# Potential Years of Life Lost and Preventable Years of Life Lost: A Primer

## What are PYLL and PrYLL?

The Potential Years of Life Lost (PYLL) is a measure, or *metric*, that captures the number of years of life lost due to death from an adverse event. In essence, one PYLL can be thought of as one year of life lost due to a premature death.

The Preventable Years of Life Lost (PrYLL) is a measure calculated in the same way as PYLL, except it considers only preventable causes of deaths. In essence, one PrYLL can be thought of as one year of life lost due to a premature death that was preventable.

The PYLL was proposed in 1978 by Romeder and McWhinnie as an indictor for ranking major causes of premature mortality. The PrYLL was developed in 2012 by Errol Taylor at The Royal Society for the Prevention of Accidents (RoSPA) to highlight the burden of unintentional injury that could be avoided as compared to other causes of preventable premature deaths.

## Why use PYLL and PrYLL?

The number and rate of deaths tend to be higher among older people because the risk of death increases with age. This can bias society to focus only on those causes of death that predominantly affect older populations. PYLL emphasizes the loss of potential contribution younger individuals can make to society, and draws more attention to the causes of death that affect younger populations. The PrYLL is used to exclude those causes of death that are deemed not preventable in order to more accurately measure the preventable loss of human potential.

The PYLL and PrYLL can be used to quantify the human impact of all injury deaths and preventable injury deaths, respectfully, and to make comparisons with other causes of death or across populations.

## How do PYLL and PrYLL work?

PYLL is calculated as the reference age minus the age at death.

| Using PYLL and PrYLL |
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| Emphasizes deaths in younger age groups |
| PYLL and PrYLL for injury causes are nearly identical because almost all injuries are considered preventable |
| PrYLL emphasizes the preventability of injuries when compared with other causes |
| Only measures mortality – does not measure morbidity |
| Can be difficult to determine specific cause of death |
| Should not be used to compare causes of injury that are age-specific |

For PYLL with a reference age of 85 years (PYLL[85]), the calculation would be:

$$PYLL[85]^{*} = 85 - \text{Age at death}$$

**Note that PYLL cannot be negative. If the age at death is larger than the reference age, the PYLL for the death is zero.*

PrYLL is calculated as the number of Potential Years of Life Lost (PYLL) for the subset of causes of deaths that are deemed to be preventable and thus avoidable ($PYLL_{\{preventable\}}$).

$$PrYLL = PYLL_{\{preventable\}}$$

Almost all injuries are considered preventable, with the notable exceptions being deaths as a results of legal interventions and acts of war. As such, PYLL and PrYLL for injury causes are nearly identical. However, it can sometimes be difficult to determine the specific cause of death and thus not all deaths can be easily classified as preventable or not. PYLL and PrYLL rates can then be obtained by dividing the PYLLs and PrYLLs per age group by the population of that age group.

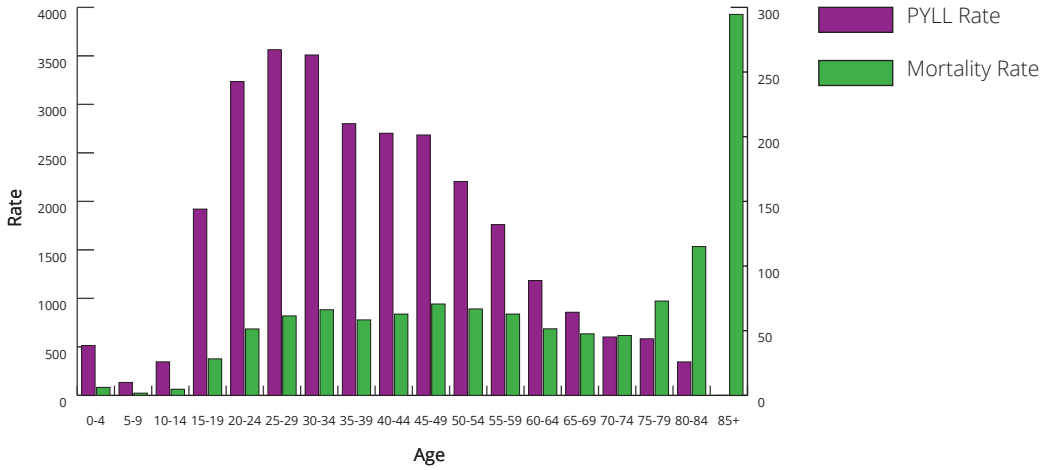
## How can we apply PYLL?

