

# Socioeconomic Variations in Multiple Cause Mortality

A geographic approach

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# Two Stories, with context

Context of multiple cause mortality in Canada

COVID-19 and multiple cause mortality

Euthanasia – Medical Assistance in Dying (MAiD)

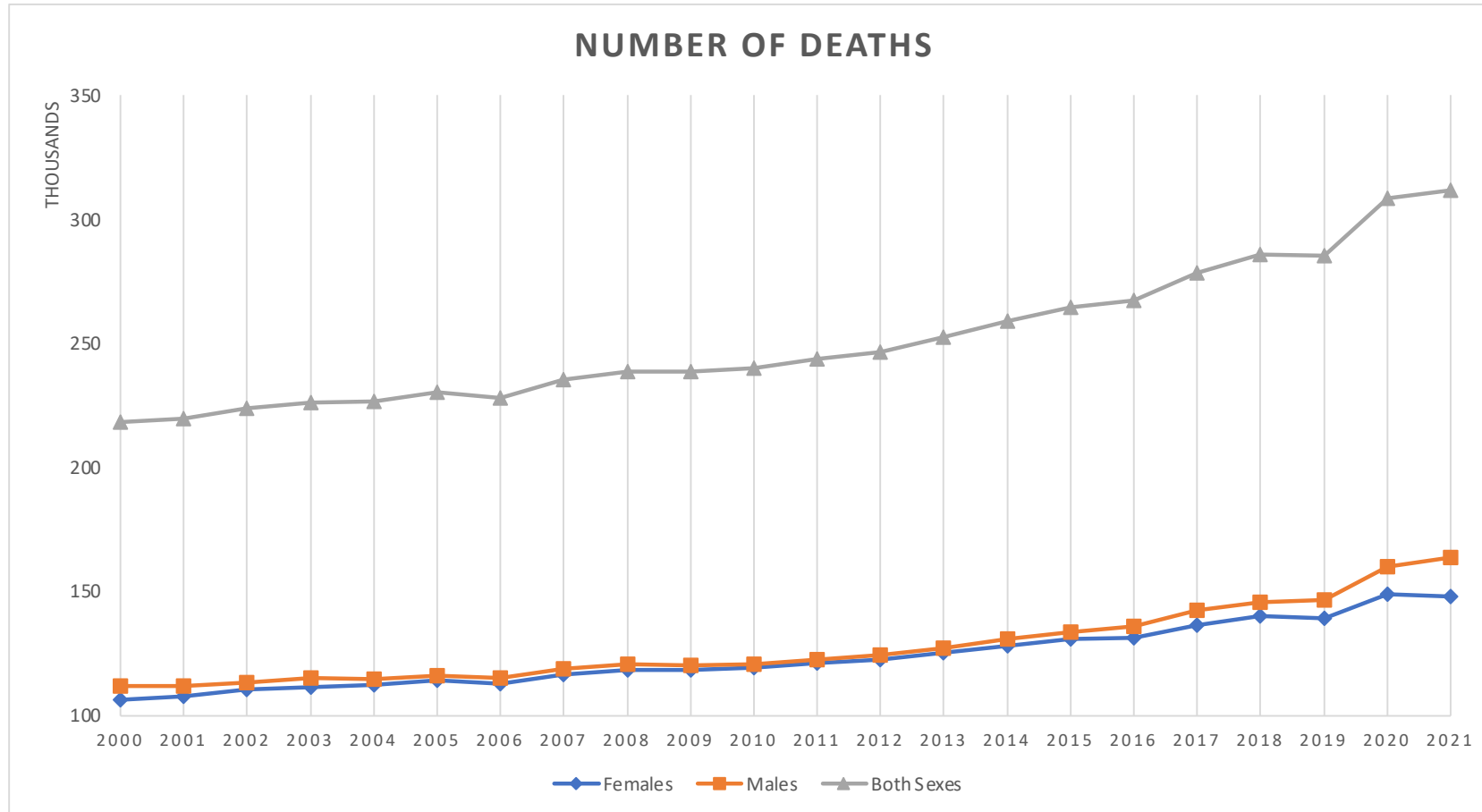
Project funded by

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Social Sciences and Humanities Research Council of Canada  
Conseil de recherches en sciences humaines du Canada

# Context – Mortality in Canada

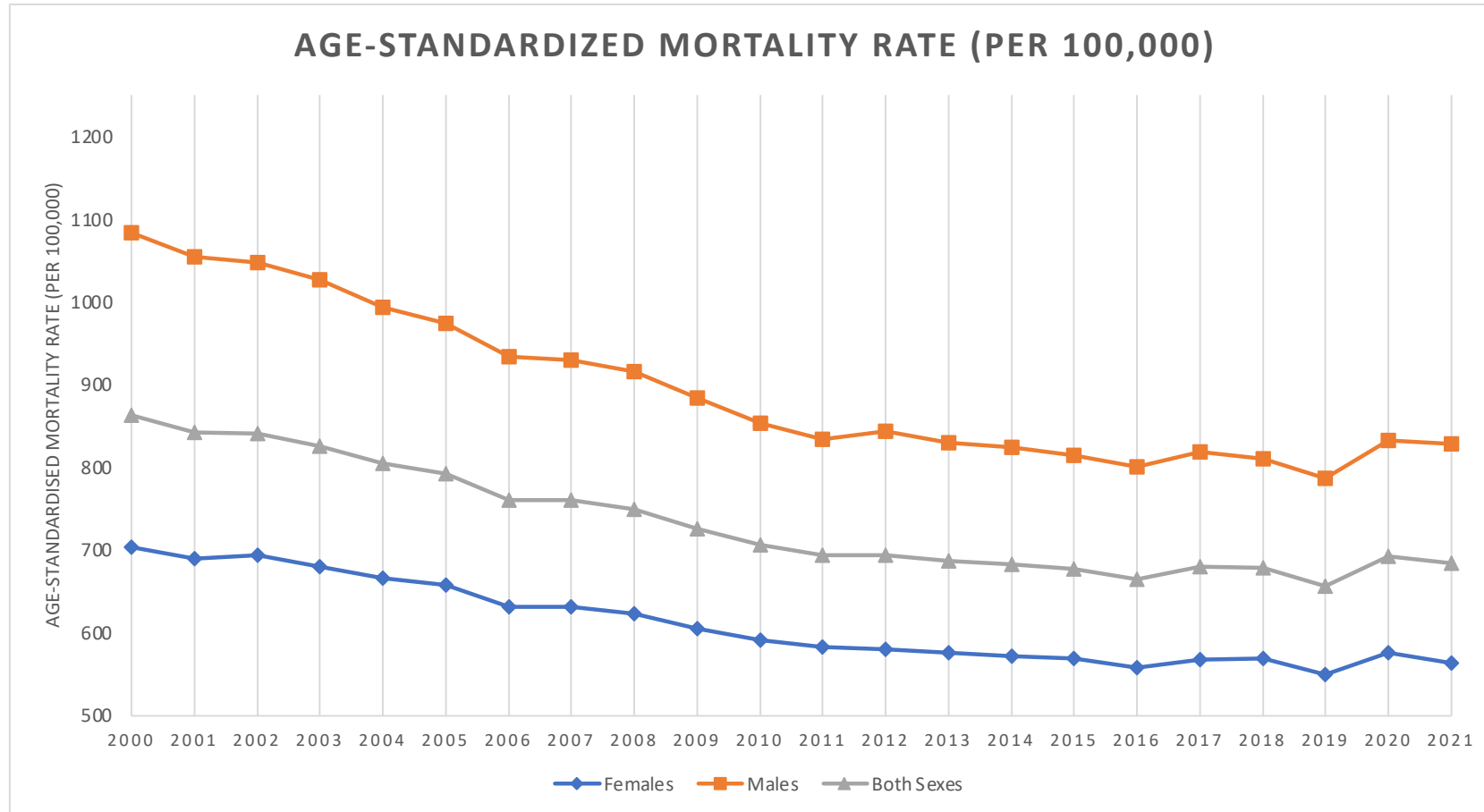
TRENDS IN MORTALITY, 2000 – 2021



Statistics Canada. [Table 13-10-0800-01 Deaths and mortality rate \(age standardization using 2011 population\), by selected grouped causes](#)

