What's Killing You?
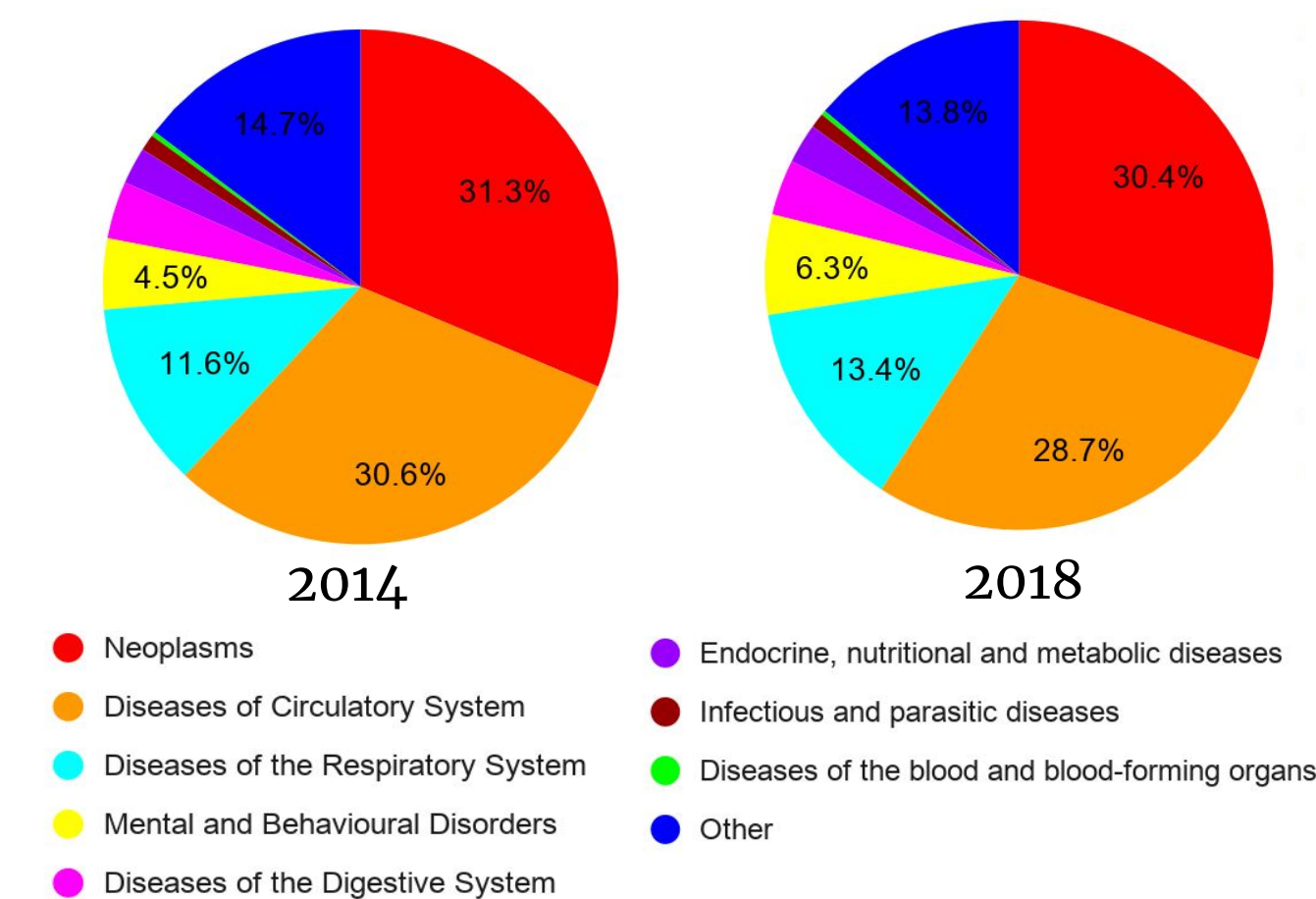
A Statistical Analysis of The Association Between Age, Gender, Place of Residence and Cause of Death in the Irish Population.

