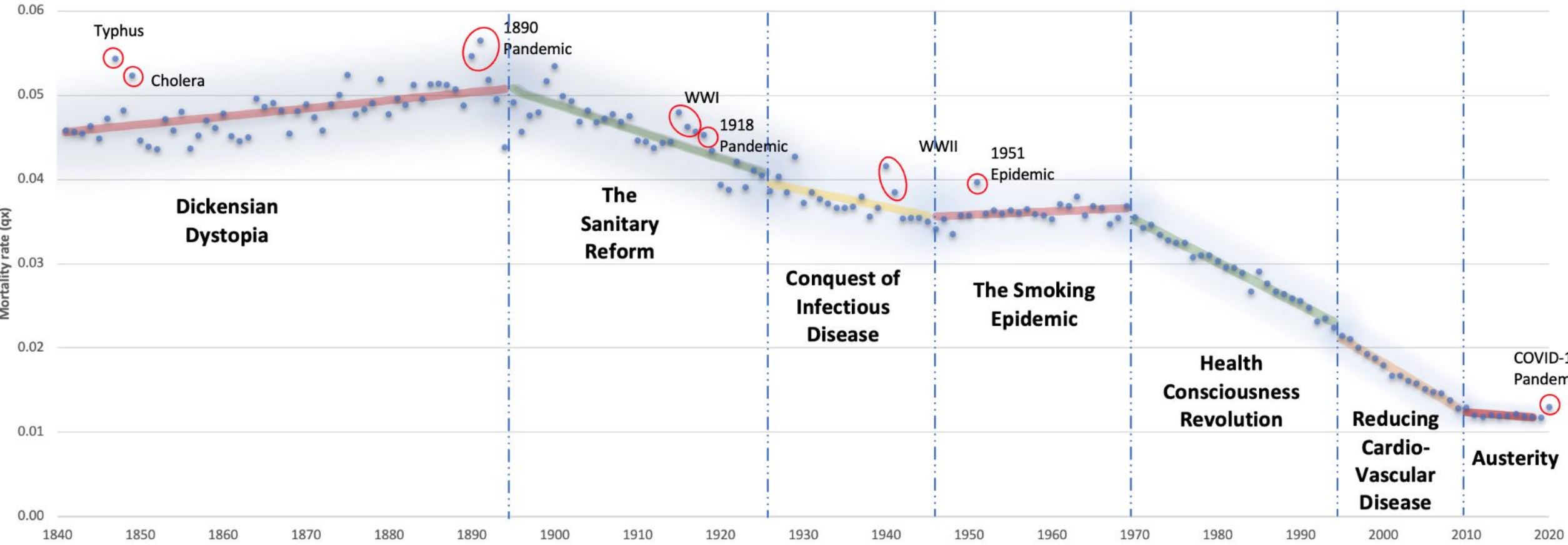
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Trends in all-cause and cause-specific mortality improvement

Historical Mortality Trends

Historical mortality trends have come in waves

Historical mortality rates for 65-year old UK male, as broad phases of social change