# Context – Mortality in Canada

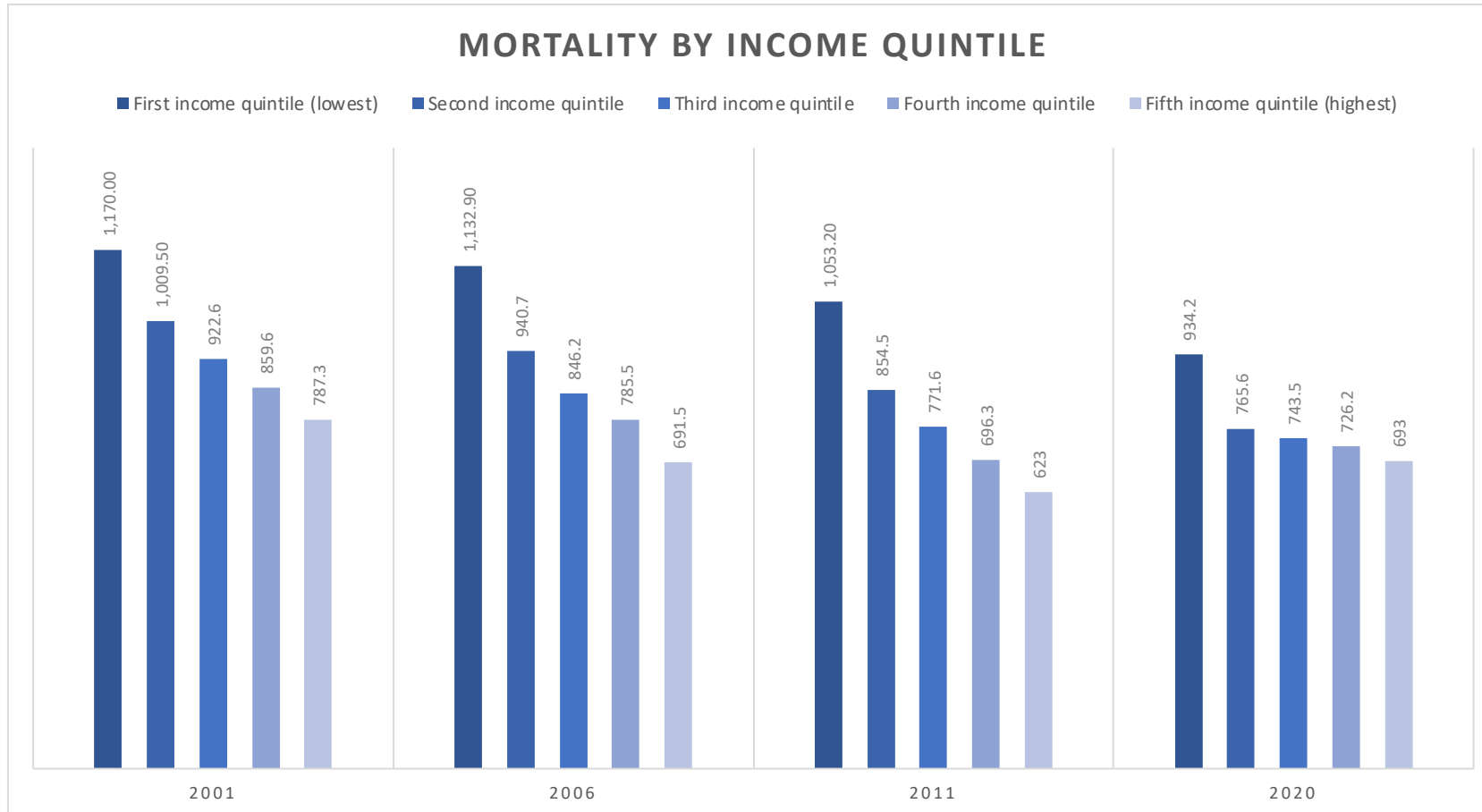
TRENDS IN MORTALITY, 2000 – 2021



Statistics Canada. [Table 13-10-0800-01 Deaths and mortality rate \(age standardization using 2011 population\), by selected grouped causes](#)

# Context – Mortality in Canada

MORTALITY BY INCOME, 2001 – 2020



Statistics Canada. [Table 13-10-0833-01](#), [Table 13-10-0759-01](#).

# Context – Mortality in Canada

DATA ACCESS AND AVAILABILITY

## Vital Statistics

- Available in Research Data Centres (1950 – 2021)
- Individual-level records
- Includes detailed geography
- Some neighbourhood SES measures assigned via postal code

## Multiple Cause Files

- Available in Research Data Centres (2000 – 2021)
- Complete from 2002 onward
- Links to Vital Statistics

# Context – Mortality in Canada

DATA ACCESS AND AVAILABILITY

## Linked Data

- Census-linked cohorts are available from 1991 through 2016
- Link Census “long-form” to vital statistics, hospitalization, emergency room visits, cancer incidence, annual place or residence

## Planned Analysis

- The analysis presented here will be expanded using the census cohorts
- (Vetting rules changed in September, limiting data release for today.)

# Context – Mortality in Canada

## MULTIPLE CAUSES OF DEATH

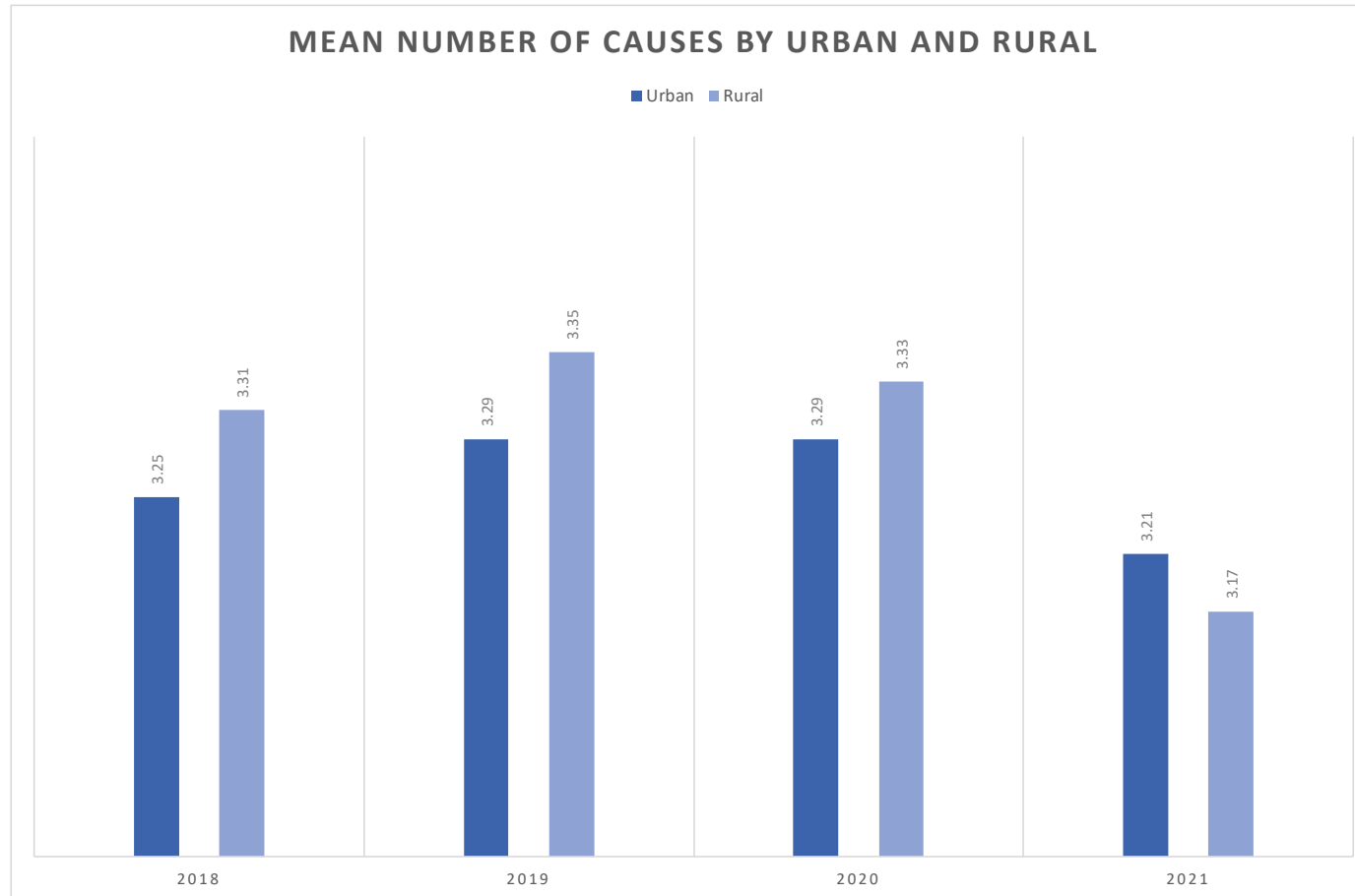
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# of Deaths	243,020	246,090	251,790	258,295	263,820	266,640	276,355	283,340	283,710	306,790	301,830
Mean # of Causes	3.15	3.16	3.3	3.29	3.29	3.26	3.26	3.26	3.3	3.29	3.2
% of Deaths with											
1 cause	18.74	18.99	17.87	18.4	19.23	20.06	19.86	20.25	20.17	20.4	<b>24.56</b>
2 causes	23.61	23.78	23.15	23.18	22.76	22.64	22.85	23.4	22.38	22.67	21.27
3 causes	21.45	21.17	20.62	20.35	20.04	19.73	19.93	19.2	19.26	18.93	17.59
4 causes	15.43	15.38	15.4	15.16	14.96	14.77	14.64	14.36	14.67	14.49	13.6
5+ causes	20.78	20.68	22.96	22.91	23.02	22.79	22.72	22.79	23.53	23.51	22.99

Statistics Canada, Vital Statistics Deaths Database, Author Calculations



# Context – Mortality in Canada

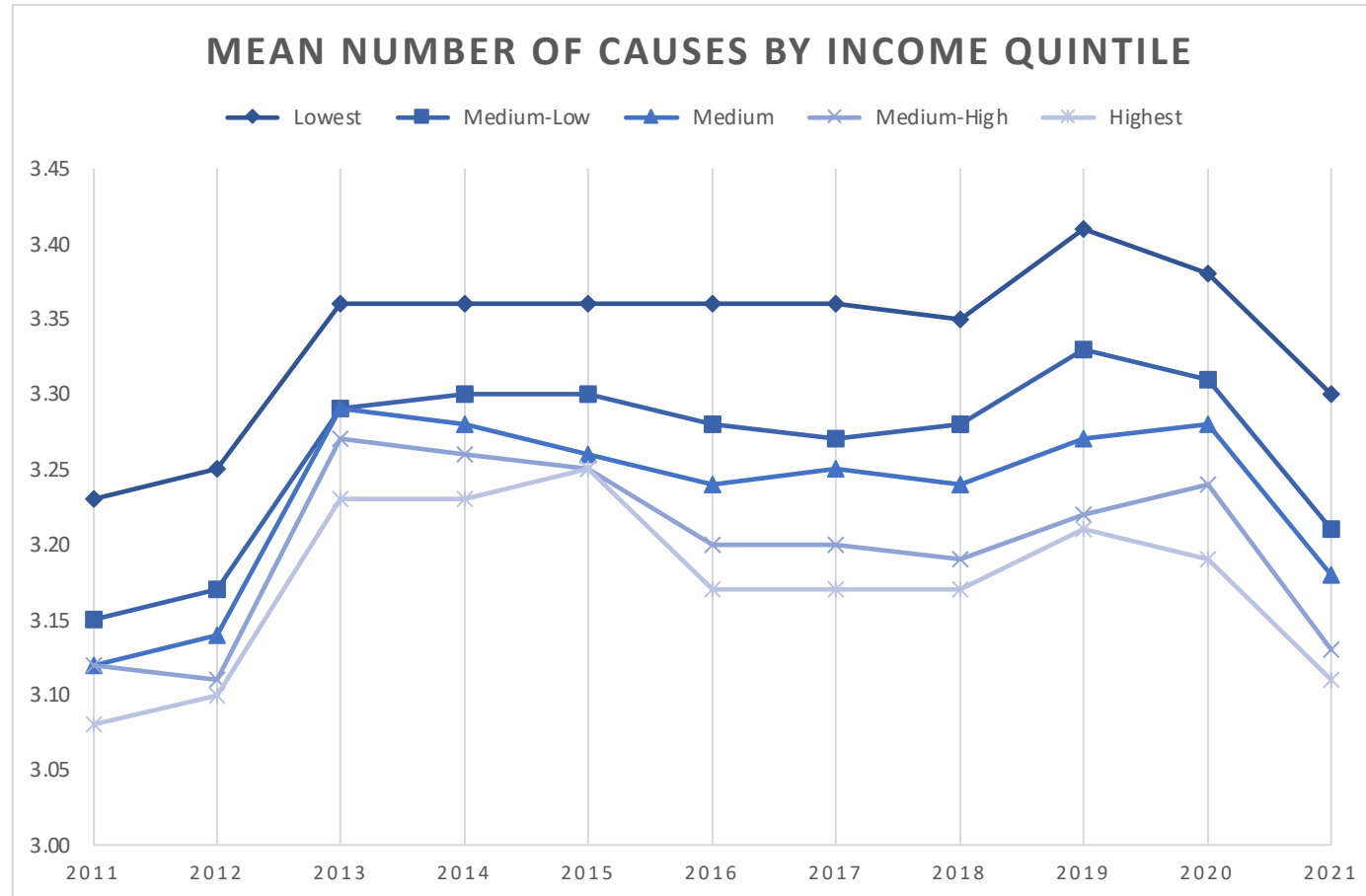
## MULTIPLE CAUSES OF DEATH



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Context – Mortality in Canada