Introduction

Despite increased awareness of the risk factors for Coronary Heart disease and increased screening for cancers, e.g. prostate and cervical cancer, circulatory diseases and neoplasms account for the majority of deaths in the Irish population as shown in the Percentage of Deaths by Cause charts for 2014 and 2018 below:
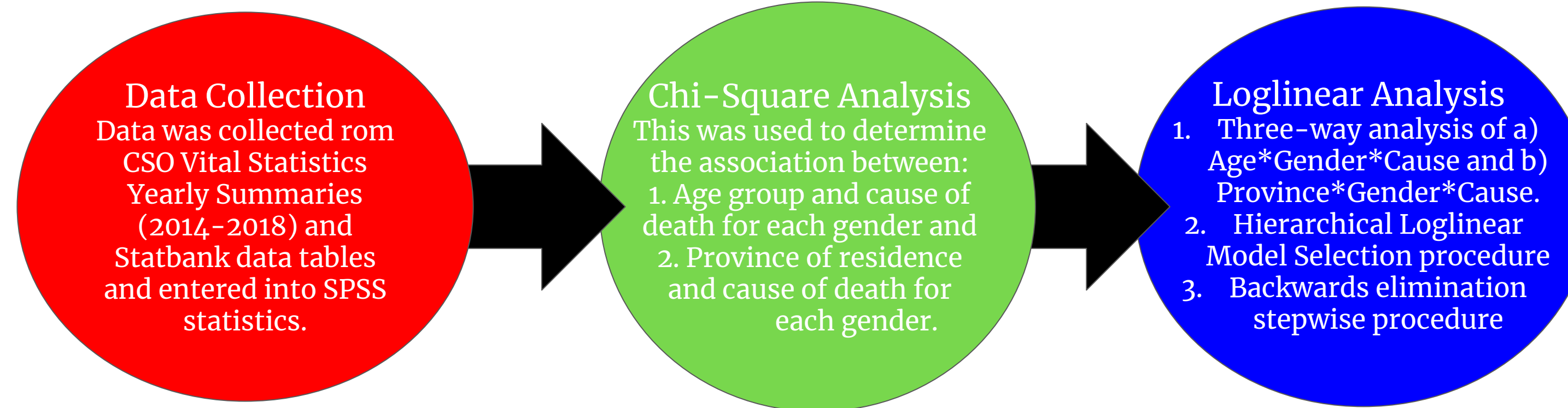

2014

2018

- Neoplasms
- Diseases of Circulatory System
- Diseases of the Respiratory System
- Mental and Behavioural Disorders
- Diseases of the Digestive System
- Endocrine, nutritional and metabolic diseases
- Infectious and parasitic diseases
- Diseases of the blood and blood-forming organs
- Other

Project Aims
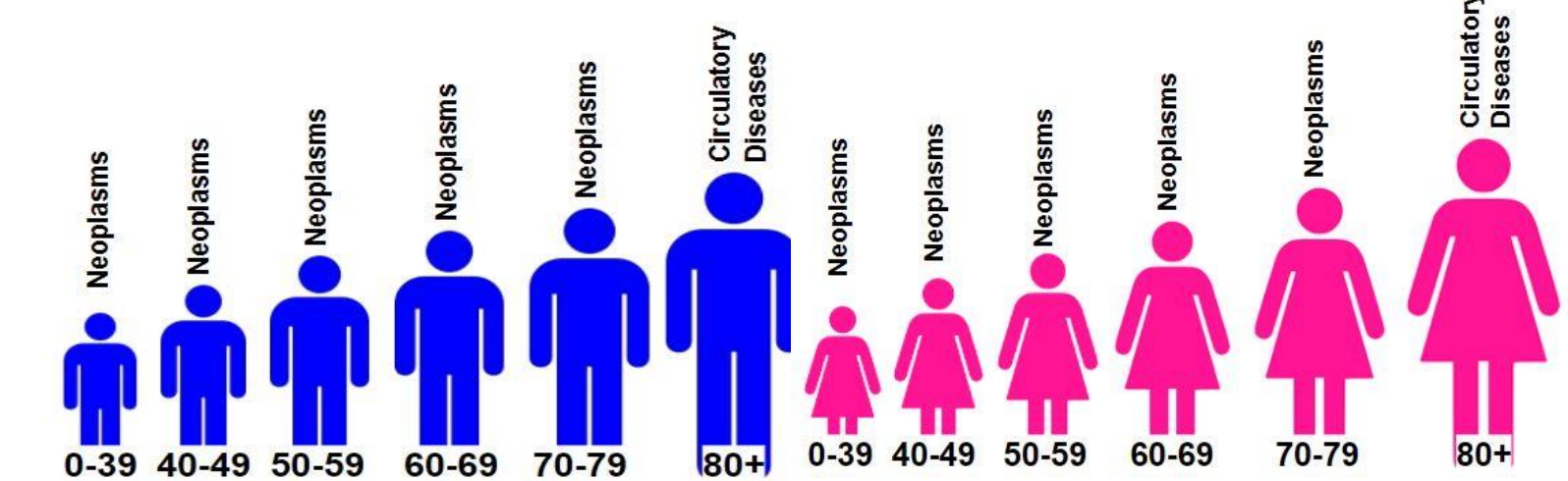
The aims of our project are:

