

MORTALITY FROM CHRONIC DISEASE IN SWITZERLAND: A POPULATION-BASED STUDY OF MULTIPLE CAUSES OF DEATH DATA

Doris Durán N.¹, Jay S. Kaufman¹, Arnaud Chiolero^{1,2}, Cristian Carmeli²

¹ Department of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, Quebec, Canada.

² Population Health Laboratory (#PopHealthLab), University of Fribourg, Fribourg, Switzerland.



School of Population and Global Health

École de santé des populations et de santé mondiale

BACKGROUND

- Cause-specific mortality relies on the underlying cause of death (UCOD), selected from diseases in the death certificate as the one that started the process of death⁽¹⁾.
- The UCOD approach oversimplifies the complex interplay between concurrent diseases at the time of death^(2,3), a critical issue for multimorbidity of aging populations.
- During the COVID-19 pandemic, WHO guidelines mandated that COVID-19 be the UCOD if this was in the certificate, even if it did not start the process of death⁽⁴⁾.
- Disrupted care and diagnostics plus a higher susceptibility to COVID-19 infection and death in people with chronic disease (CD) potentially increased CD mortality, but this can't be accounted for when using the UCOD approach.

AIM

Assess the impact of the COVID-19 pandemic on chronic disease excess mortality in Switzerland, by age and sex, comparing the traditional mortality analysis and a weighted multiple cause-of-death approach (MCOD).

Weighted multiple cause-of-death – examples and weighting strategies⁽³⁾

	Patient A	Patient B	Patient C
Part I: Immediate cause & conditions leading to death	COVID-19	COVID-19	Stomach cancer
Part II: Contributing causes	Breast cancer	Melanoma Diabetes	Suspected COVID-19 Diabetes
Weighted MCOD	0.66 for COVID-19 0.33 for Cancer	0.5 for COVID-19 0.25 for Cancer; 0.25 for Diabetes	0.5 for Cancer 0.25 for COVID-19 0.25 for Diabetes

$$\text{UCOD: } \omega_{ic} = \begin{cases} 1 & c = \text{UCOD} \\ 0 & c \neq \text{UCOD} \end{cases} \quad \text{Weighted MCOD: } \omega_{ic} = \begin{cases} \frac{2}{C_i+1} & c = \text{UCOD} \\ \frac{1}{C_i+1} & c \neq \text{UCOD} \end{cases}$$

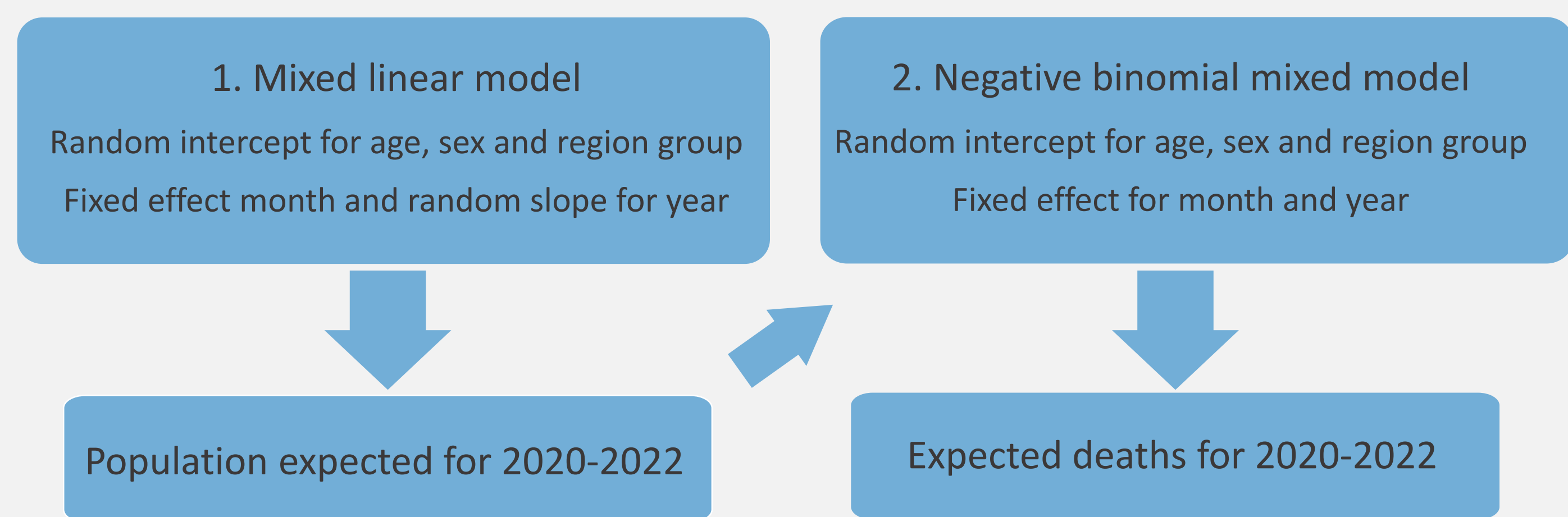
c is one cause of death of the total of causes (C_i) in the certificate of individual *i*