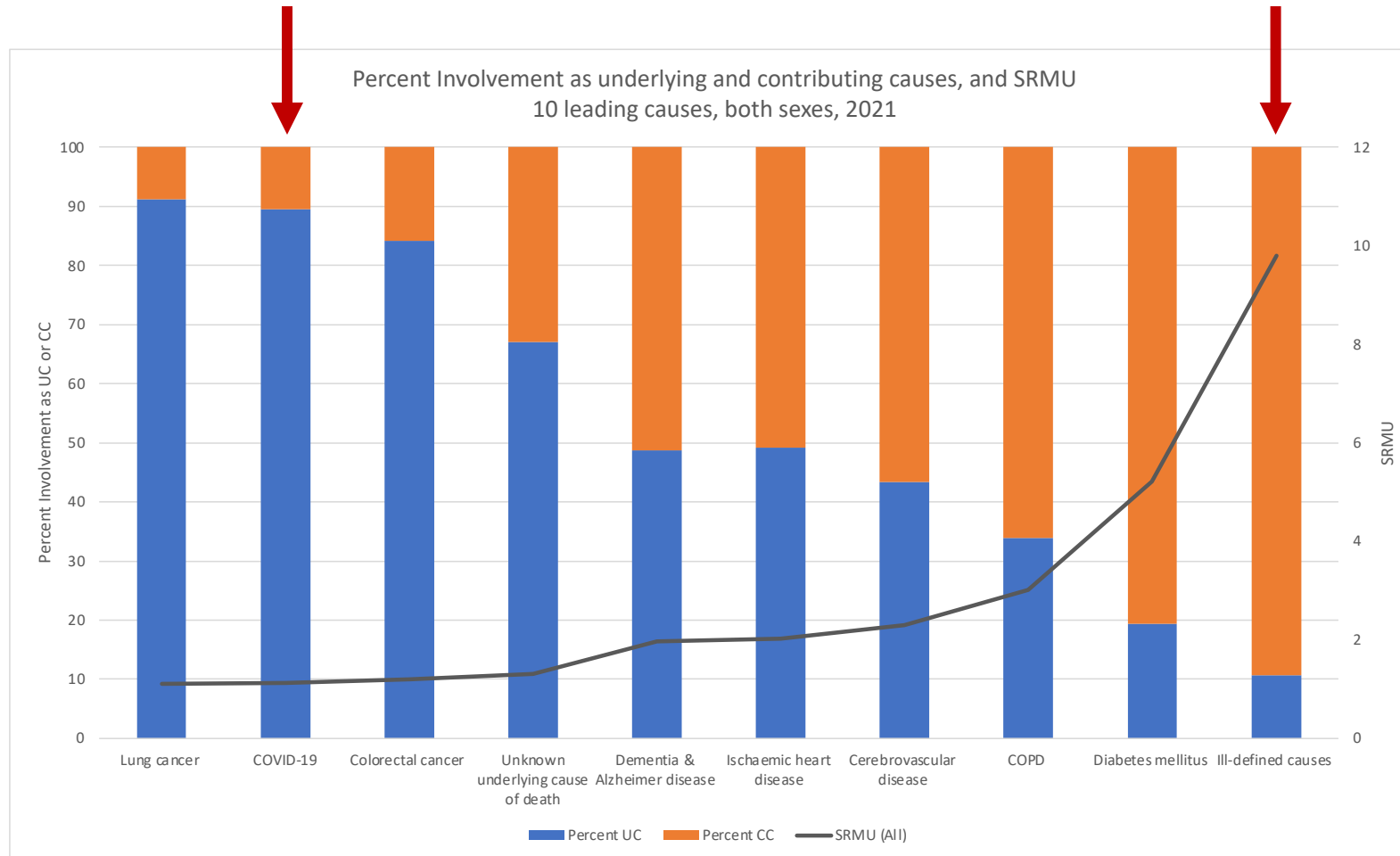
## MULTIPLE CAUSES OF DEATH



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Context – Mortality in Canada

## MULTIPLE CAUSES OF DEATH



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Context – Mortality in Canada

## MULTIPLE CAUSES OF DEATH

Cause of Death	Rank (deaths, both sexes)	SRMU (Males)	SRMU (Females)
Ischaemic heart disease	1	2.09	2.02
Dementia & Alzheimer disease	2	2.21	1.98
Lung cancer	3	1.11	1.10
COVID-19	4	1.09	1.10
Ill-defined causes	5	9.07	12.02
Cerebrovascular disease	6	2.41	2.18
COPD	7	3.06	2.84
Colorectal cancer	8	1.24	1.20
Diabetes mellitus	9	5.24	5.16
Other blood cancers	10	1.46	1.45
Pancreatic cancer	11	1.05	1.04
Breast cancer	12	1.61	1.34
Prostate cancer	13	1.57	
Pneumonia	14	5.49	5.33
Other heart diseases	15	4.12	3.72

Statistics Canada, Vital Statistics Deaths Database, Author Calculations  
Coding as per Bishop et. al (2022)

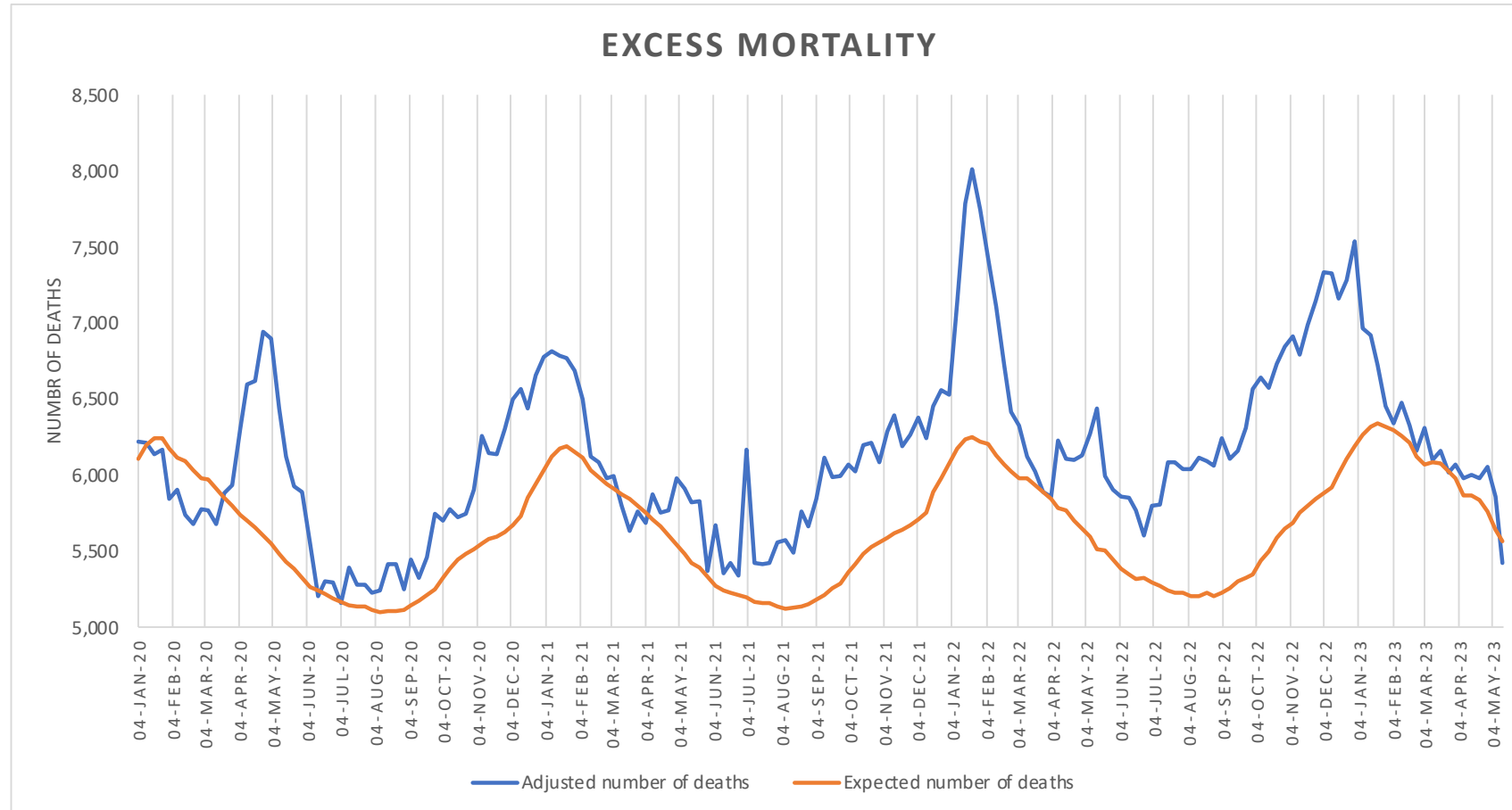
# COVID-19 – Mortality

## TRENDS IN COVID-19 DEATHS

- As in many countries, COVID-19 had a differential impact on the population
- Multiple cause of death statistics can provide additional information on the impact of COVID-19 on mortality