1. To determine whether associations exist between:
   a. age, gender and cause of death in the Irish population.
   b. location (province of residence), gender and cause of death in the Irish population.

2. To find the best models describing:
   a. the association between age, gender and cause of death.
   b. the association between gender, location of residence and cause of death.

3. To increase public awareness of the most common causes of death across age and gender in each province with a view to promoting the need to monitor personal health and engage with preventive / detection measures for these causes of death.

Analytical Methods

Data Collection
Data was collected rom CSO Vital Statistics Yearly Summaries (2014-2018) and Statbank data tables and entered into SPSS statistics.

Chi-Square Analysis
This was used to determine the association between:
1. Age group and cause of death for each gender and
2. Province of residence and cause of death for each gender.

Loglinear Analysis
1. Three-way analysis of a) Age*Gender*Cause and b) Province*Gender*Cause.
2. Hierarchical Loglinear Model Selection procedure
3. Backwards elimination stepwise procedure

Results

Chi-Square Tests of Independence

Age, Gender and Cause of Death:

- All cell counts were > 1 and more than 80% of expected cell frequencies were > 5.

- Pearson's Chi-Square test shows that there was a significant association between cause of death and age for both males ($\chi 2(35) = 5196.78$, p <.001) and females ($\chi 2(35) = 11235.68$, p < .001).

- The effect size was small for both males (Cramer's V=.125) and females (Cramer's V=.186).

Gender, Location and Cause of Death:

- All cell counts were > 1 and 80% of expected cell frequencies were > 5.

- Pearson's Chi-Square test shows that there was a significant association between cause of death and province of residence for both males ($\chi 2(21) = 124.07$, p <.001) and females ($\chi 2(21) = 189.79$, p < .001).

- The effect size was small for both males (Cramer's V=.025) and females (Cramer's V=.031).

