**Methods**

***Data***

The data for this study came from the 2017 multiple cause-of-death data file which was retrieved from the CDC’s Vital Statistics Online Data Portal. Our study examined deaths from falls among older adults so only individuals who were 65 years and older were included in the study. We identified individuals whose underlying cause of death was from falling using the *International Classification of Diseases, 10th Revision (ICD-10)* codes W00-W19. Altogether, there were 2,070,371 subjects included in the study of which 31,244 died from falls. In addition to reporting the underlying cause of death, the multiple cause-of-death datasets includes up to 20 other contributing causes of death labelled with *ICD-10* codes.

All *ICD-10* codes in the multiple mortality dataset were recorded up to four digits. We used a hierarchical *ICD-10* dataset to link disease codes to their disease descriptions as well as their three-digit *ICD-10* codes, sub-chapters, and chapter groups. This dataset was taken from the ‘*icd’* package in *R* and then updated to include any missing *ICD-10* codes or descriptions. The hierarchical dataset allowed us to aggregate four digit codes into three-digit codes or sub-chapter groups. For example, the three-digit *ICD-10* code ‘E14’ indicates unspecified diabetes mellitus and a further digit (0-9) is added to specify the type of diabetes mellitus. Moreover, ‘E14’ falls under ‘E10-E14’ which is a sub-chapter group that encompasses all codes for diabetes mellitus. A code such as ‘E149’ would then aggregate into ‘E14’ or ‘E10-E14’.

***Measures of Association***

The co-occurrence of diseases and conditions associated with death from falls were measured through proportionate mortality ratios (PMRs) with 95% confidence intervals (CI) and population attributable risks (PARs), assuming that the mortality data follows a Poisson distribution. To compute sex and age adjusted PMRs, we stratified the dataset by age group and sex before calculating the observed and expected values of each *ICD-10* code. In total, there were 12 stratified groups between two sexes and six age groups. The observed and expected values were summed across groups by gender for sex-adjusted PMRs, and then all groups were summed for the overall age-sex-adjusted PMRs. The following equation summarizes the PMR calculations:

is the number of individuals in Group A who had condition C given that they died from falls. The expected value is calculated from , the prevalence of condition C in Group A, and which is the total number of individuals who died from falls in Group A.

The PAR was calculated using the PMR as following:

Here, is the prevalence of condition C among all individuals who died in 2017 that were 65 years and older. These calculations were repeated for aggregated three-digit *ICD-10* codes and *ICD-10* subgroups. *ICD-10* codes S00-S99 and T00-T19 were included in calculations but omitted from the final PAR tables because they encompassed injuries that were a result from falling.

***Conditional Pairs***

The multiple cause-of-death dataset lists up to 20 contributing causes of death which co-occur in the same individual. Our goal was to quantify the relationship between pairs of diseases or conditions that regularly occurred across individuals who died from falls. The previous measures of associations that were calculated for single *ICD-10* codes were adapted for use in conditional pairs. PMRs were calculated with the following equation:

is the number of individuals with condition 1 and condition 2 who died from falls. is the prevalence of having condition 1 and condition 2 among the whole study sample while is the number of individuals who died from falls. The equation to calculate PAR was the same as Equation 2, except the prevalence accounted for individuals who had both condition 1 and condition 2 across the whole dataset.