# COVID-19 – Mortality

TRENDS IN COVID-19 DEATHS

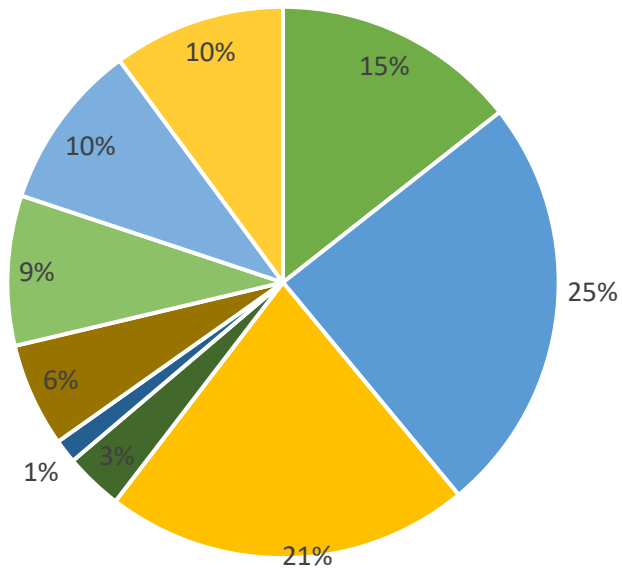


Statistics Canada. Table: 13-10-0784-01

# COVID-19 – Mortality

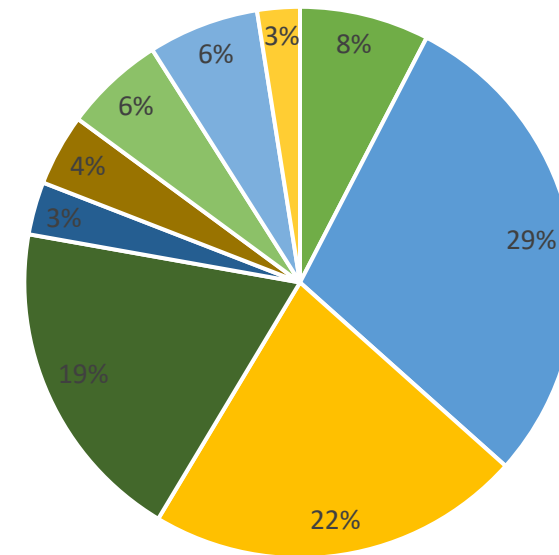
## CONTRIBUTING CONDITIONS

COVID-19 as Underlying Cause



- Respiratory
- Cancer
- Endocrine
- Cardiovascular
- Digestive Diseases
- Blood
- Neuropsychiatric conditions
- Genitourinary
- Others

COVID-19 as Contributing Cause

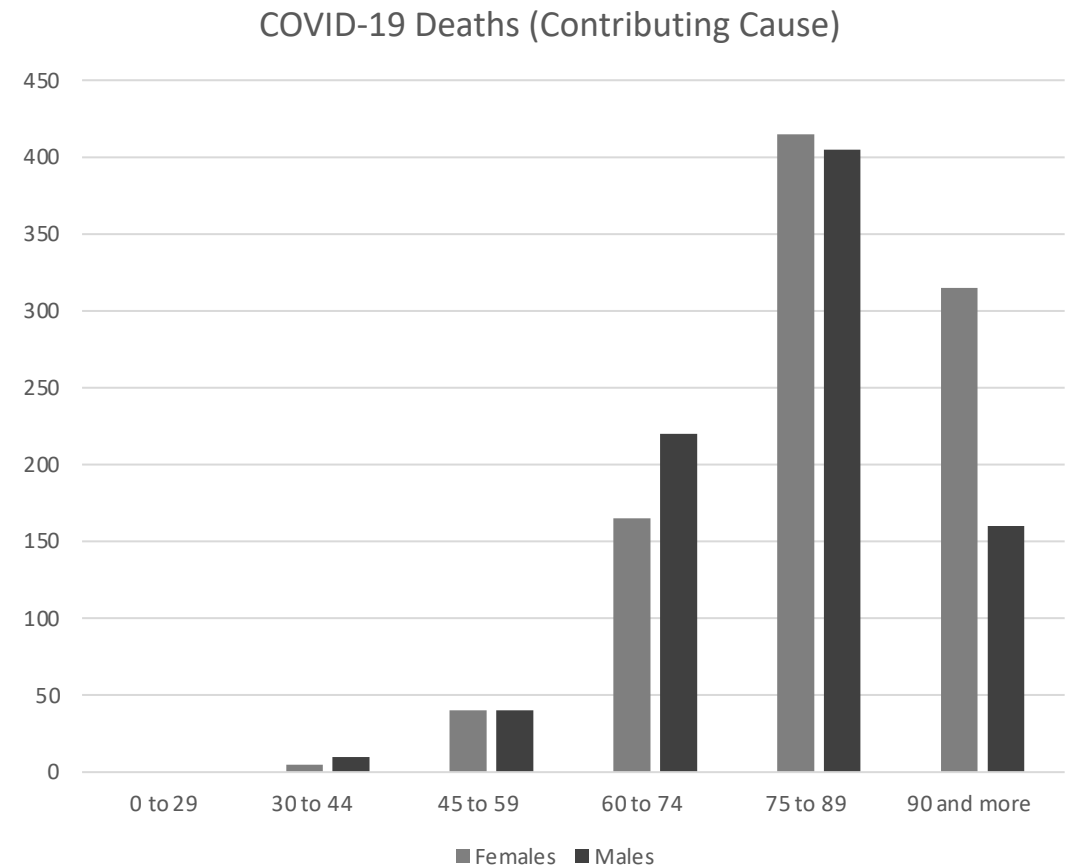
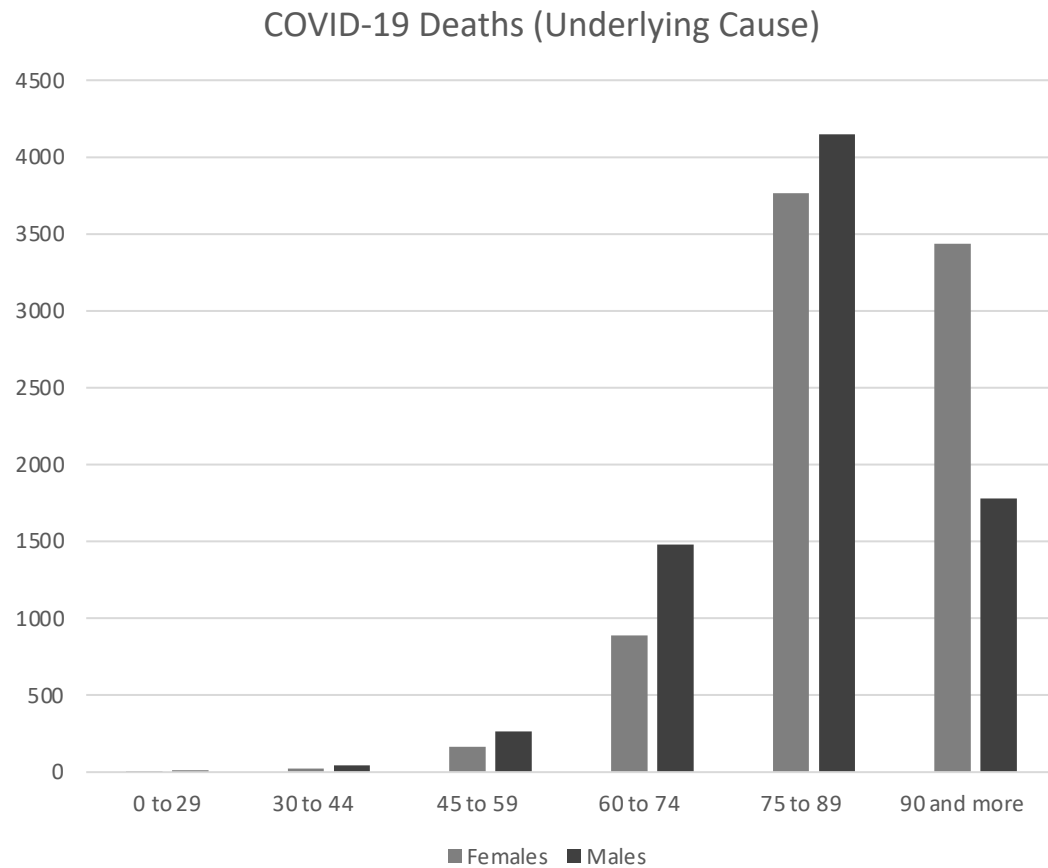


- Respiratory
- Cancer
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Statistics Canada. Table: 13-10-0784-01

