

# SOCIOECONOMIC FACTORS ASSOCIATED WITH SUICIDE IN AUSTRALIA: A FOCUS ON INDIVIDUAL INCOME

Professor Nicholas Biddle <sup>1</sup>

Dinith Marasinghe <sup>2</sup>

Lucy Ellen <sup>3</sup>

<sup>1,2,3</sup>ANU Centre for Social Research and Methods

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

## ⑤ KEY FINDINGS AND CONCLUSION

# TABLE OF CONTENTS

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

## ⑤ KEY FINDINGS AND CONCLUSION

- Suicide is a major public health concern worldwide.
- According to the World Health Organisation, more than 700,000 people die due to suicide every year.
- 3,139 Australians died by suicide in 2020.
- 15<sup>th</sup> leading cause of death in 2020.
- In addition to human costs, suicide also has significant social and economic costs.
- Estimated cost of suicide and suicide attempts to the Australian economy was 16 and 34 billion during the 2018-2019 financial year

- Economists have made notable attempts to develop models to understand the complex nature of suicide.

- Economists have made notable attempts to develop models to understand the complex nature of suicide.
- Main economic factors associated with suicide:
  - ⇒ *Age, Relative income, Income uncertainty and Unemployment*

- Economists have made notable attempts to develop models to understand the complex nature of suicide.
- Main economic factors associated with suicide:
  - ⇒ *Age, Relative income, Income uncertainty and Unemployment*
- However, these models have been hampered by the lack of **individual-level** data.
- Nearly all previous studies that were based on individual-level data were limited to **suicide attempts** or **suicidal thoughts**
- Other studies were based on aggregate-level data.
- As a result of this data limitation, the effects of economic factors on suicide was largely unknown.

# RESEARCH QUESTIONS

1. To study the relationship between **social factors** and suicide.

# RESEARCH QUESTIONS

1. To study the relationship between **social factors** and suicide.
2. To explore how **relative income** and **income uncertainty** affect the likelihood of suicide.

# RESEARCH QUESTIONS

1. To study the relationship between **social factors** and suicide.
2. To explore how **relative income** and **income uncertainty** affect the likelihood of suicide.
3. To explore how **continuous periods of unemployment** affect the likelihood of suicide.

# TABLE OF CONTENTS

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

## ⑤ KEY FINDINGS AND CONCLUSION

- Linked longitudinal data from the Multi-Agency Data Integration Project (MADIP).
  - Census 2011
  - Personal income tax records (PIT) (2011-2016)
  - Social security information (SSRI) (2011-2016)
  - Causes of death data (2011-2016)

## CENSUS DATA

Census data was used to capture the social factors of suicide.

1. Highest education level
2. Age
3. Sex
4. Indigenous status
5. Core activity need for assistance
6. Household composition

## PERSONAL INCOME TAX RECORDS (PIT) AND SOCIAL SECURITY INFORMATION (SSRI) DATA

PIT and SSRI data were used to derive economic factors of suicide.

## PERSONAL INCOME TAX RECORDS (PIT) AND SOCIAL SECURITY INFORMATION (SSRI) DATA

PIT and SSRI data were used to derive economic factors of suicide.

- Relative income

## PERSONAL INCOME TAX RECORDS (PIT) AND SOCIAL SECURITY INFORMATION (SSRI) DATA

PIT and SSRI data were used to derive economic factors of suicide.

- Relative income
- Income uncertainty

## PERSONAL INCOME TAX RECORDS (PIT) AND SOCIAL SECURITY INFORMATION (SSRI) DATA

PIT and SSRI data were used to derive economic factors of suicide.

- Relative income
- Income uncertainty
- Proxy for unemployment

- Relative income :
  - ⇒ Relative income was defined as the total income of an individual relative to the mean income in the area in which the person lived in 2011 (measured for Statistical Area Level 2 (SA2)). This measure was then divided into quintiles.