METHODS

Data and measures:

- Population-based analysis for all deaths in Switzerland between 2011- 2022.
- The data was extracted from Swiss Federal Statistical Office (FSO).
- Causes of death were identified via ICD-10 codes of chapters in the GBD Study.
 - Neoplasms, diabetes, chronic obstructive pulmonary disease, cardiovascular disease, and dementia.

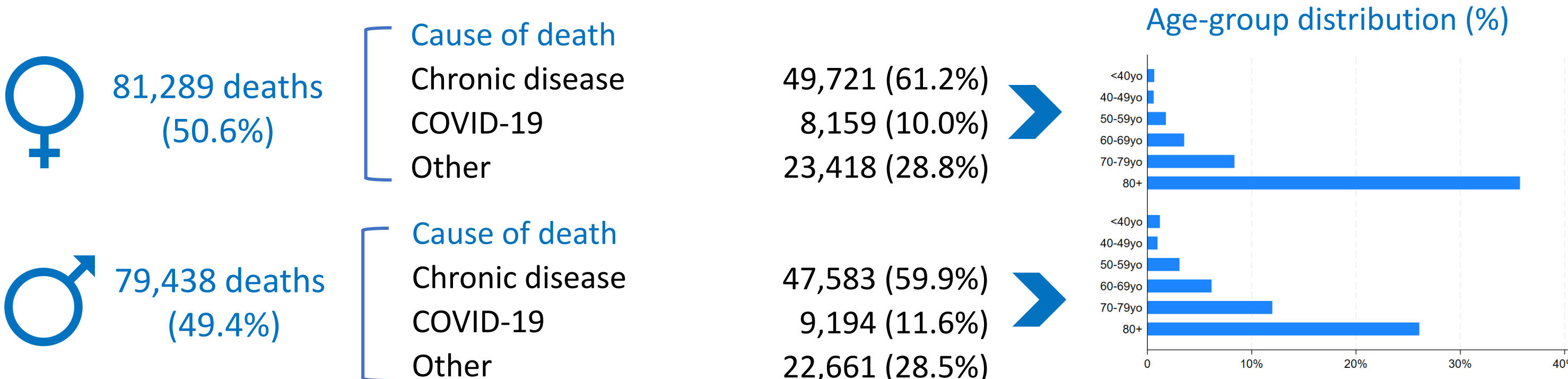
Modeling strategy:



Outcome:

Excess absolute deaths were estimated for February of 2020 until April of 2022 by sex and age-group. $\text{Excess deaths} = \text{expected deaths} - \text{observed deaths}$

RESULTS



RESULTS

Figure 1. Monthly excess chronic disease deaths with UCOD and weighted MCOD strategies by sex, all ages combined. February 2020- April 2022, Switzerland.