# COVID-19 – Mortality

## COVID-19 DEATHS BY AGE

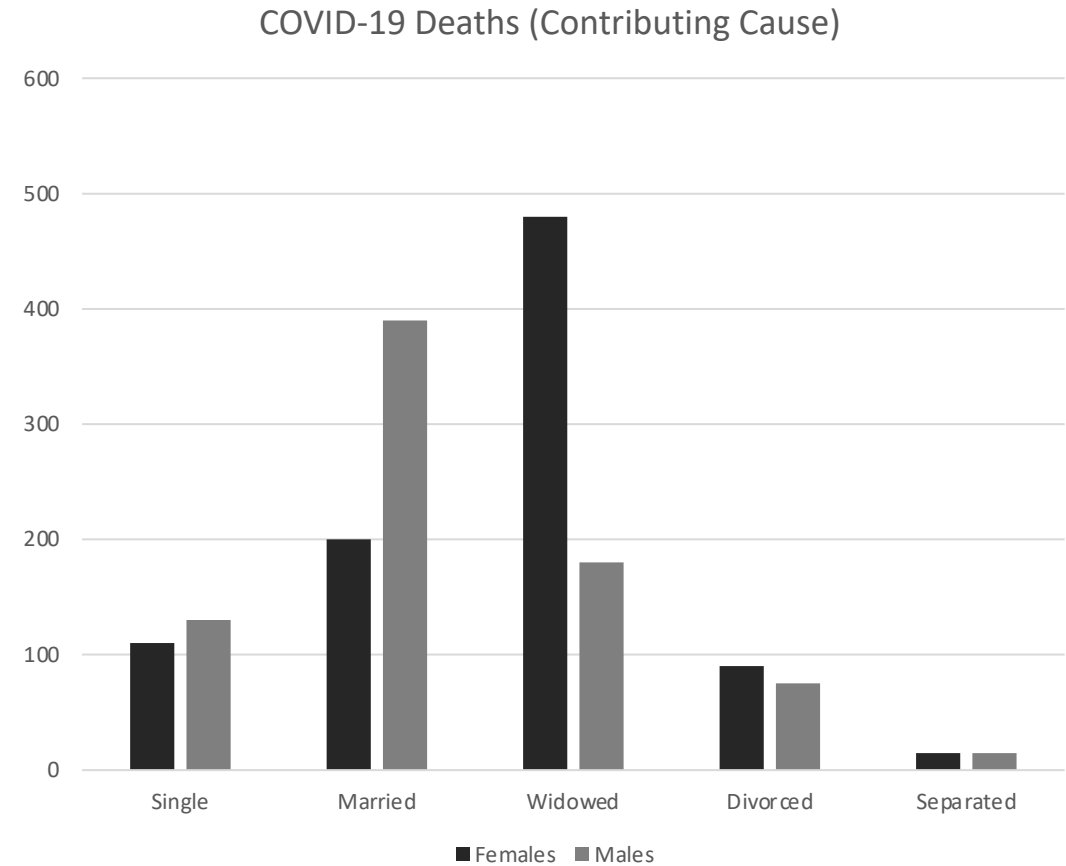
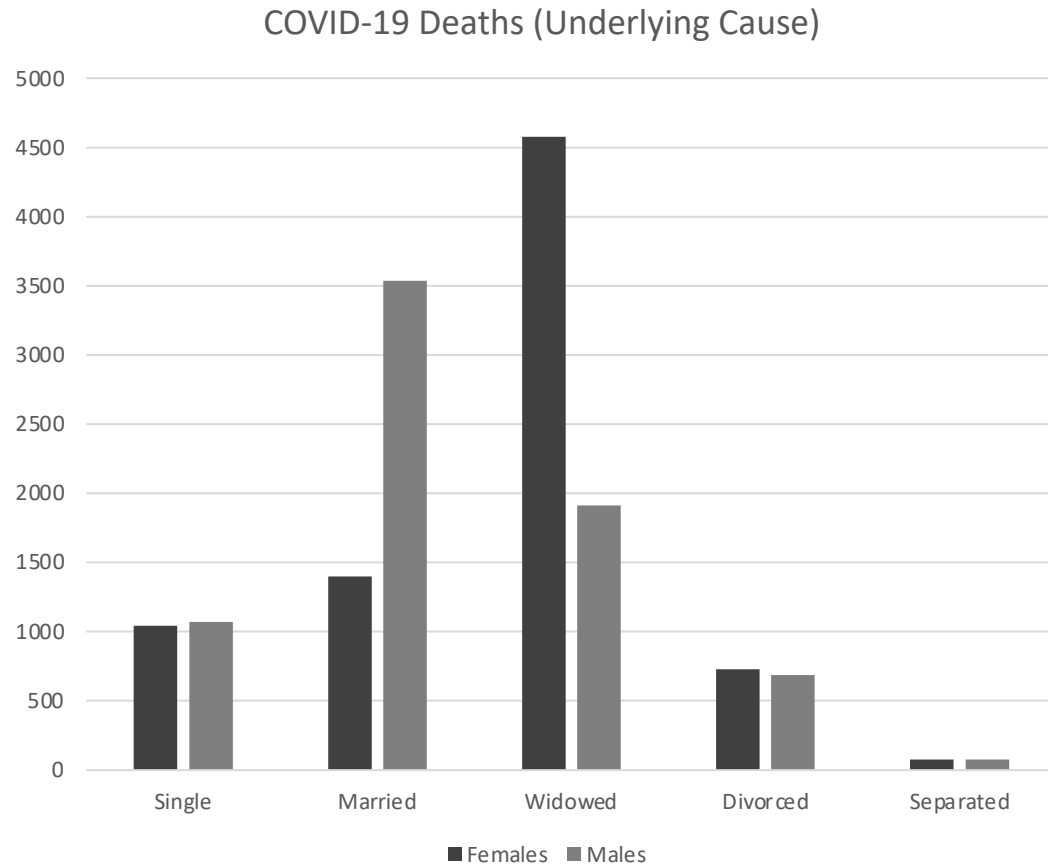