- Relative income :
  - ⇒ Relative income was defined as the total income of an individual relative to the mean income in the area in which the person lived in 2011 (measured for Statistical Area Level 2 (SA2)). This measure was then divided into quintiles.
- Income uncertainty :
  - ⇒ For each individual  $i$ , income uncertainty was captured as the coefficient of variation of income (relative standard deviation). This measure was then divided into quintiles.

$$\text{Income uncertainty}_{i,t-1,t} = \frac{\sigma_{i,t-1,t}}{\text{income}_{i,t-1,t}} \quad (1)$$

- Relative income :
  - ⇒ Relative income was defined as the total income of an individual relative to the mean income in the area in which the person lived in 2011 (measured for Statistical Area Level 2 (SA2)). This measure was then divided into quintiles.
- Income uncertainty :
  - ⇒ For each individual  $i$ , income uncertainty was captured as the coefficient of variation of income (relative standard deviation). This measure was then divided into quintiles.

$$\text{Income uncertainty}_{i,t-1,t} = \frac{\sigma_{i,t-1,t}}{\text{income}_{i,t-1,t}} \quad (1)$$

- Proxy for unemployment :
  - ⇒ To capture the unemployment status of an individual, social security payment information was used. - **Newstart allowance** and **Youth allowance (other)**

# TABLE OF CONTENTS

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

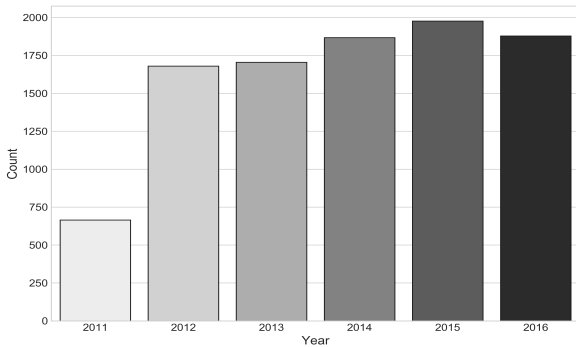
## ⑤ KEY FINDINGS AND CONCLUSION

- Given the longitudinal nature of MADIP, the analysis was conducted using a population-averaged (GEE) logistic model with robust standard errors.

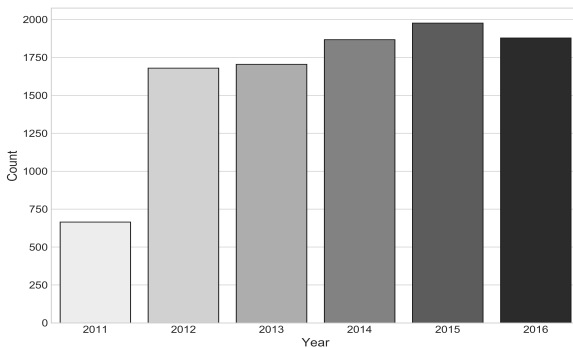
$$y_{i,t}^* = \alpha + \beta \mathbf{x}_i + \delta z_{i,t} + \epsilon_{i,t} \quad (2)$$

$$y_{i,t} = \begin{cases} 1 & \text{if } y_{i,t}^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad (3)$$

# SUICIDE BY YEAR

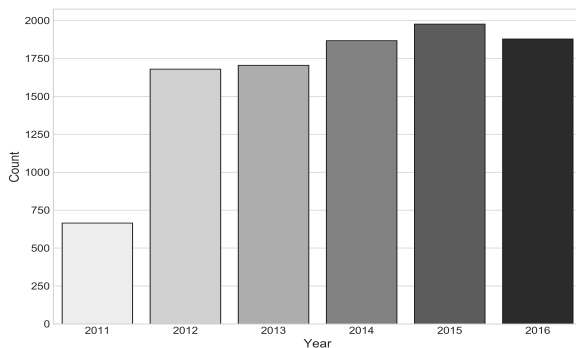


# SUICIDE BY YEAR



- Analysis scope : Time frame 2012 - 2016. Population - Age 15+

# SUICIDE BY YEAR



- Analysis scope : Time frame 2012 - 2016. Population - Age 15+
- Sample size -  $\sim$  2000 suicides and 16 million non suicides per year

# TABLE OF CONTENTS

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

## ⑤ KEY FINDINGS AND CONCLUSION

## RESULTS - SOCIOLOGICAL FACTORS

- Females were **less likely** to end their lives relative to males.
- Those with lower levels of education (relative to bachelor or higher degrees) were **more likely** to end their lives.
- Individuals who required core assistance were **more likely** to end their lives.
- Non-indigenous individuals were **more likely** to end their lives relative to Indigenous individuals.
- Households with more than 1 member were **more likely** to end their lives relative 1 member households.