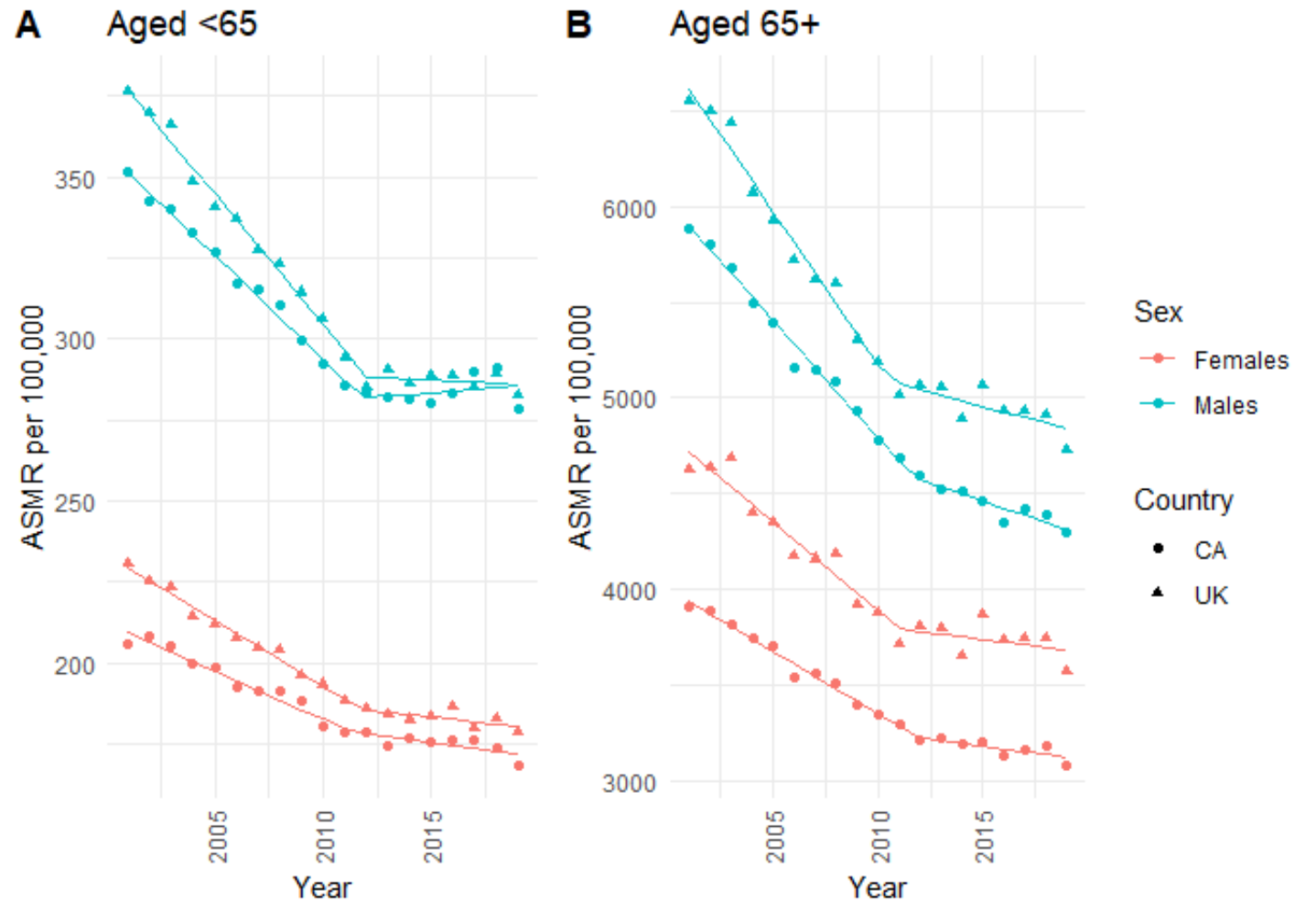


Methods

Design	Description
Data	All-cause and cause-specific death and population counts <ul style="list-style-type: none">- Canada and England & Wales (UK)- 2000 to 2019- Adults (20+ years, single year of age)- Sex (female/male)
Case definition	ICD-10 Codes Disease of the circulatory system (I00-I99), hypertensive diseases (I10-I15), ischemic heart diseases (I20-I25), heart failure (I50), cerebrovascular diseases (I60-I69), diseases of arteries, arterioles and capillaries (I70-I78), and other (I00-I02, I05-I09, I26-I28, I30-I49, I51, I80-I89, I95-I99)
Model	Joinpoint regression on age-standardized mortality rates (ASMR) considering one changepoint

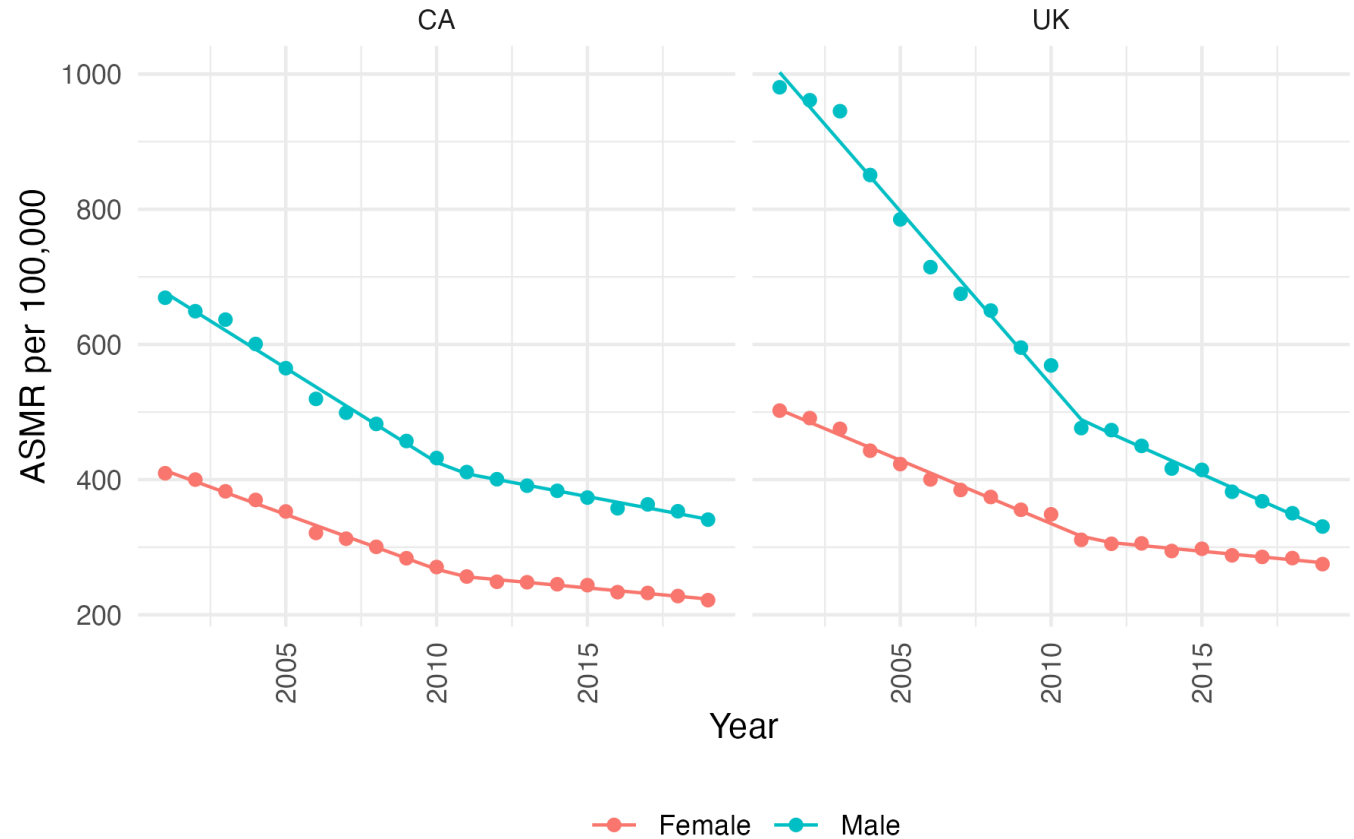
ASMR – All-Cause

- **Steep decline until 2011/12, after that...**
- **Aged <65 years**
 - **Annual improvement reduced by 70-108%**
 - **No longer significant for males**
- **Aged 65+ years**
 - **Annual improvement reduced by 69-85%**
 - **No longer significant for UK females**