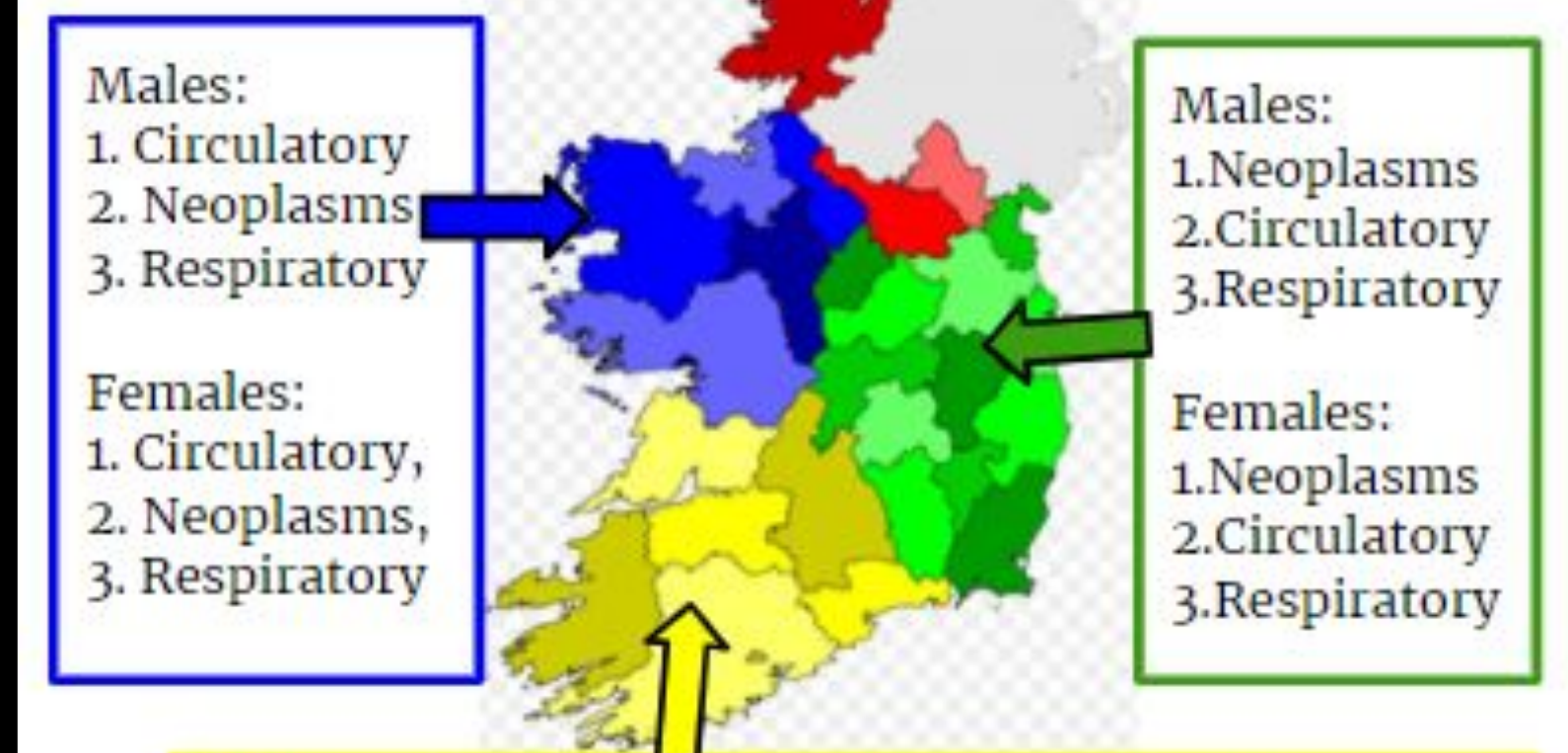### Loglinear Analysis

Age, Gender and Cause of Death:

- A saturated model was chosen that retained all effects.

- The model had a likelihood ratio of $\chi 2(0) = 0$, p = 1 which indicated that the highest-order interaction (age*gender*cause) was significant $\chi 2(35) = 1781.82$, p<.001.

- The likelihood ratio goodness-of-fit test indicated that the model was not a good fit to the observed data, $\chi 2(2) = 0.00$, p <.001.

Gender, Location and Cause of Death:

- An unsaturated model was chosen that retained three, two-way associations of gender*cause, gender*location and cause*location ($\chi 2(31) = 1289.88$, p<.001) and all main effects ($\chi 2(11) = 213,646.36$, p<.001).

- The likelihood ratio goodness-of-fit test indicated that the model was a good fit to the observed data, $\chi 2(21) = 29.50$, p = .103.

Conclusions

- A statistically significant association exists between gender, age and cause of death and also between gender, location of residence and cause of death.

Neoplasms	Neoplasms	Neoplasms	Neoplasms	Neoplasms	Circulatory Diseases	Neoplasms	Neoplasms	Neoplasms	Neoplasms	Neoplasms	Circulatory Diseases
0-39	40-49	50-59	60-69	70-79	80+	0-39	40-49	50-59	60-69	70-79	80+

- Neoplasms account for the greatest % of deaths in males and females under 80 years of age whereas circulatory diseases account for the largest % of deaths in males and females over 80 years of age.

Males: 1. Circulatory 2. Neoplasms 3. Respiratory
Females: 1. Circulatory 2. Neoplasms 3. Respiratory

Males:
1. Circulatory
2. Neoplasms
3. Respiratory

Females:
1. Circulatory,
2. Neoplasms,
3. Respiratory

Males:
1.Neoplasms
2.Circulatory
3.Respiratory

Females:
1.Neoplasms
2.Circulatory
3.Respiratory

Males: 1. Neoplasms 2. Circulatory 3. Respiratory
Females: 1. Circulatory 2. Neoplasms 3. Respiratory

- Circulatory diseases account for the highest % of deaths in males in Ulster and Connacht.
- Neoplasms account for the highest % of deaths in males in Leinster and Munster.
- Circulatory diseases account for the highest % of deaths in females in Ulster, Munster and Connacht.
- Neoplasms account for the highest % of deaths in females in Leinster.