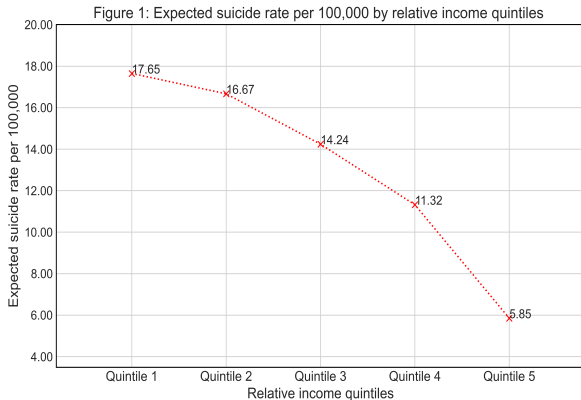
## RESULTS - ECONOMIC FACTORS

- Individuals with higher incomes were **less likely** to end their lives relative to those with lower incomes.
- Those with higher income uncertainty were **more likely** to end their lives relative those with lower income uncertainty.
- Individuals who experienced longer periods of unemployment were **more likely** to end their lives.

## RESULTS - ECONOMIC FACTORS

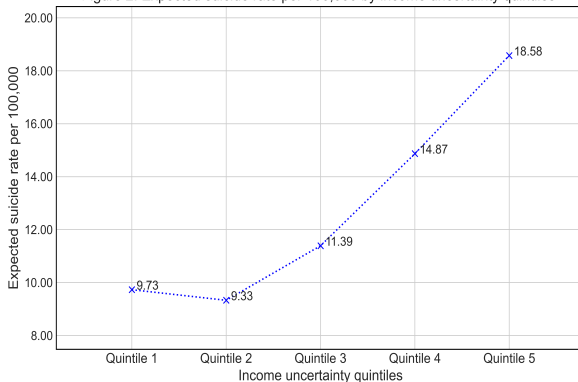
- Individuals with higher incomes were **less likely** to end their lives relative to those with lower incomes.
- Those with higher income uncertainty were **more likely** to end their lives relative those with lower income uncertainty.
- Individuals who experienced longer periods of unemployment were **more likely** to end their lives.
- Income uncertainty caused by both **reductions** and **increases** in income increased the likelihood of suicide. (*Stratified regression*).