ASMR – CVD

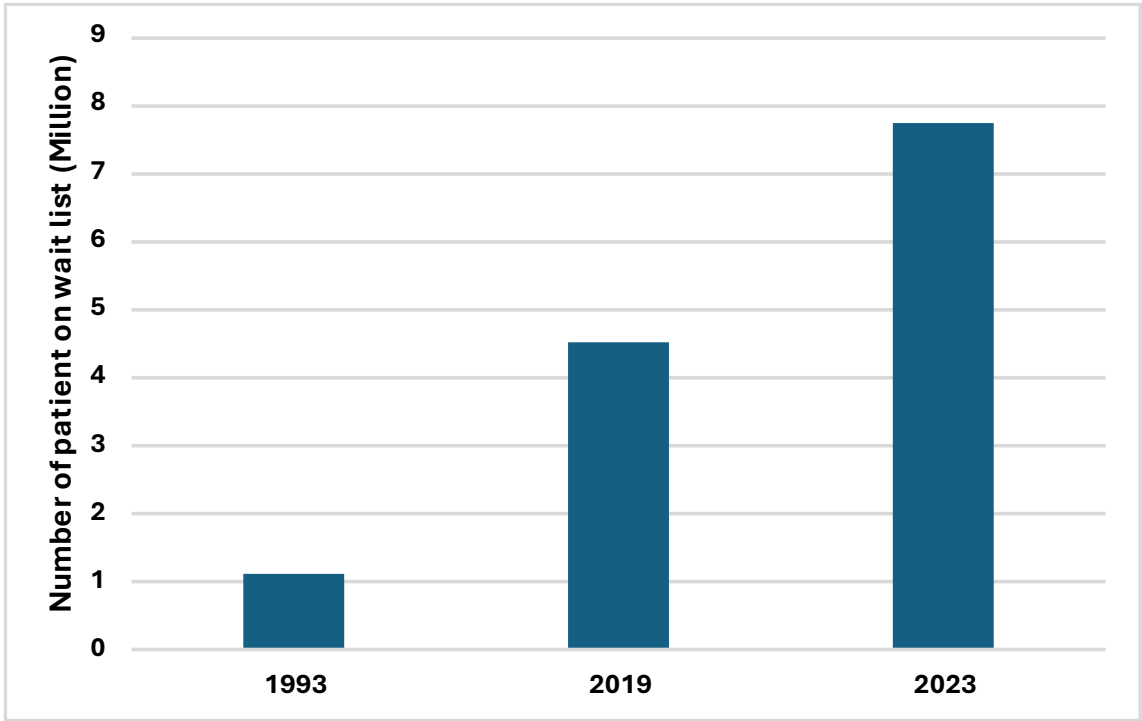
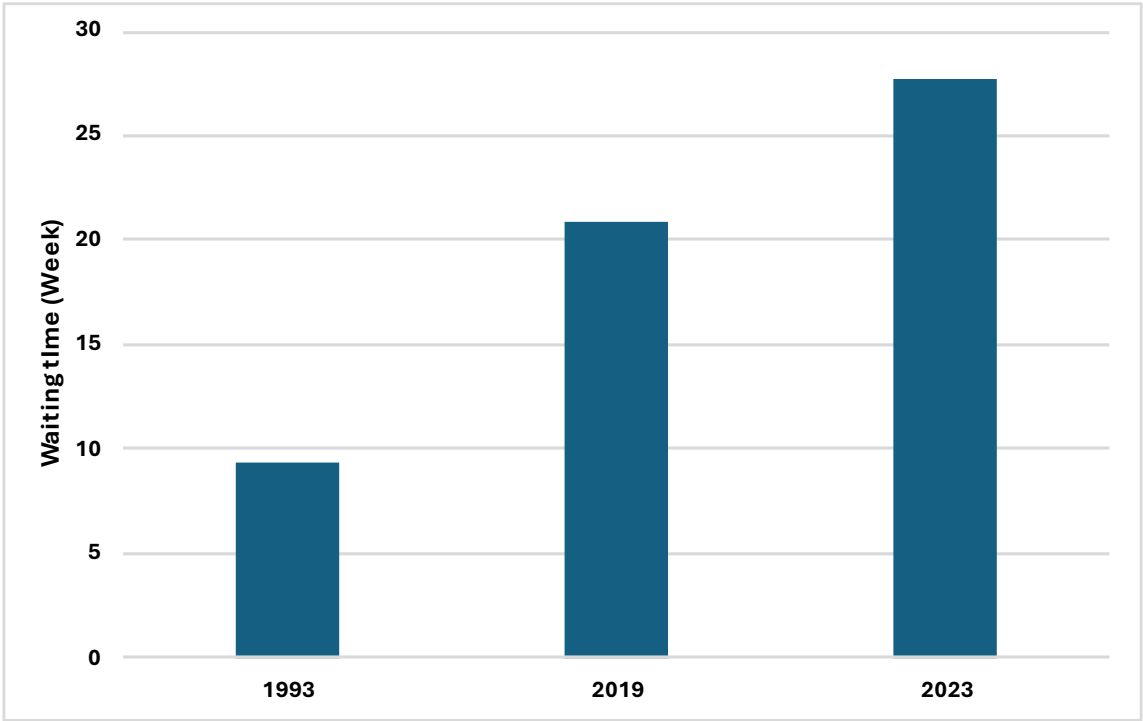
- **CVD is the primary driver of the slowdown in mortality improvement, explaining 66% for males and 89% for females**
- **Reduction in CVD mortality improvement since 2011/2012**
- **Slowdown is most pronounced among UK females**
- **Marked narrowing of the CVD mortality gender gap in the UK**



