INJURY PREVENTION CENTRE

DATA 101: Understanding Injury Data

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injurypreventioncentre.ca

UNIVERSITY OF ALBERTA

DATA 101:
Understanding Injury Data

Data 101: Understanding Injury Data, is intended to increase knowledge of how to read, interpret, and understand injury data. When presenting injury data, there are two numbers which should be taken into account:

FREQUENCY

Describes the number of occurrence or events

(i.e.: number of deaths, hospital admissions, and emergency department visits)

Examples:

In Alberta, 2021, All Ages, Both Sexes
- 3,220 injury-related deaths (excluding adverse events and complications)

In Calgary Zone, 2019, All Ages, Both Sexes
- 698 motor vehicle-related hospital admissions

In South Zone, 2020, Children 5-9 year, Both Sexes
- 836 fall-related emergency department visits

In Edmonton Zone, 2022, Youth 15-19 year, Males
- 1,415 sports-related emergency department visits

In North Zone, 2021, Seniors 65-69 years, Females
- 567 fall-related emergency department visits

In the North Zone, 2021, Seniors 65-69 years, Males
- 405 fall-related emergency department visits

RATE

Is a measure of frequency of an event *within a defined population.*

Rates are used to compare the frequency with other time periods or other populations.

Example: comparing rate of injury deaths by zone

Rate is calculated as:

$$\textbf{rate} = \frac{\textbf{frequency (number)}}{\textbf{population}}$$

Rates are often expressed in terms of occurrences or events *per 100,000 population*

To calculate the rate you will need:

$$\frac{\text{numerator}}{\text{denominator}} \rightarrow \frac{\text{\# deaths, hosp. admissions, ED visits}}{\text{population of interest}}$$

Example: bicycle-related emergency dept visits (n=200) for children 10 to 14 years of age (n=4,000)

$$\frac{\text{numerator}}{\text{denominator}} \rightarrow \frac{\text{\# ED visits}}{\text{pop. of children 10-14 yrs}} \rightarrow \frac{200}{4{,}000}$$

$$\frac{200 \text{ ED visits}}{4{,}000 \text{ kids 10-14 yrs}} = \frac{x}{100{,}000}$$

$x = 5{,}000$
$\therefore$ 5,000 ED visits per 100,000 kids 10-14 yrs

So, for every 100,000 children between 10 and 14 years of age, there would be 5,000 bicycle-related emergency department visits.

Adapted from: *Injury Data 101: How do we describe the burden of injury?* BCIRPU, 2023

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AGE-SPECIFIC RATE

Age-specific rates are calculated to a specific age group *within* a specific population, and can be used to compare with other age specific rates for the same population

COMPARING AGE-SPECIFIC RATES:
Who is at higher risk of fall-related emergency department visits in Alberta in 2022?

Infants and Toddlers, 0-4 years **OR** Children, 5-9 years

Infants and Toddlers, 0-4 years

Frequency: 10,858 ED visits
Population: 207,462

$$\frac{10{,}858 \text{ visits}}{207{,}462 \text{ population}} = 0.52337 \times 100{,}000 \text{ population}$$

$$\therefore 5{,}233.7 \text{ per } 100{,}000 \text{ population}$$

So, for every 100,000 infants and toddlers in Alberta in 2022, there were 5,234 fall-related emergency department visits.

Children, 5-9 years

Frequency: 11,071 ED visits
Population: 284,474

$$\frac{11{,}071 \text{ visits}}{284{,}474 \text{ population}} = 0.38917 \times 100{,}000 \text{ population}$$

$$\therefore 3{,}891.7 \text{ per } 100{,}000 \text{ population}$$

So, for every 100,000 children between 5 and 9 years of age in Alberta in 2022, there were 3,892 fall-related emergency department visits.

Interpretation:

Children 5 to 9 years of age had a higher number (frequency) of fall-related emergency department visits compared to infants and toddlers (11,071 visits compared to 10,858 visits, respectively).

However, when we calculate the *rate*, which takes into account the population, infants and toddlers have a higher fall-related emergency department visits rate with 5,233.7 visits/100,000 population (compared to 3,891.7 visits/100,000 population of children aged 5 to 9).

Therefore, **infants and toddlers are at higher risk** of a fall-related emergency department visits than children 5 to 9 years of age.

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AGE-STANDARDIZED RATE

Age-standardized rates are calculated to make comparisons *between* populations, across different geographic regions. (e.g. comparing the rate of seniors falls (65+ years) *between* zones).

Age-standardized rate take into account the differences in the composition of the population by using a standard population.

The calculation for age-standardized rate is done by dividing the number of cases by the respective population, then multiplying by 100,000. Each age-standardized rate is then multiplied by the proportion of the standard population belonging to the particular age group.

$$\text{Age-standarization} = \left[\frac{\text{age-specific frequency}}{\text{age-specific population}} \times 100{,}000 \text{ population}\right] \times \text{proportion of standard population}$$

COMPARING AGE STANDARDIZED RATES

Who is at higher risk of a fall-related hospital admissions in 2022?

Central Zone, Both Sexes **OR** North Zone, Both Sexes

Central Zone, 2022

Frequency: 2,449 hospital admissions
Population: 479,950

$$\frac{2{,}449 \text{ admission}}{479{,}950 \text{ population}} = 0.0051026 \times 100{,}000 \text{ population}$$

$$\therefore 510.26 \text{ per } 100{,}000 \text{ population}$$

Proportion of residents 65+ years = 18.23%

Age-standardized rate = 466.09 admissions / 100,000 population

North Zone, 2022

Frequency: 1,743 hospital admissions
Population: 476,094

$$\frac{1{,}743 \text{ admissions}}{476{,}094 \text{ population}} = 0.0033610 \times 100{,}000 \text{ population}$$

$$\therefore 336.10 \text{ per } 100{,}000 \text{ population}$$

Proportion of residents 65+ years = 12.36%

Age-standardized rate = 466.96 admissions / 100,000 population

Interpretation:
While the Central Zone had over 700 more fall-related admissions than the North Zone, the age-standardized rates are similar.

If regions have different population structures, hospital admissions rates are not a fair comparison; a better measure would be an age-standardized rate.

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