Statistics Canada, Vital Statistics Deaths Database, Author Calculations



# COVID-19 – Mortality

## COVID-19 DEATHS BY MARITAL STATUS

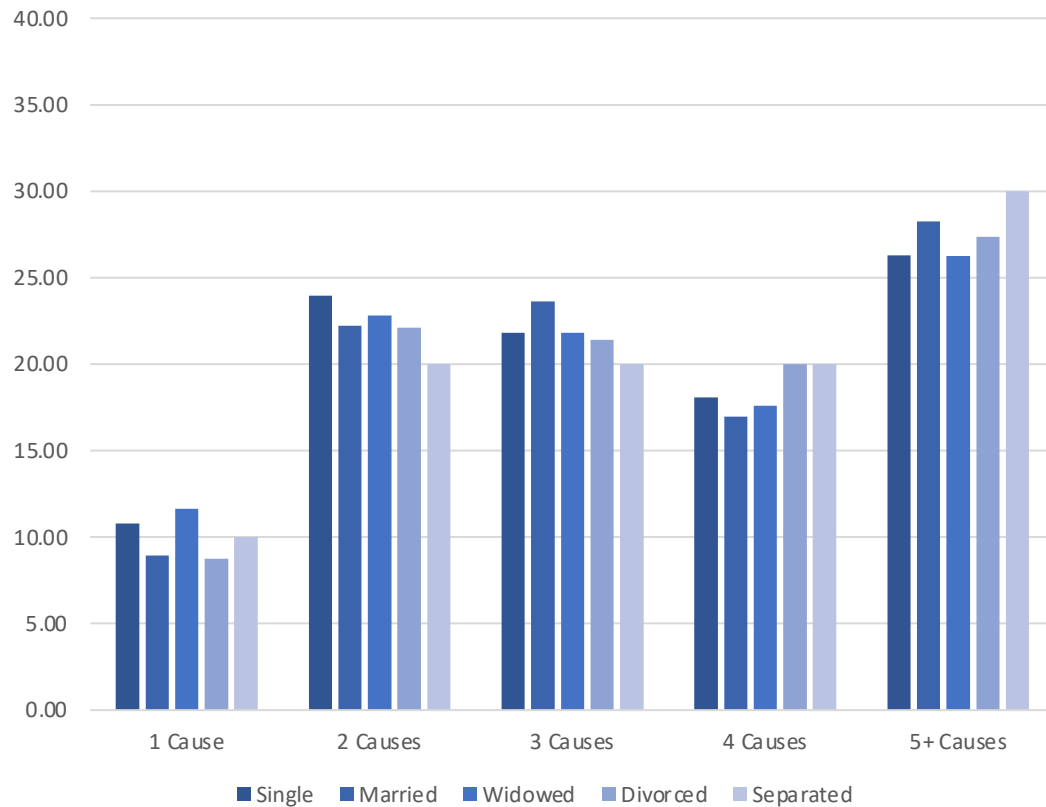


Statistics Canada, Vital Statistics Deaths Database, Author Calculations

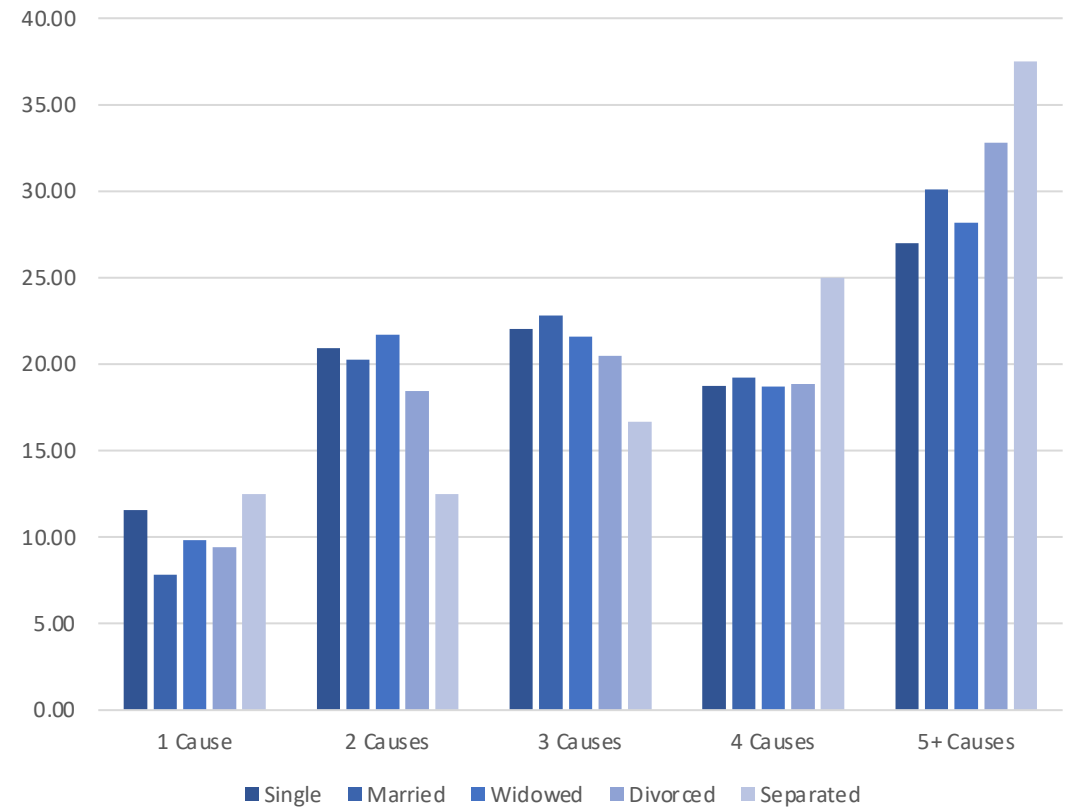
# COVID-19 – Mortality

## COVID-19 DEATHS BY MARITAL STATUS

Percent of COVID Deaths by Number of Causes, 2020



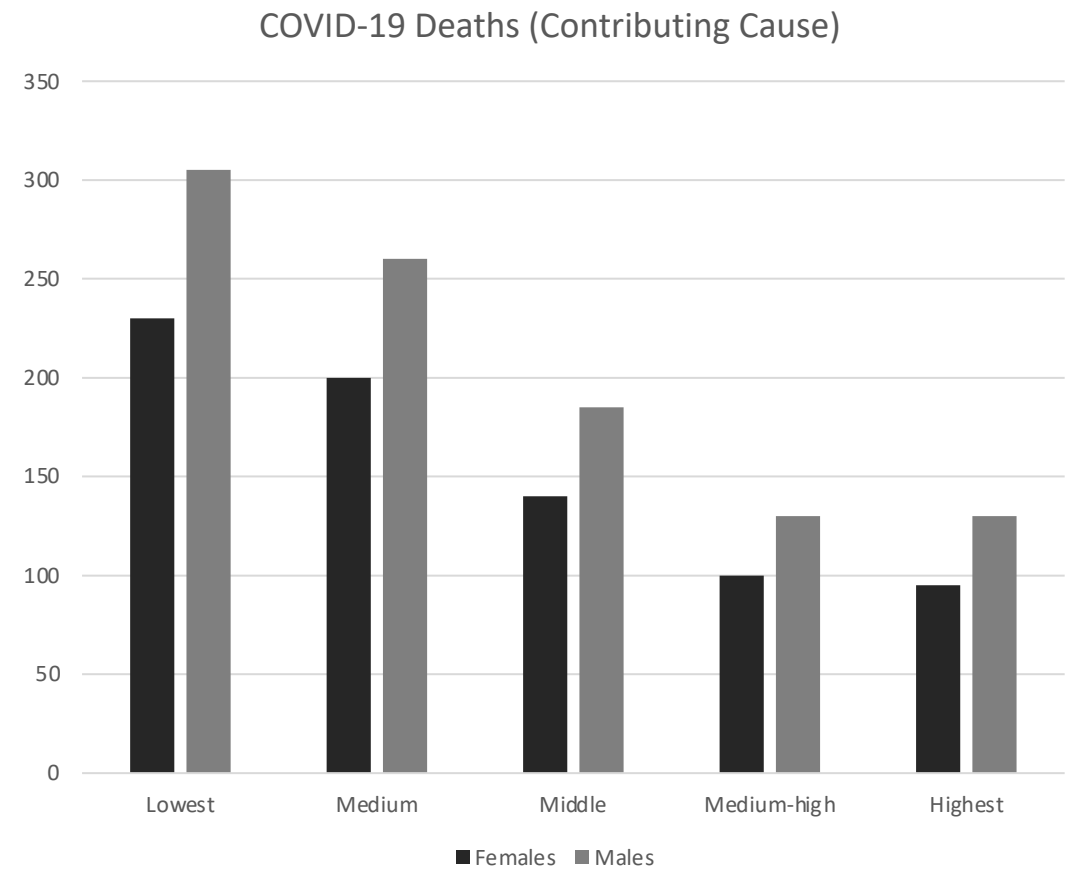
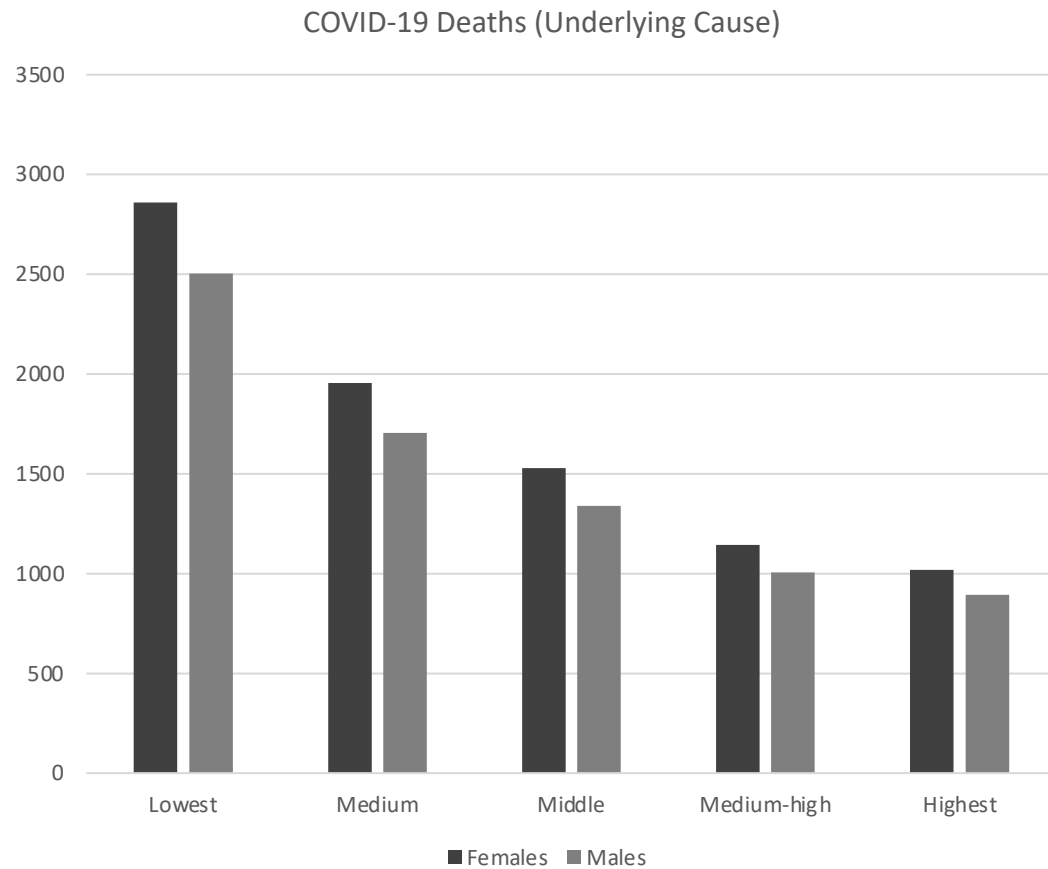
Percent of COVID Deaths by Number of Causes, 2021