Healthcare System Performance

Canada: Median wait from referral by general practitioner to treatment

UK: Number of patients on waiting list for planned NHS treatment



Sources:

CA: <https://www.fraserinstitute.org/categories/health-care-wait-times>

UK: <https://www.nuffieldtrust.org.uk/resource/chart-of-the-week-how-has-the-waiting-list-changed-over-the-years>; <https://www.bbc.com/news/health-67087906>

Socioeconomic disparity

Trends in 21st century

Income

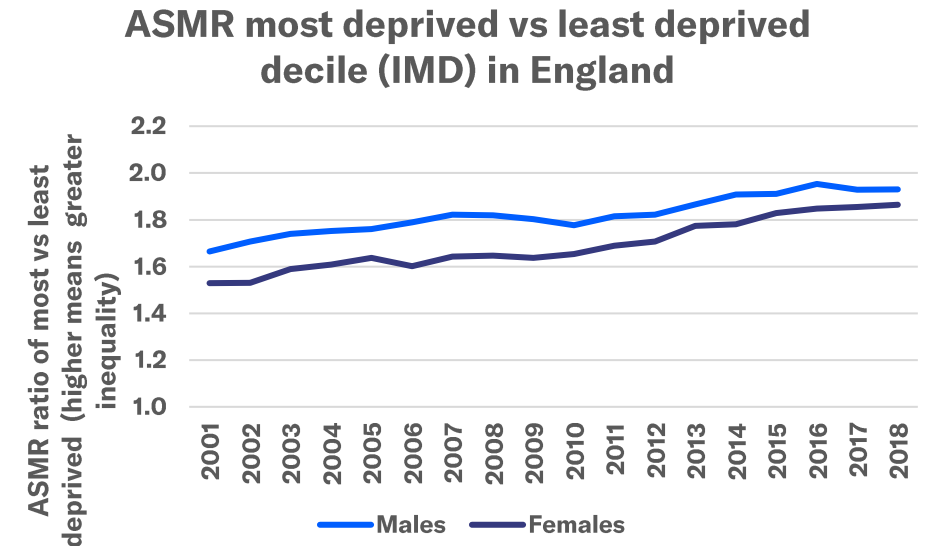
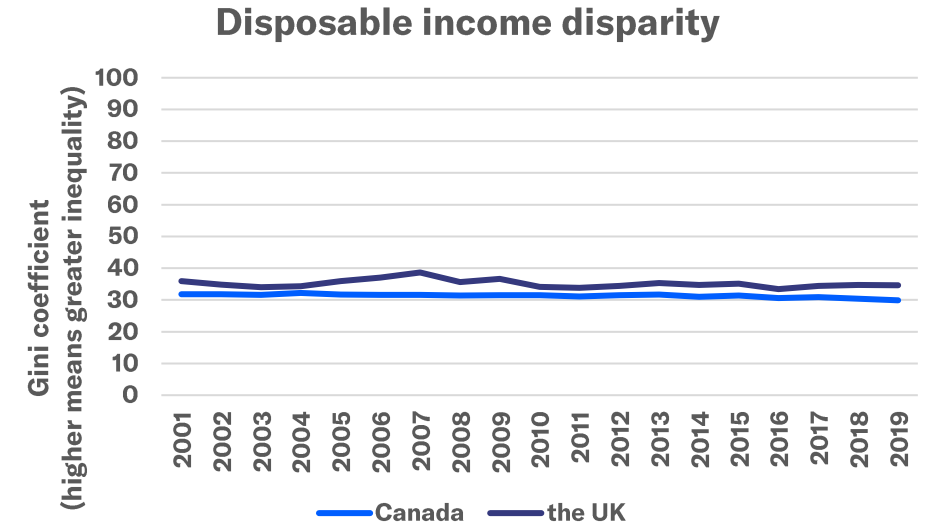
- **Gini coefficient of Canada and the UK is relatively stable from 2000 to 2019**

