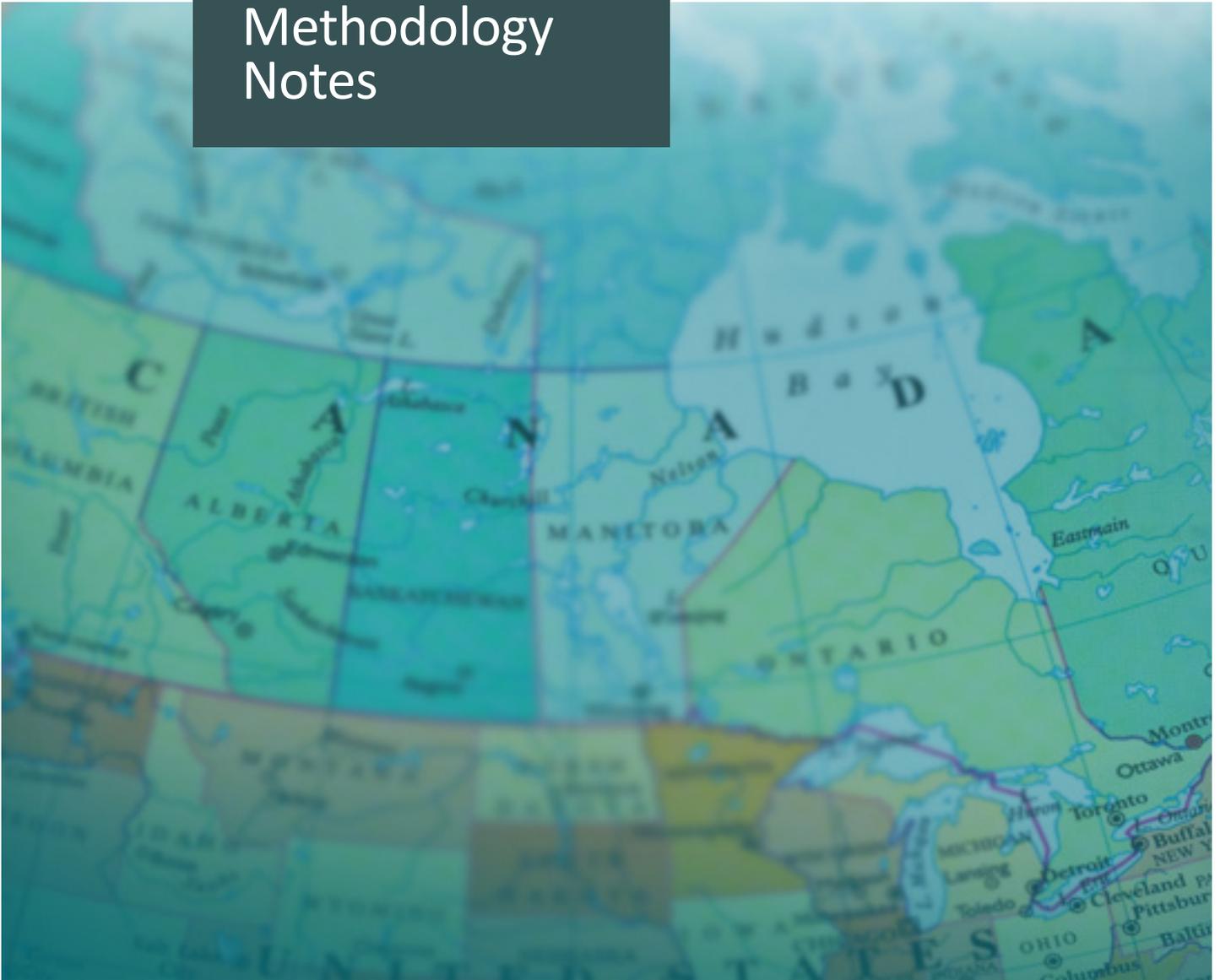


Methodology Notes



Use of Funnel Plots for Reporting Indicator Results



Canadian Institute
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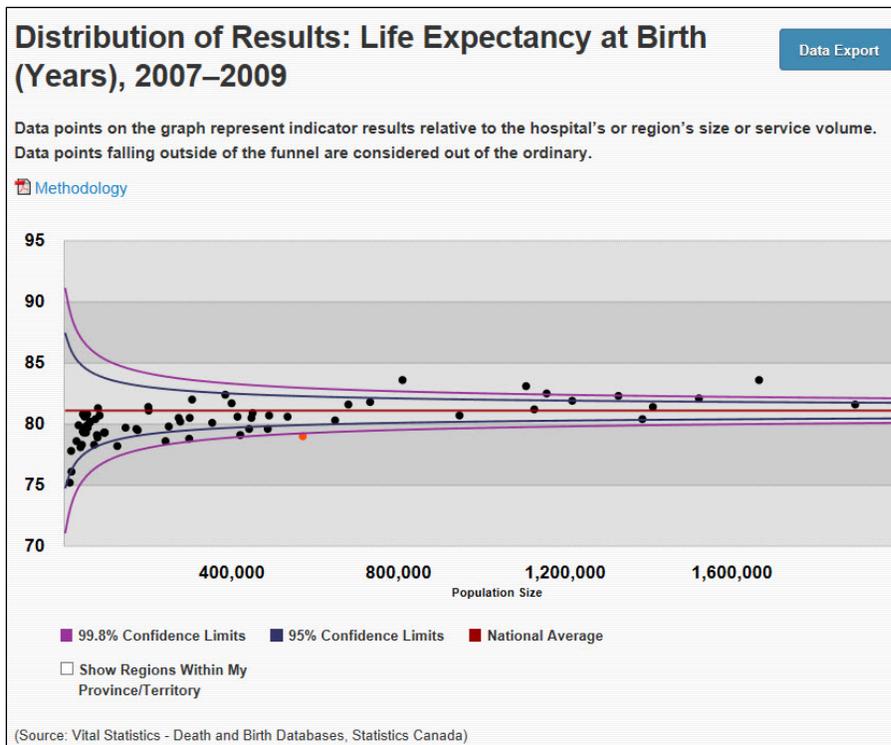
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Use of Funnel Plots for Reporting Indicator Results

Figure 1 Sample funnel plot (Life Expectancy at Birth indicator)



What is a funnel plot?

As used in the Your Health System tool, a *funnel plot* is a visual representation of a facility's, corporation's or health region's indicator result compared with the national average and with the results of other facilities, corporations or health regions. It consists of 2 main parts: a mathematically derived *funnel* superimposed on a *scatter plot*.

The funnel plot's vertical axis (y-axis) represents the indicator value. Dots higher up the axis show facilities, corporations or health regions with a higher indicator value, regardless of the directionality of an indicator. For some indicators, a higher value is more desirable (e.g., Improved Physical Functioning in Long-Term Care, Life Expectancy at Birth), whereas for other indicators (e.g., All Patients Readmitted to Hospital), a higher value is not desirable.

The funnel plot's horizontal axis (x-axis) is dependent on the indicator and the level of reporting (facility, corporation or health region). Thus the horizontal axis may reflect the number of persons served by a facility (patient volume), the number of people residing in a health region (census population) or the statistically expected number of people that may experience the event of interest (e.g., hospital readmissions or deaths). For *long-term care indicators*, for example, the horizontal axis represents the total number of resident assessments included in the calculation of a particular facility's, corporation's or health region's indicator value for that year.

The *scatter plot* represents indicator results for facilities, corporations or health regions. Each dot represents a facility's, corporation's or health region's indicator value, relative to its service volume or total number of annual assessments.

The *funnel* is a mathematically derived boundary (and represents the statistical margins of error), signifying either 2 or 3 standard deviations above and below the national average.

- The outside funnel represents the 99.8% confidence limits and is 3 standard deviations from the average.
- The inner funnel represents the 95% confidence limits and is 2 standard deviations from the average.
- The annual service or assessment volume is incorporated into the funnel shape, with wider boundaries for smaller service or assessment volumes and narrower boundaries for larger service or assessment volumes.