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# COVID-19 – Mortality

## COVID-19 DEATHS BY INCOME QUINTILES

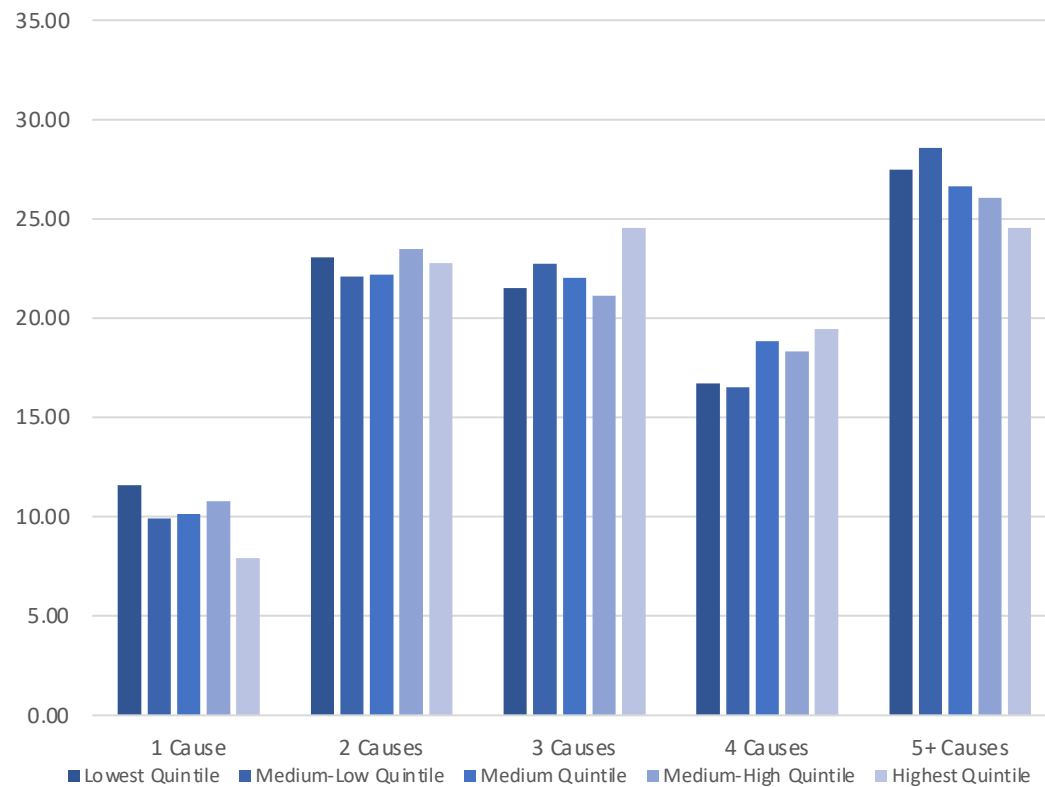


Statistics Canada, Vital Statistics Deaths Database, Author Calculations

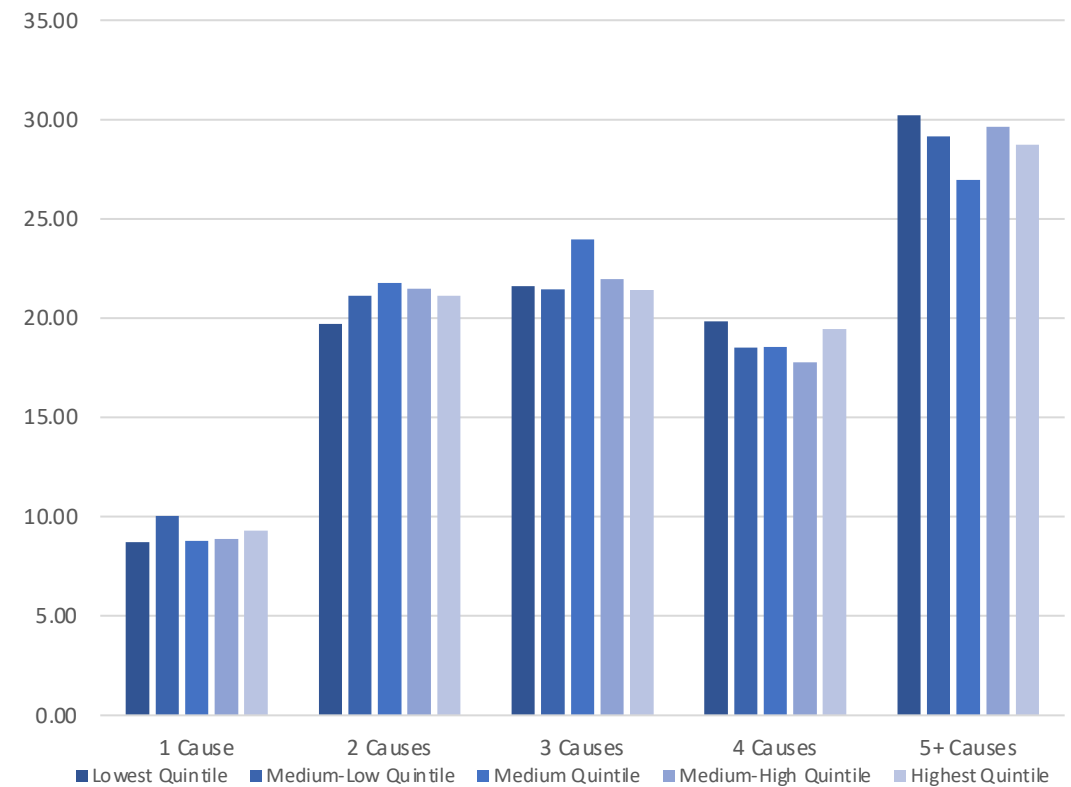
# COVID-19 – Mortality

## COVID-19 DEATHS BY INCOME QUINTILES

Percent of COVID Deaths by Number of Causes, 2020



Percent of COVID Deaths by Number of Causes, 2021



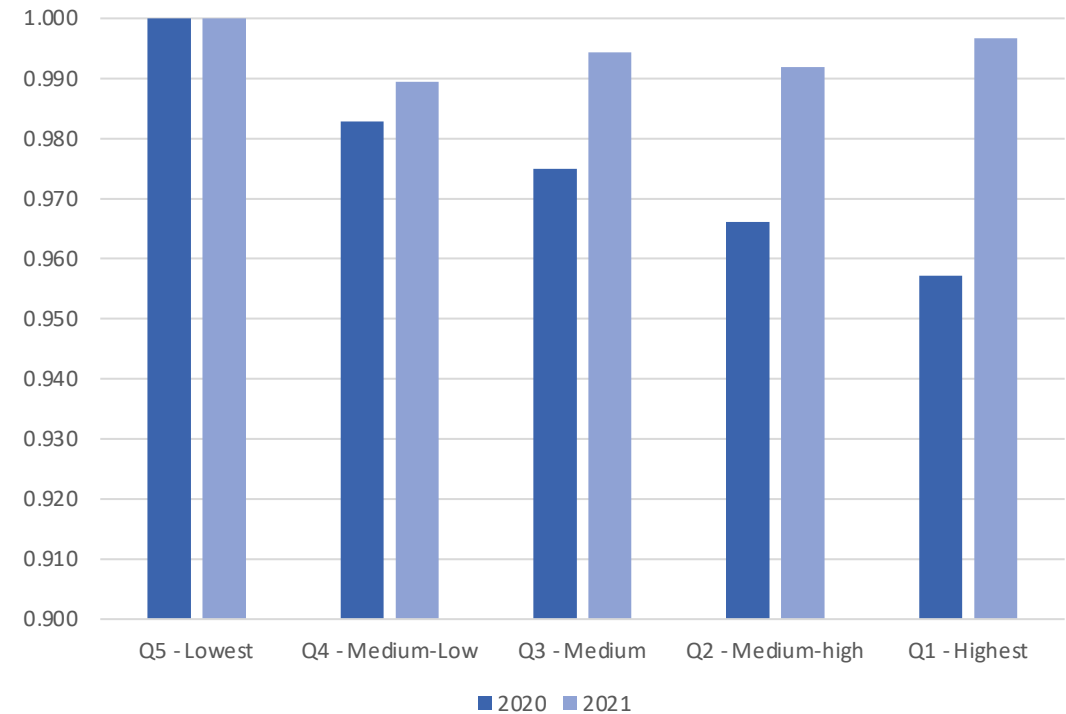
Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# COVID-19 – Mortality

## COVID-19 DEATHS BY INCOME QUINTILES

- In 2020, lower number of cause of death for higher income quintiles
- In 2021, this trend was not as apparent

IRR of Mean # Contributing Causes for COVID-19 Deaths  
vs. All Deaths  
by Neighbourhood Income Quintile

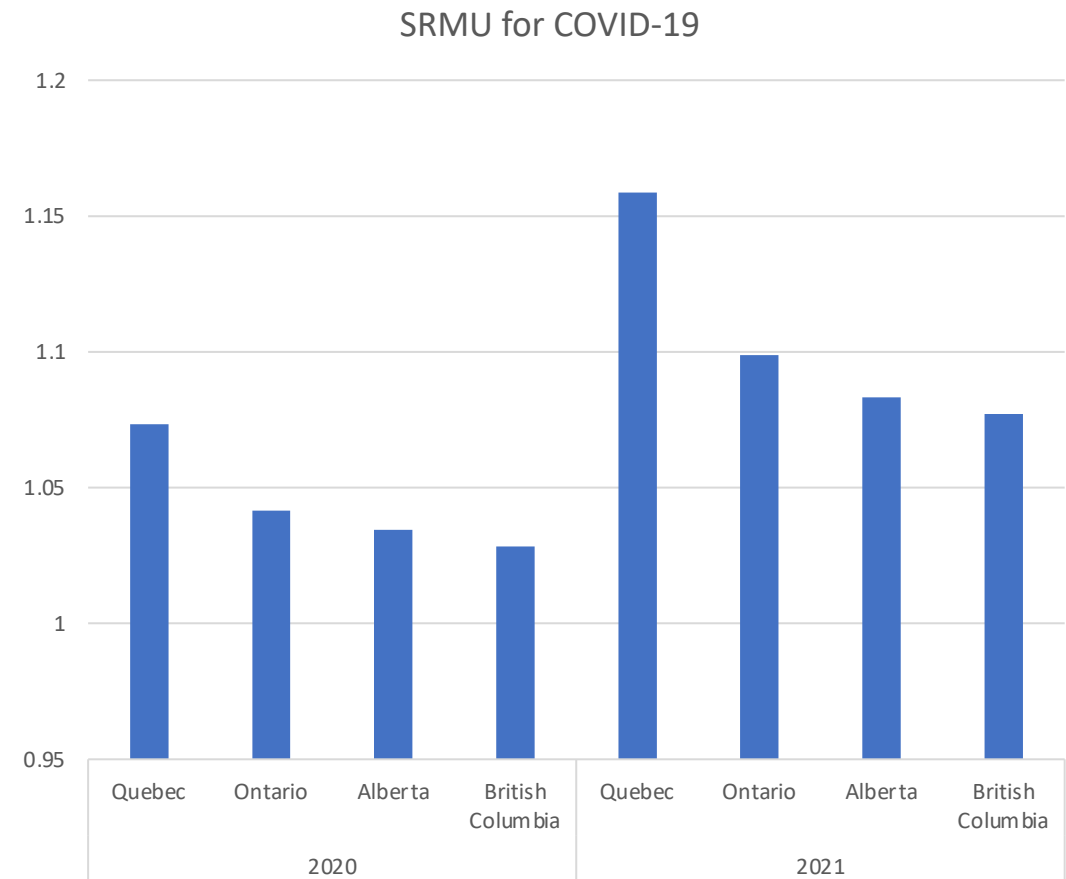


Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# COVID-19 – Mortality

CODING AS UNDERLYING OR CONTRIBUTING

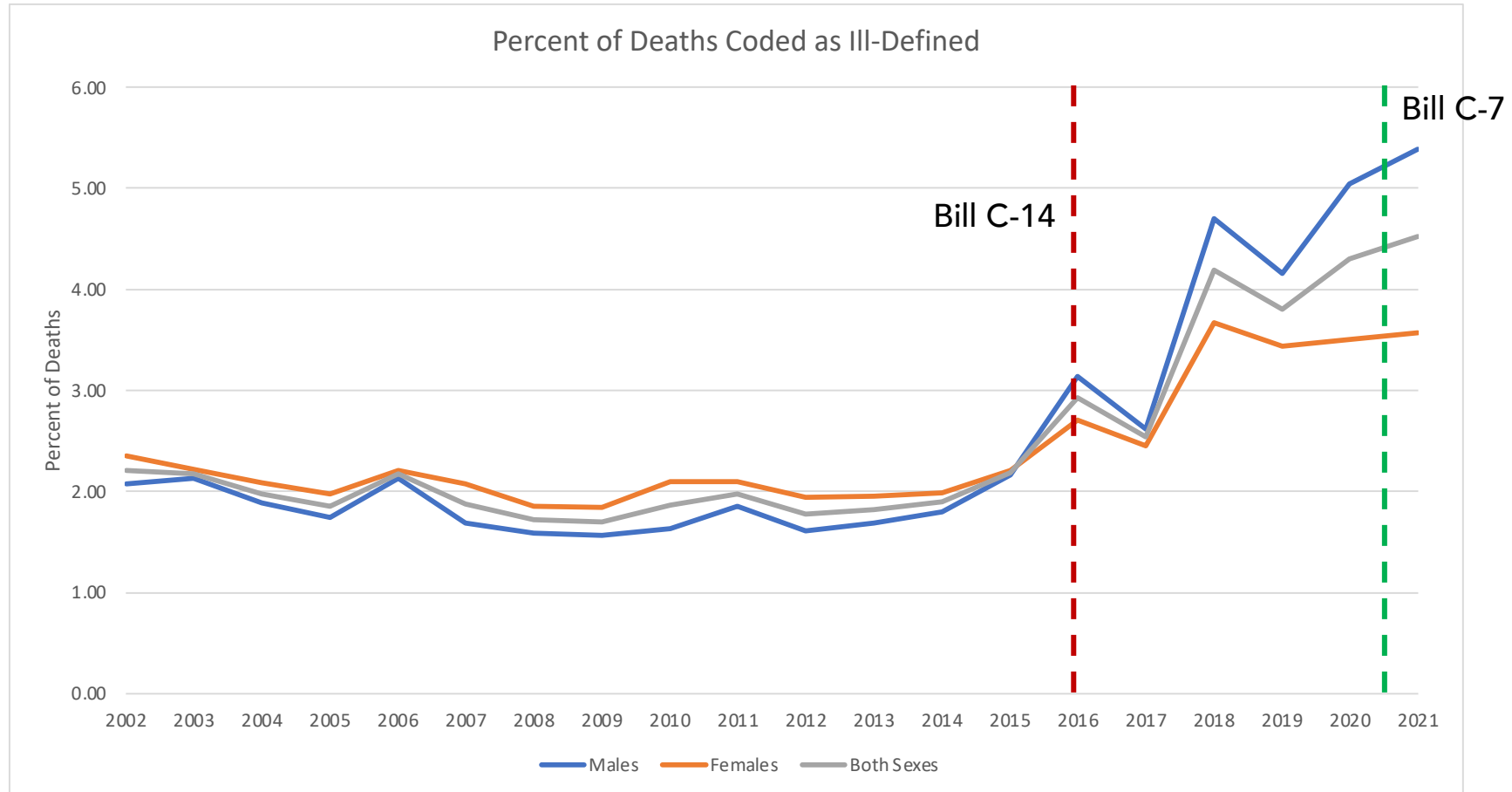
- In 2020, the SRMU for COVID-19 deaths was very low (nearly all underlying)
- In 2021 this didn't change significantly, except in Quebec where the SRMU increased