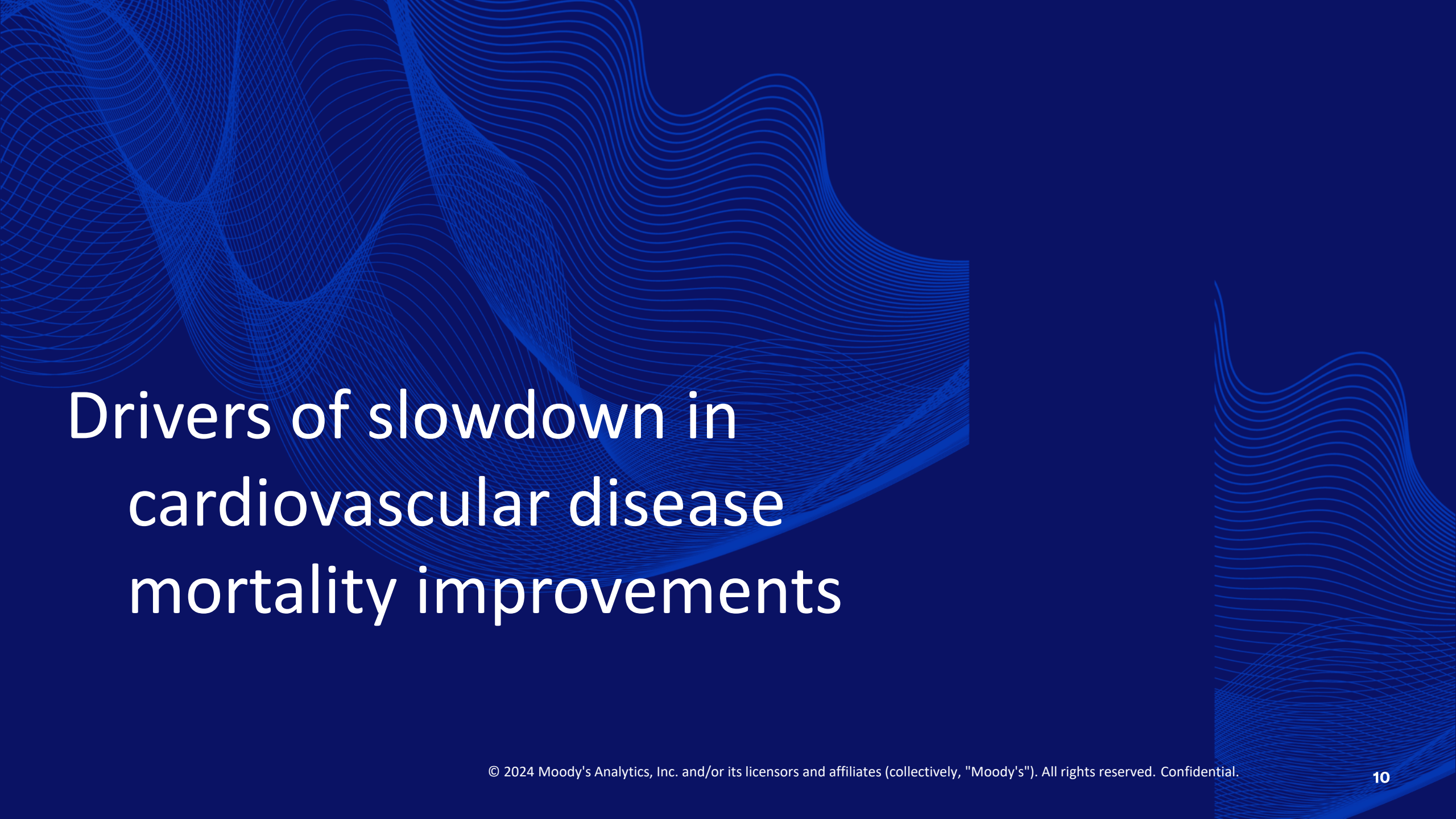
Mortality

- **Canada: Widened disparity, particularly in premature and avoidable mortality [1], and from 2008 after the financial crisis [2]**
- **The UK: Relatively stable during 2000s, but since around 2010 increased [3], with the most affected conditions being ischaemic heart disease, respiratory cancers, and chronic obstructive pulmonary disease [3]**

References (doi): [1] PMC7532016 [2] PMC7117737 [3] PMC7098478

Data:
<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/changingtrends inmortalitybynationalindicesofdeprivationenglandandwales/2001to2018>



The background of the slide is a solid dark blue color. Overlaid on this are several abstract, wavy, light blue lines that create a sense of motion and depth. These lines are most prominent on the left side and bottom right, where they form a grid-like pattern that tapers and flows. The overall aesthetic is modern and data-oriented.