- The solid horizontal line in the middle of the funnel represents the national value for the indicator.

Note: Funnel plots can be provided for only those indicators that have well-developed measures of variation. This enables a clear presentation of the indicator results in relation to an appropriate size measure for a facility, corporation or health region, as well as the creation of the funnel around the national average. For these reasons, funnel plots are not created for all indicators.

How is a funnel plot interpreted?

Your Health System funnel plots are advantageous because they provide a visual representation of performance by service or assessment volume at the facility, corporation or health region level relative to the national average, giving additional context for indicator performance. By doing so, funnel plots also discourage inappropriate ranking of organizations. Typically, lower service volumes create indicator results that are subject to more variation than those created by larger volumes. Funnel plots address this issue by providing a strong visual indication of indicator results that are statistically higher or lower than the national average while taking into account service volumes.

Indicator values outside of the funnel indicate out-of-the-ordinary results after the annual service or assessment volumes have been accounted for. Health regions, corporations or facilities with indicator values inside the funnel have results within an expected variation, given their size. To interpret indicator results as they relate to the funnel, we must consider the directionality of the indicator.

- When lower values for the indicator are desirable (e.g., mortality rates, Experiencing Pain in Long-Term Care), facilities, corporations or health regions with results lying above the upper 95% confidence limits (funnel) can be considered to be in the “warning” zone, while those above the upper 99.8% confidence limits (funnel) are in the “concern” zone. Such results may warrant further investigation.
- When higher values for the indicator are desirable (e.g., Hip Fracture Surgery Within 48 Hours, Improved Physical Functioning in Long-Term Care), facilities, corporations or health regions with results lying below the lower 95% confidence limits (funnel) are in the “warning” zone, while those below the lower 99.8% confidence limits (funnel) are in the “concern” zone.

Bibliography

Spiegelhalter DJ. Funnel plots for comparing institutional performance. *Statistics in Medicine*. 2005.



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