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Ill-Defined Causes of Death

I46, I509, I959, I99, J960, J969, P285, R00–R99 (excluding R95)



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Ill-Defined Causes of Death

NOT ACTUALLY THAT ILL-DEFINED

## Medical Assistance in Dying (MAiD)

Allows eligible individuals to receive assistance from medical practitioners to end their life

Specific eligibility criteria under initial law

Eligibility was expanded in 2021 (required by courts)

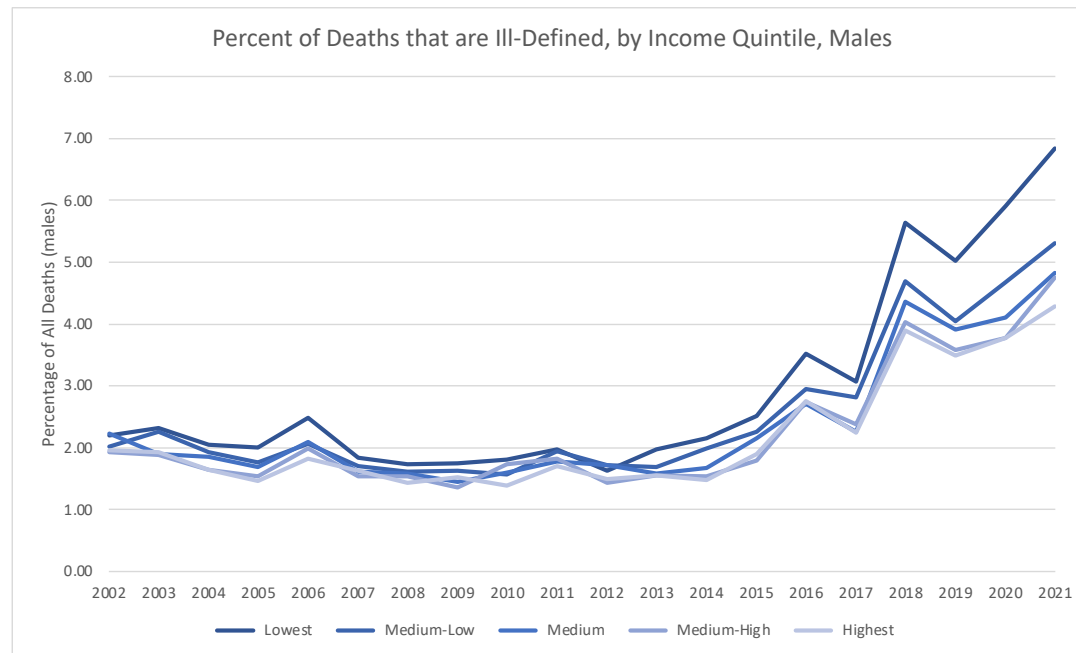
Deaths increased from 1,018 in 2016 → 10,064 in 2021



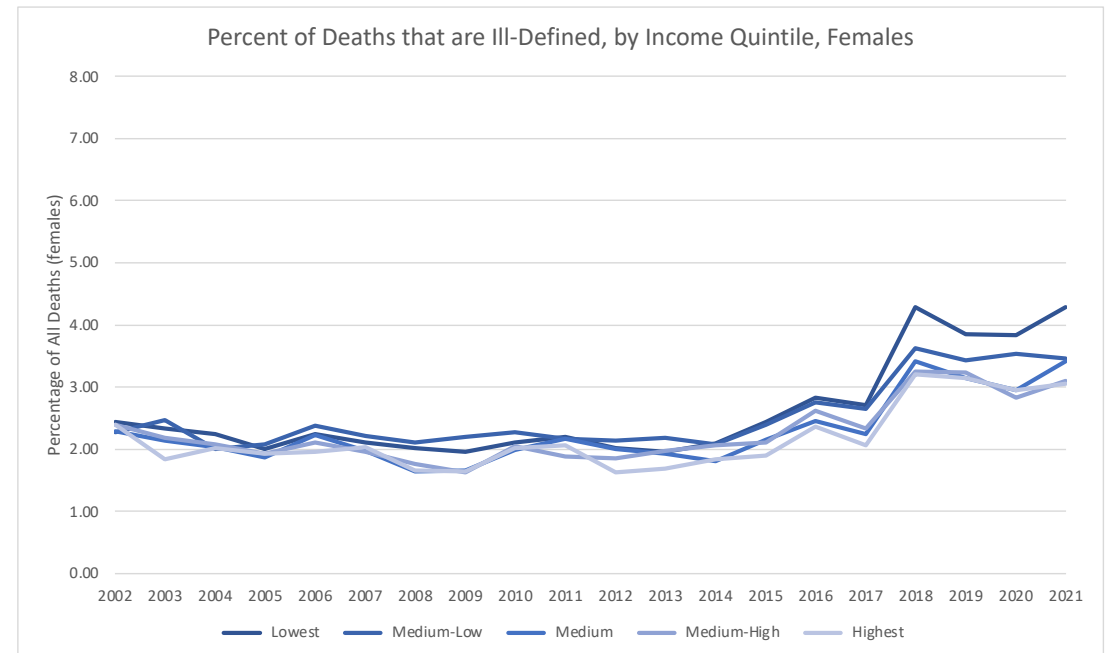
# Ill-Defined Causes of Death

I46, I509, I959, I99, J960, J969, P285, R00–R99 (excluding R95)

## Males



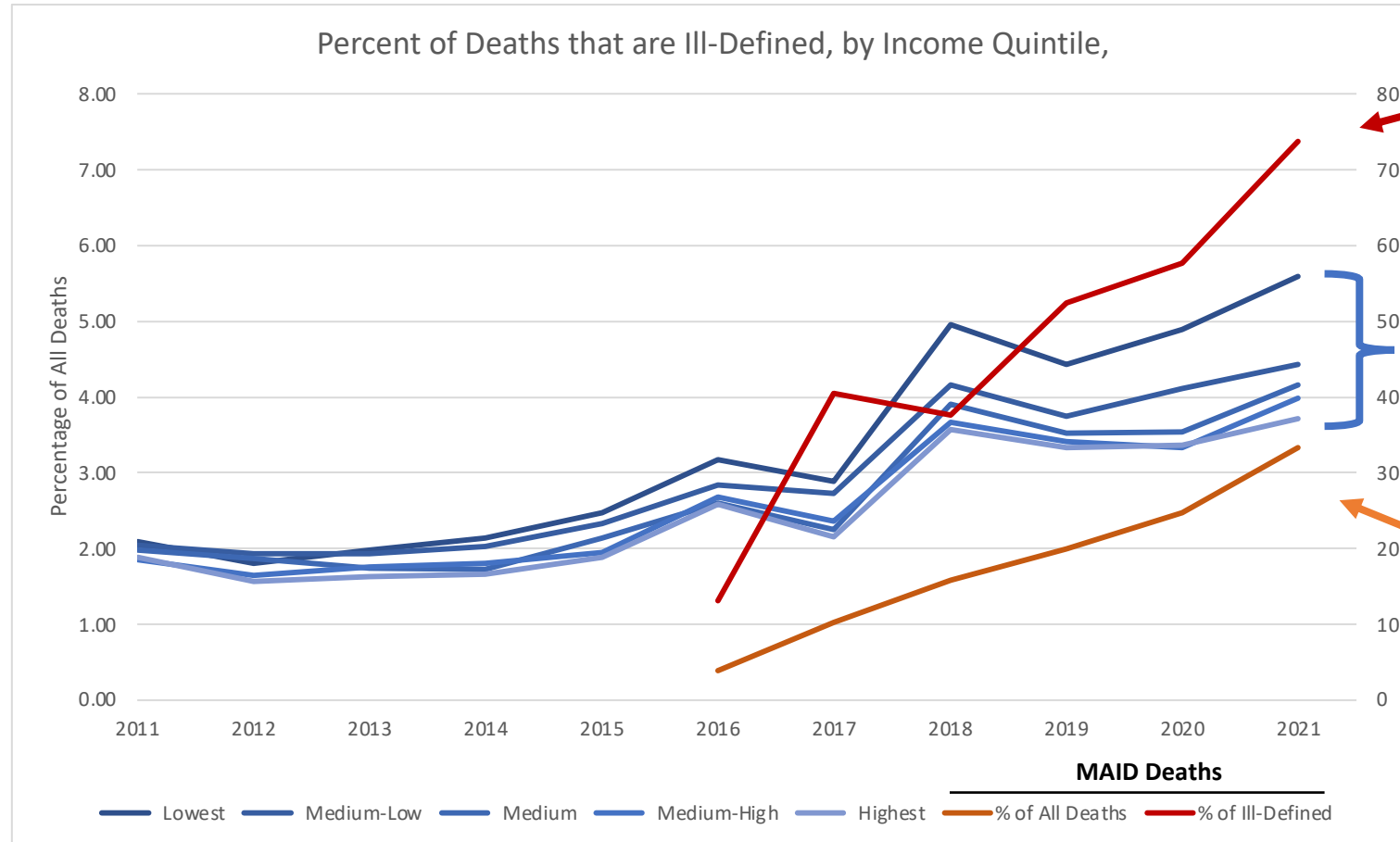
## Females



Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Ill-Defined Causes of Death

I46, I509, I959, I99, J960, J969, P285, R00–R99 (excluding R95)



74% of "ill-defined" causes of death

2% difference between lowest and highest income quintiles

Is now 3.3% of all deaths in Canada.

Statistics Canada, Vital Statistics Deaths Database, Author Calculations

# Two Stories, with context

Differences in contributing cause statistics by SES

COVID-19 has been coded differentially as underlying or contributing

Euthanasia – Medical Assistance in Dying (MAiD) is now a major cause of death in Canada

There are large & significant differences by income quintiles  
Is coded as “ill-defined” – but actually isn’t (usually R98)

# Contact Information

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<http://carleton.ca/determinants>

- Percent involvement of underlying an associated SRMU
  - By sex, by period (2018-2019, 2020-2021)