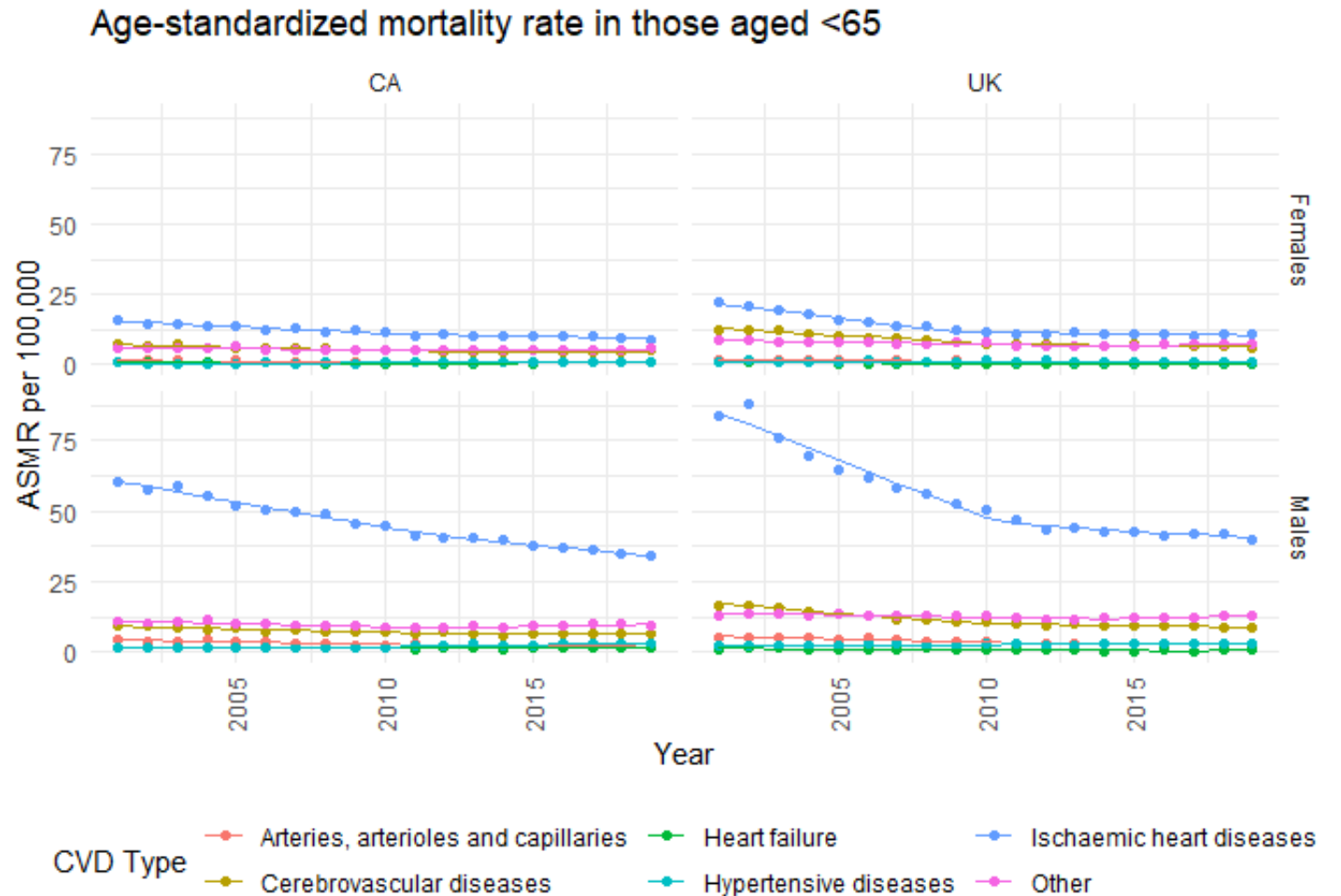
Drivers of slowdown in cardiovascular disease mortality improvements

ASMR – CVD Cause Specific Ages 20-64 years

- **Poor outcomes for acute CVD**
 - Ischaemic heart diseases
 - Cerebrovascular diseases

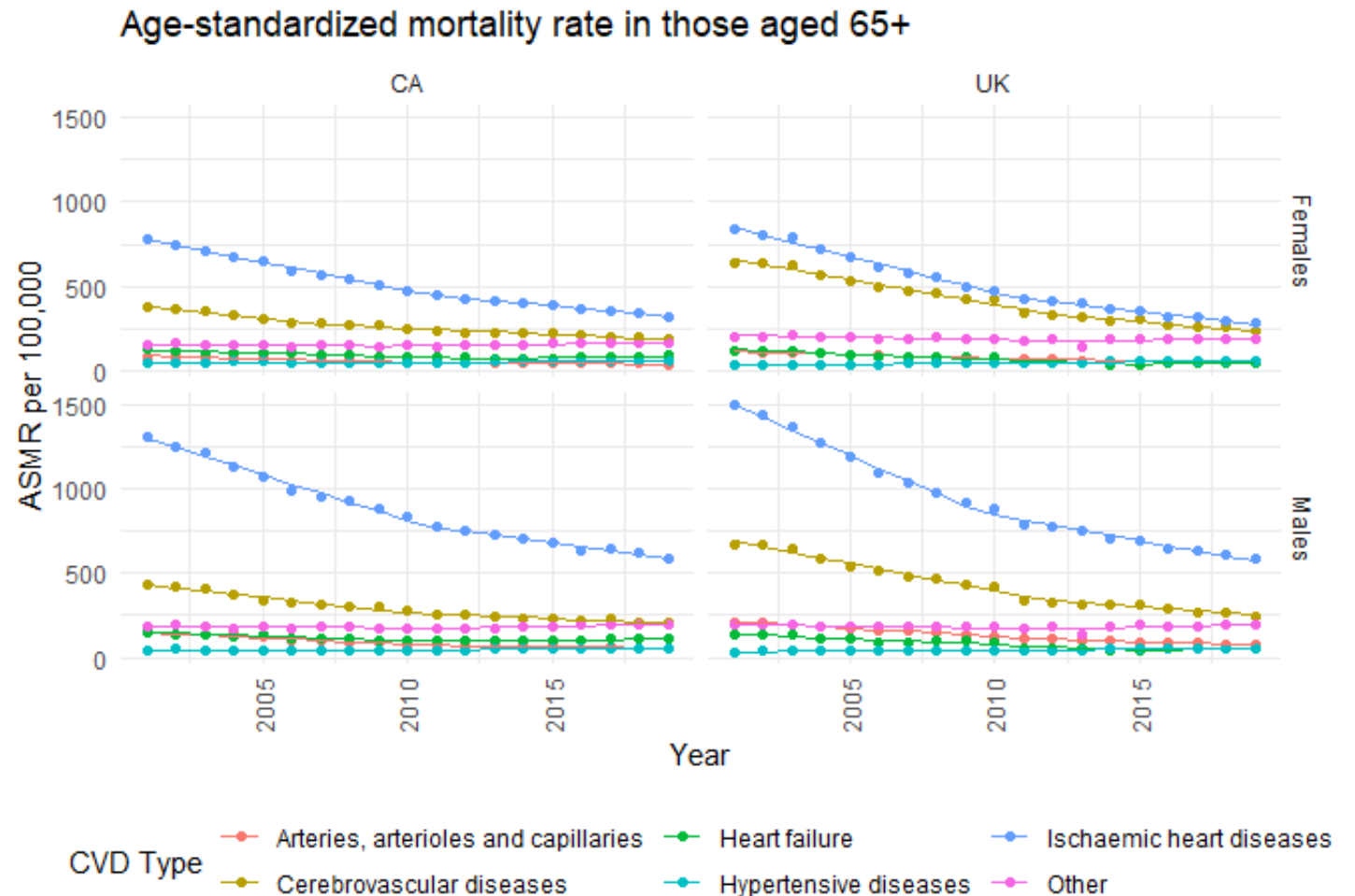
- **More pronounced in the UK & among males**