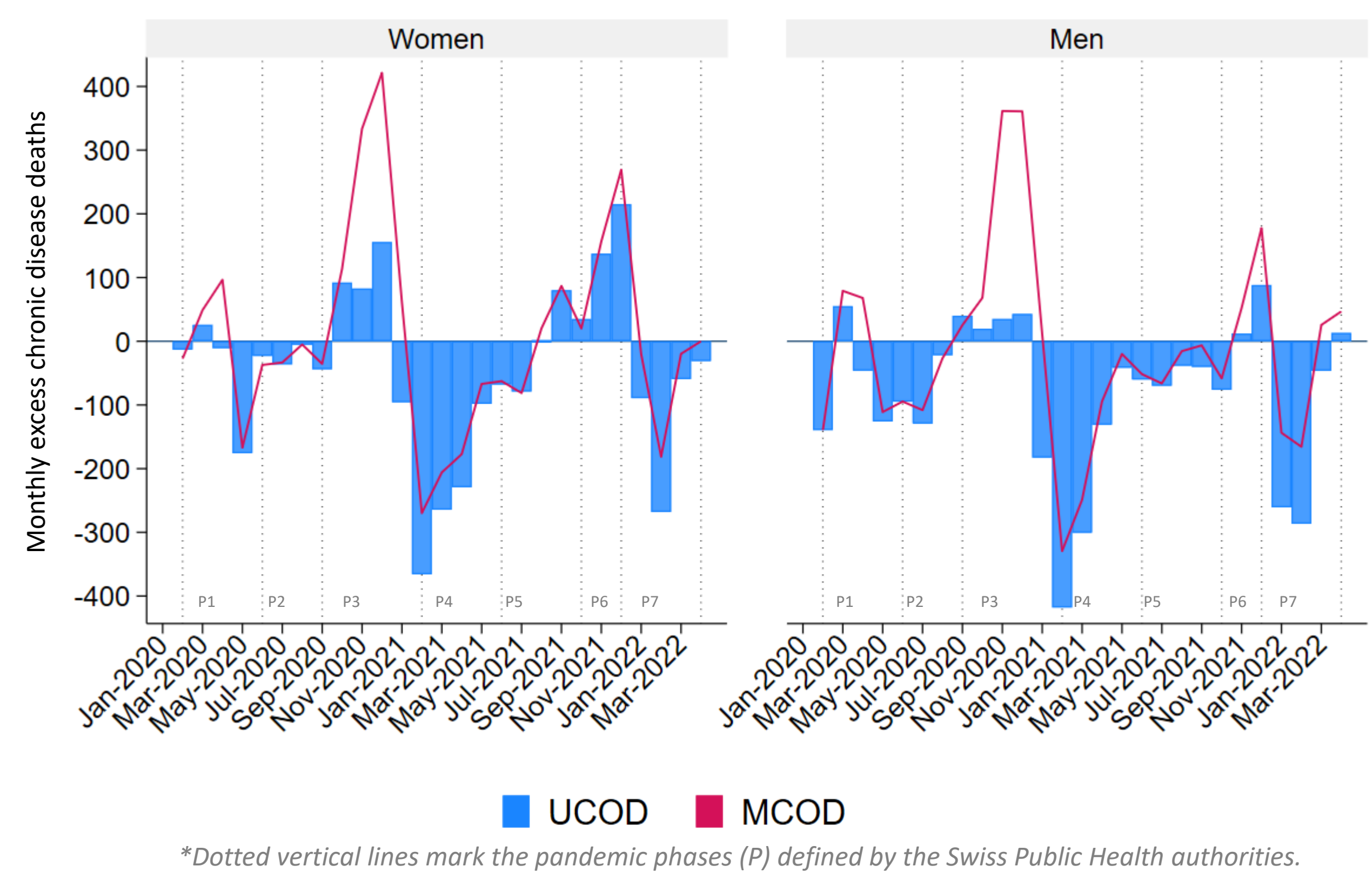


Figure 2. Total excess chronic disease deaths by age group and sex. February 2020- April 2022, Switzerland.