In injury prevention, PYLL is used to identify the human impact of injury-related deaths, used to determine effectiveness of programs and interventions, as well as resource allocation. The PrYLL allows for the comparison between different leading preventable causes of death.

## Example: Injury Mortality in British Columbia

Looking at unintentional injury mortality rates for British Columbia in 2016 **(Figure 1),** the burden of injury appears to be low among the younger age groups and increases exponentially after 65 years of age. An entirely different picture is seen, however, when Potential Years of Life Lost (PYLLs) are used to describe the burden of unintentional injury by age.

***Figure 1: Comparing mortality rate and PYLL[85] rate for all injury causes per 100,000 population in BC during the 2016 calendar year***




PYLL places more value on deaths of younger age groups due to more potential years of life lost. Despite the 85+ age group having the highest mortality rate, PYLL places no value to these deaths. PYLL rate is highest in the 20-34 year old age groups and lower in children, due to low mortality rates, and elderly, due to fewer years of life lost. This aspect of PYLL is particularly important to note when comparing causes that affect different age ranges. PYLL should not be used to compare causes of injury that are age specific, for example falls among older adults with self-harm among youth.

Looking at the leading causes of PYLL for British Columbia in 2016 **(Figure 2)**, the top 4 were cancer, injury, circulatory disease, and respiratory disease. However, looking at the Preventable Years of Life Lost (PrYLL), the leading cause was injury **(Figure 3),** which accounted for 37% of PrYLL of all preventable causes. Cancer was the leading cause for PYLL, but less than 40% of those PYLLs were considered preventable. In comparison, over 98% injury PYLLs were considered preventable. PrYLL is not only an useful metric to highlight the preventability of injuries, but also the fact that injuries make up the highest proportion of avoidable lost human potential.

***Figure 2: Top 4 leading causes of PYLL[85] in BC during the 2016 calendar year***

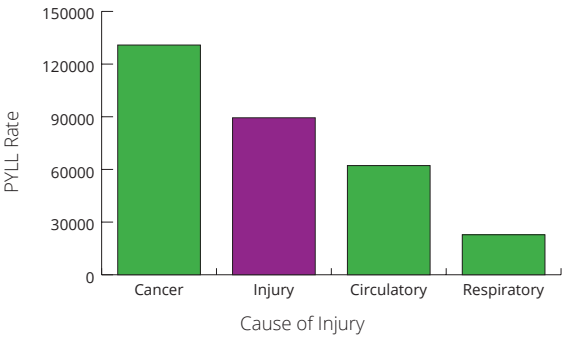
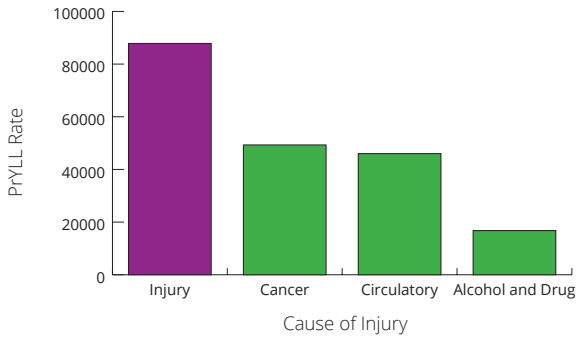



***Figure 3: Top 4 leading causes of PrYLL[85] in BC during the 2016 calendar year***





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