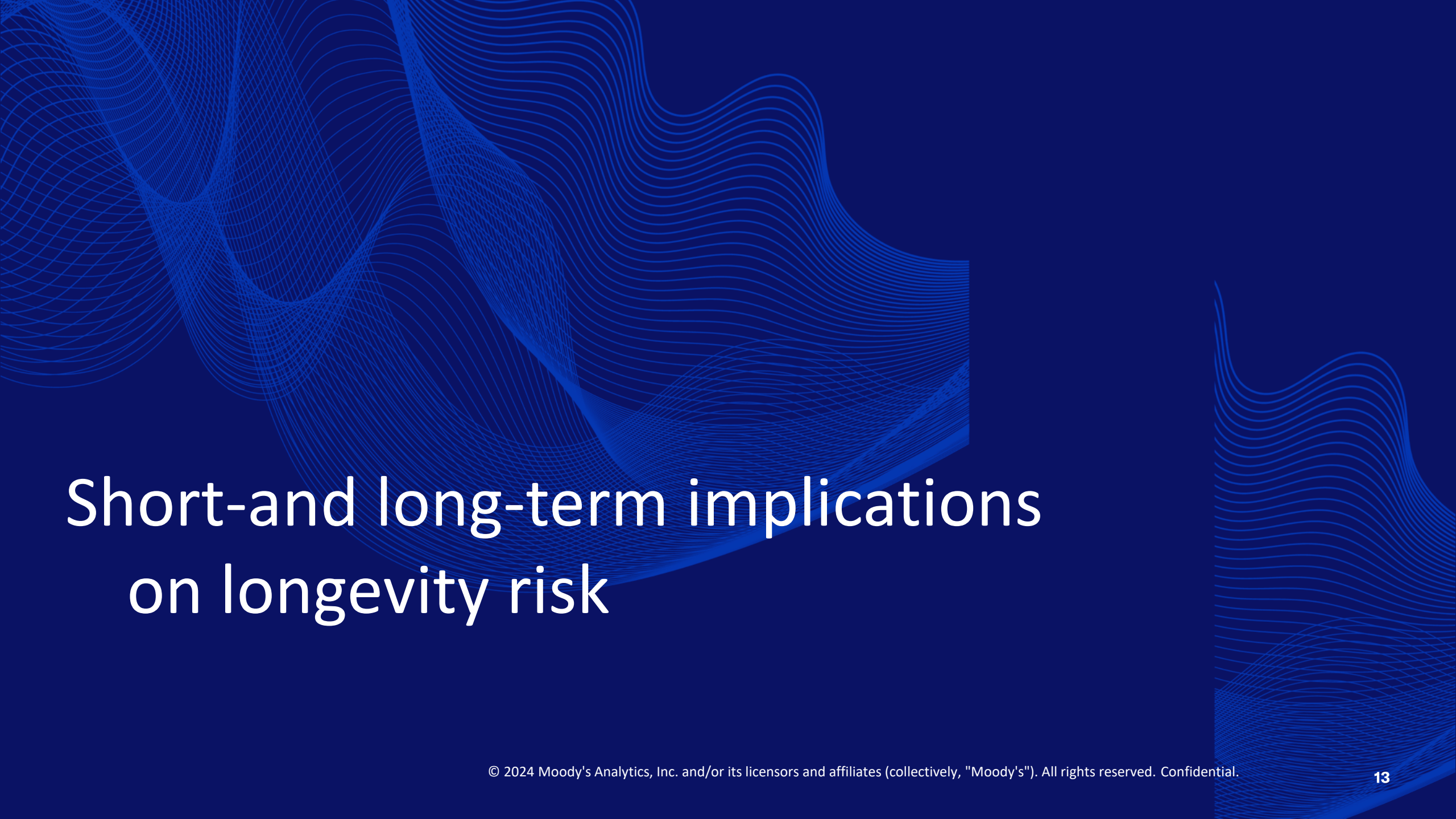
- **Background rise of hypertensive diseases especially in the UK**



ASMR – CVD Cause Specific Age 65+ years

- **Similar mortality experience between CA and UK**
- **Suboptimal mortality outcomes for both acute and end stage CVD (Other)**
 - **Degradation of quality clinical care**
 - **Absence of advances in the management of heart failure**