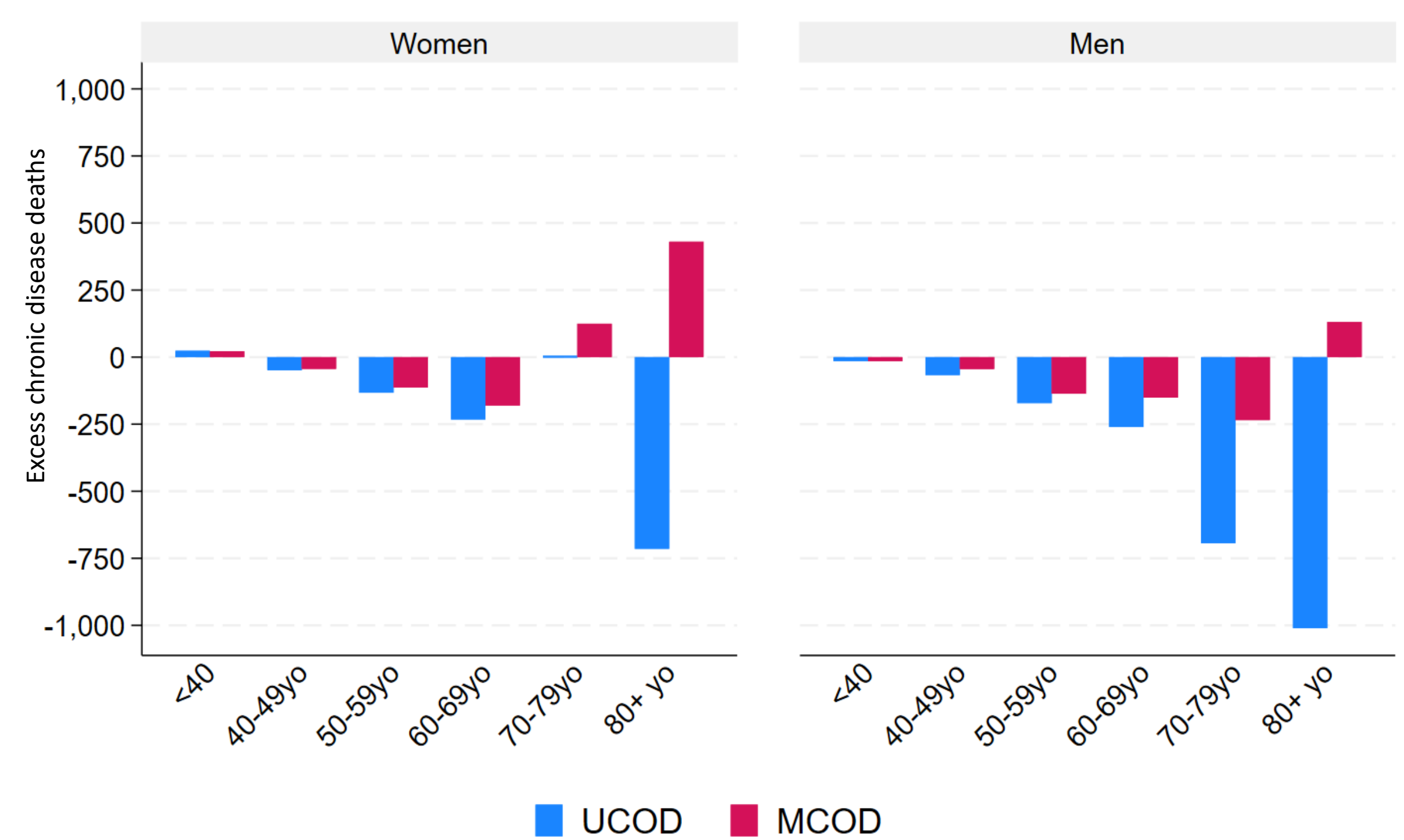
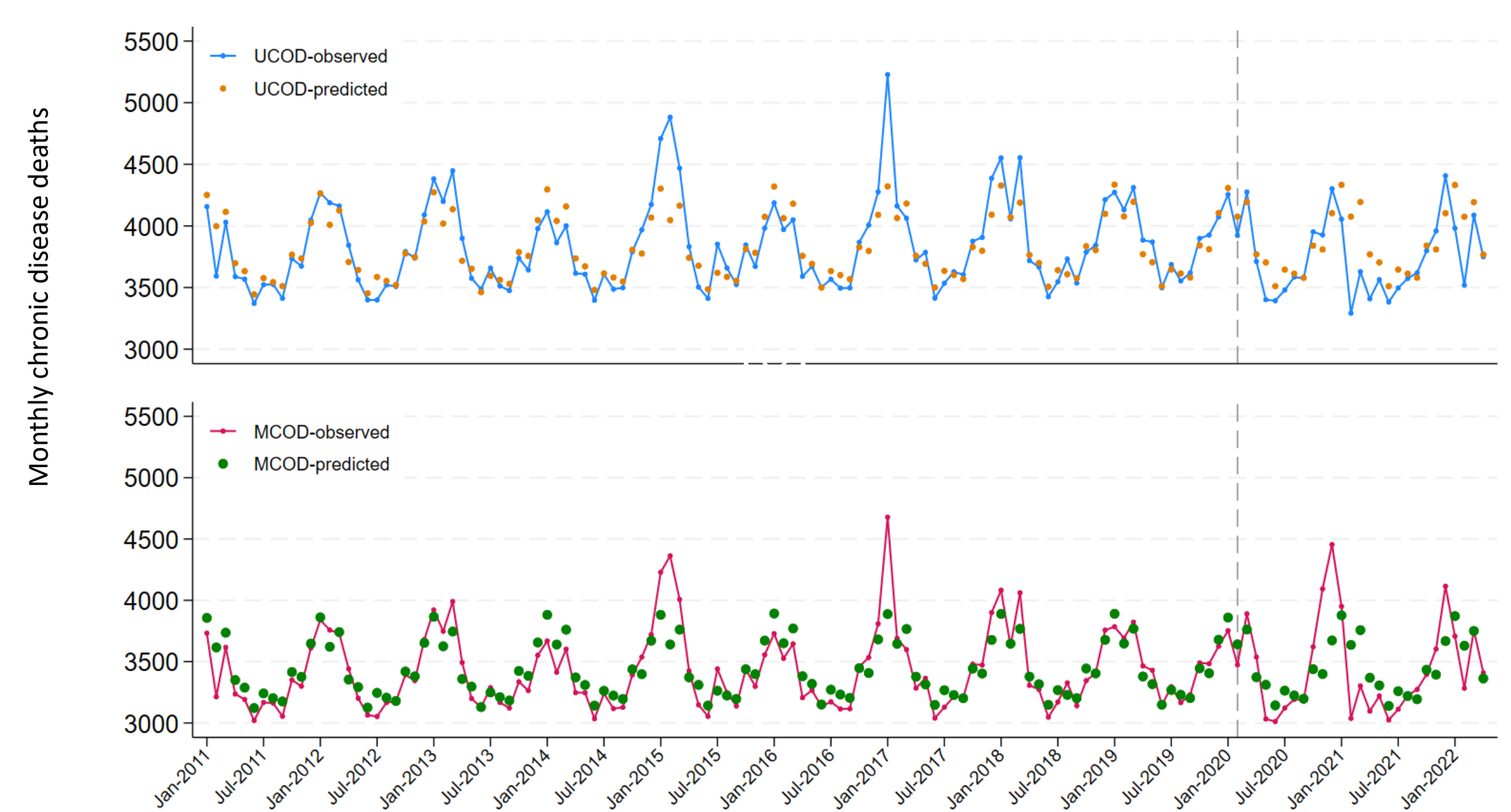