# EXPECTED SUICIDE RATE PER 100,000 BY RELATIVE INCOME



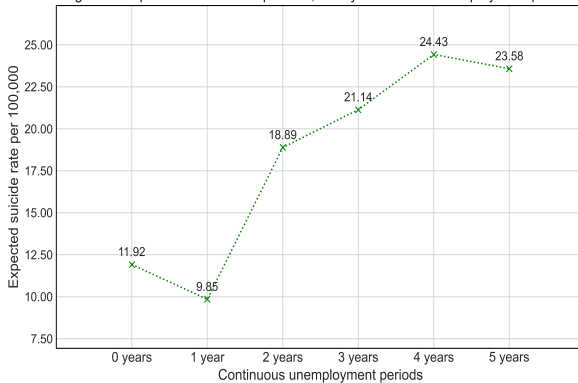
# EXPECTED SUICIDE RATE PER 100,000 BY INCOME UNCERTAINTY

Figure 2: Expected suicide rate per 100,000 by income uncertainty quintiles



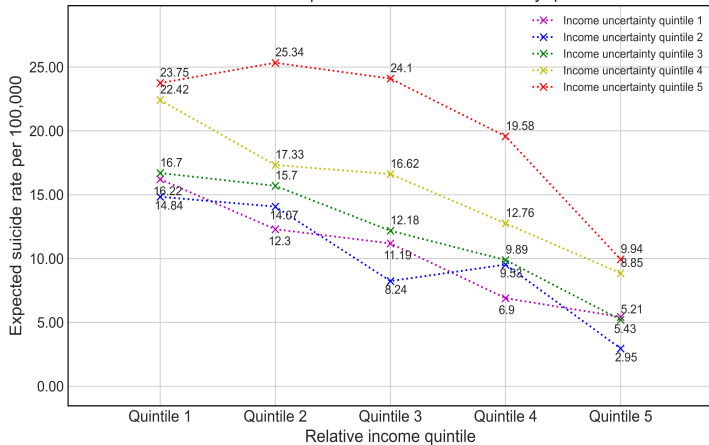
# EXPECTED SUICIDE RATE PER 100,000 BY UNEMPLOYMENT PERIODS

Figure 3: Expected suicide rate per 100,000 by continuous unemployment periods



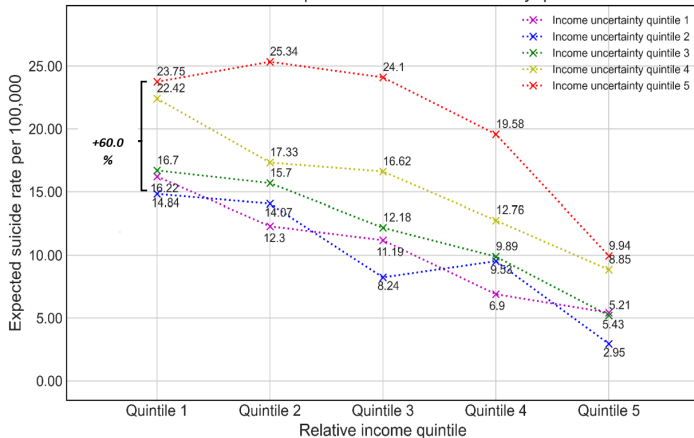
# INTERACTION BETWEEN INCOME QUINTILES AND INCOME UNCERTAINTY

Figure 4: Expected suicide rate per 100,000 for a given relative income quintile and income uncertainty quintile



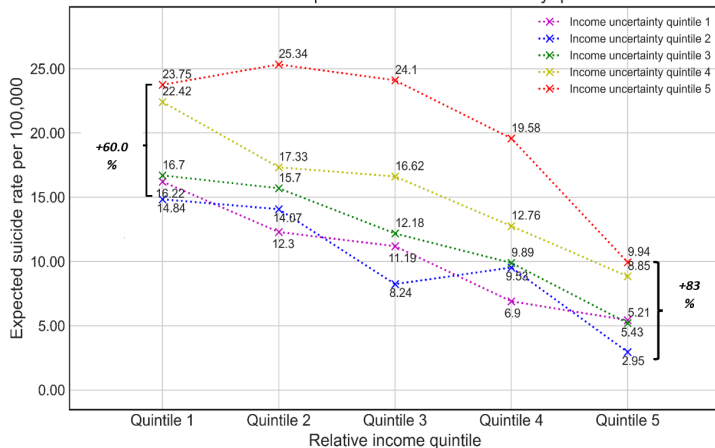
# INTERACTION BETWEEN INCOME QUINTILES AND INCOME UNCERTAINTY

Figure 4: Expected suicide rate per 100,000 for a given relative income quintile and income uncertainty quintile



# INTERACTION BETWEEN INCOME QUINTILES AND INCOME UNCERTAINTY

Figure 4: Expected suicide rate per 100,000 for a given relative income quintile and income uncertainty quintile



- The expected suicide rate per 100,000 decreased as the level of income increased, across all levels of income uncertainty.
  - Change expected suicide rate per 100,000 if an individual in **income uncertainty quintile 1** moves from **lowest** income to **highest** income quintile.  
⇒ -67%
  - Change expected suicide rate per 100,000 if an individual in **income uncertainty quintile 5** moves from **lowest** income to **highest** income quintile.  
⇒ -58%
- The expected suicide rate per 100,000 increased as income uncertainty increased, across all income level quintiles.
  - Change in expected suicide rate per 100,000 if an individual in **income quintile 1** moves from **lowest** income uncertainty to **highest** income uncertainty quintile.  
⇒ +60%
  - Change expected suicide rate per 100,000 if an individual in **income quintile 5** moves from **lowest** income uncertainty to **highest** income uncertainty quintile. ⇒ +83%

# TABLE OF CONTENTS

## ① INTRODUCTION

### 1.1 Motivation

## ② DATA

## ③ METHODOLOGY

## ④ RESULTS

### 4.1 Sociological factors

### 4.2 Economic factors

### 4.3 Expected suicide rate per 100,000 by relative income

### 4.4 Expected suicide rate per 100,000 by income uncertainty

### 4.4 Expected suicide rate per 100,000 by unemployment periods

## ⑤ KEY FINDINGS AND CONCLUSION

## KEY FINDINGS AND CONCLUSION

- Those who had higher levels of income were more likely to end their lives relative to those with lower levels of income.
- Higher levels of income uncertainty was related with higher suicide rate of suicide per 100,000. This result was robust to income uncertainty caused both by increases and reduction in income.
- In relative terms, uncertainty of income increased the suicide rate per 100,000 for individuals in high income quintiles relative to those in lower income quintiles.
- In absolute terms, suicide rate per 100,000 was still greater for those in the lowest income quintile.
- Those who were continuously unemployed for longer had a higher suicide rate per 100,000 relative to those unemployed for shorter periods.