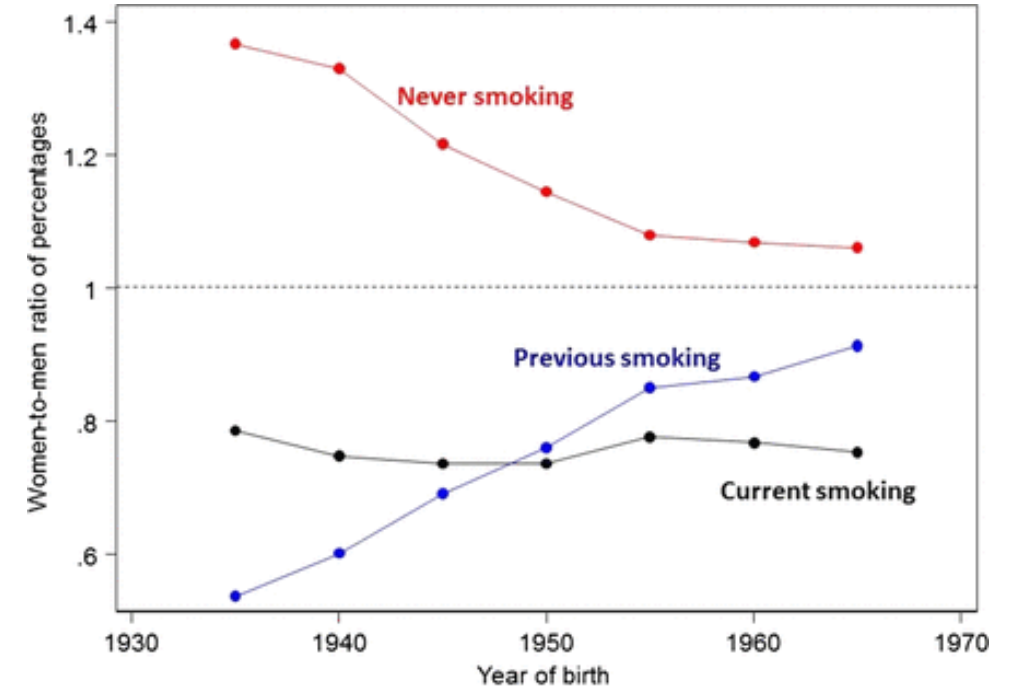


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Short-and long-term implications on longevity risk

Past – CVD Driving Mortality Improvement

- **Cardiovascular disease (CVD) mortality continue to shape the overall trend in mortality rate for both Canada and the UK**
- **Rates of CVD mortality improvement are consistently higher for male than female, before and after the change point**
 - **Largely due to historically delayed smoking initiation and cessation**
- **Recent slowdown largely explained by increase in mortality due to hypertensive disease, coupled with a stagnation in the improvements against acute and end-stage CVD conditions**



UK biobank study; DOI: [10.1136/bmjopen-2014-005663](https://doi.org/10.1136/bmjopen-2014-005663)

Present – The Triple Challenge

1. Hypertensive diseases – silent threat

- **Characterized by high blood pressure; often asymptomatic until more severe complications**
- **Difficult to detect and manage effectively**
- **Need for more innovative screening and treatment strategies**
- **Real potential to significantly alter the current trajectory of CVD mortality trends**

2. Acute cardiovascular diseases

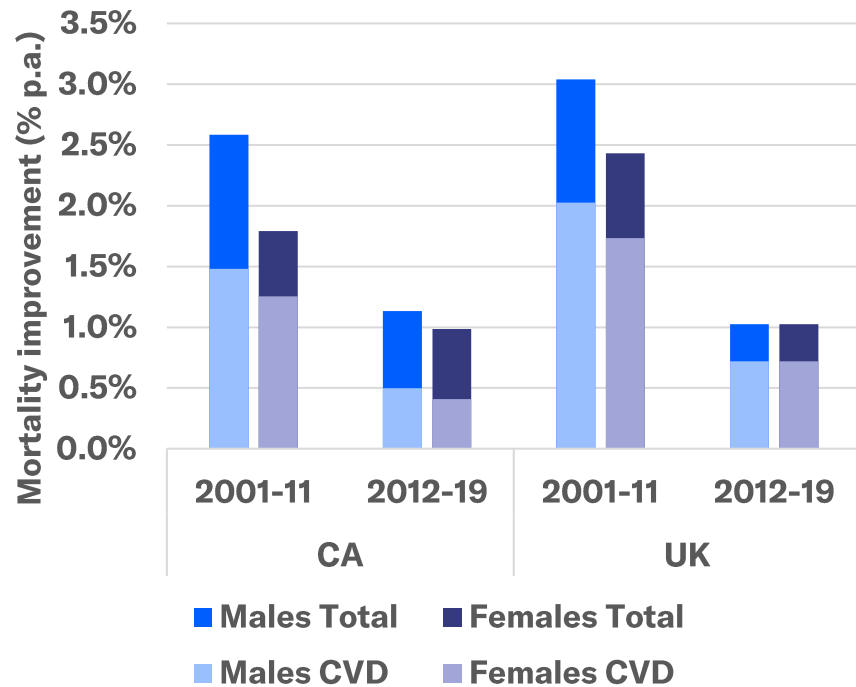
- **Challenges in maintaining quality care within overstretched healthcare systems in both countries**
- **Adapting clinical practices to patients (young and women) presenting with atypical symptoms**

3. End-stage cardiovascular diseases

- **Culmination of progressive cardiovascular damage**
- **No significant clinical advances in recent years**
 - **Only few disease-altering treatments in research pipeline**
 - **Malpractice in regenerative medicine**

Future

Average all-cause and CVD-specific mortality improvement by time period



Traditional longevity models may need to be adjusted to reflect the current and future realities of CVD mortality

- 1. Short-term longevity risk: assume continuation of the 2012-19 trend**
- 2. Long-term longevity risk: picking up 2000-11 trend depends on**
 - **Innovations in screening and treatment for hypertensive conditions**
 - **Maintaining quality care for CVD patients**
 - **Renewed focus on overcoming the barriers to progress in treating end-stage CVD**

Thank You

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