Figure 3. Monthly observed and predicted chronic disease deaths with UCOD and weighted MCOD strategies, both sexes and all ages combined. January 2011- April 2022, Switzerland.



KEY MESSAGES

- Different phases of the pandemic showed excess and deficit chronic disease deaths.
- UCOD and MCOD informed excess deaths differently in older age-groups.
- From September 2020 until February of 2021, phase 3 of the pandemic in Switzerland, UCOD and MCOD differ greatly in magnitude of chronic disease excess deaths.
 - Phase 3 of the pandemic corresponds to the period with the highest number of COVID-19 deaths in Switzerland.
- The MCOD approach can further inform cause-specific mortality by accounting for concurrent diseases at the time of death.

References

- (1) World Health Organization. International Statistical Classification of Diseases and Related Health Problems (ICD) [Internet]. Available from: <https://www.who.int/standards/classifications/classification-of-diseases>
- (2) Bishop K, Moreno-Betancur M, Balogun S, et al. Quantifying cause-related mortality in Australia, incorporating multiple causes: observed patterns, trends and practical considerations. Int J Epidemiol. 2023;52(1):284-294.
- (3) Breger TL, Edwards JK, Cole SR, Saag M, et al. Estimating a set of mortality risk functions with multiple contributing causes of death. Epidemiology. 2020;31(5):704-12.
- (4) World Health Organization. 2020. World Health Organization International Guidelines for Certification and Classification (Coding) of COVID-19 as Cause of Death.

doris.duran@mail.mcgill.ca

