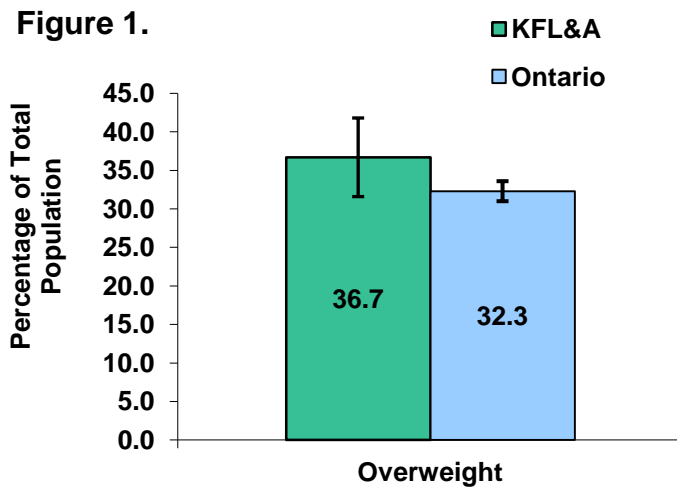


Understanding Confidence Intervals and Statistical Significance in Facts & Figures

Many estimates are presented in the form of percentages with 95% confidence intervals. For example, Figure 1 (using hypothetical data) shows us that 36.7% (95% CI: 31.6, 41.8) of the KFL&A population ages 18-64 are overweight (BMI between 25.0 and 29.9). This percentage is the estimate (also called the 'point estimate') of the *true* proportion of people who are overweight in KFL&A. As we have not asked 100% of the KFL&A population, we must use the estimate from a sample to infer the true proportion of the people who are overweight. If we re-sampled the KFL&A population, we would likely to get a different point estimate of the overweight population each time because different individuals would be included.

How accurate is this estimate of overweight people (36.7%) in the KFL&A population? This is where confidence intervals come into play.



Confidence intervals provide an 'estimate interval', which gives us a measure of 'precision' or 'confidence' around our point estimate.

Confidence intervals provide an 'estimate interval', that is, a range of values around the point estimate within which the true value can be expected to fall. Using our example from above, the 95% confidence interval provides a range, in this case 31.6% to 41.8%, within which we are 95% confident that the true population proportion falls. For Ontario, the point estimate is 32.3%, with a much narrower estimate interval than KFL&A of 31.5% to 33.1%.

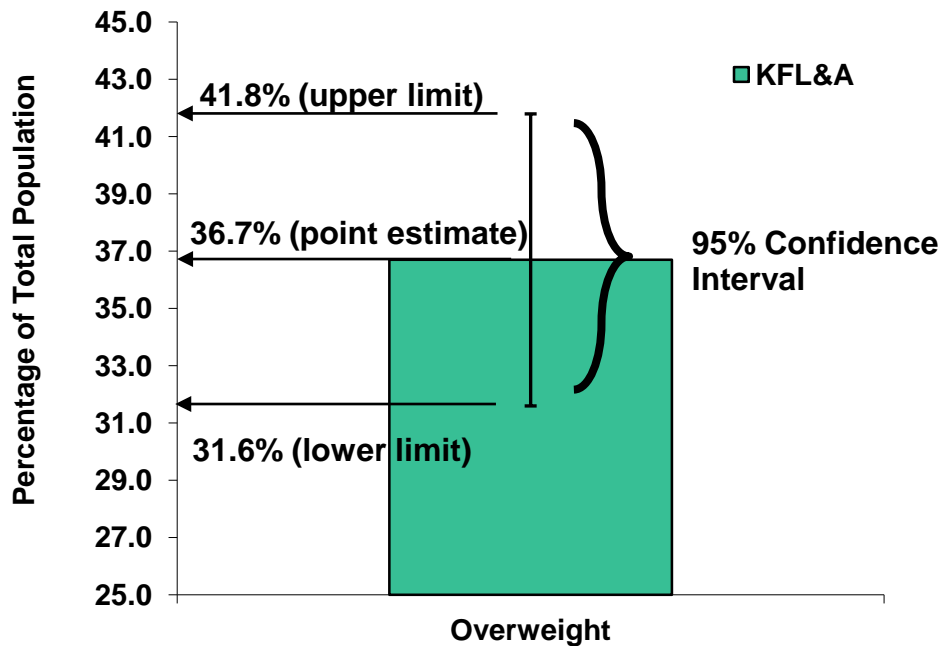
Which point estimate is more precise? The estimate interval for Ontario is narrower than the estimate interval for KFL&A. This tells us that there is more precision around the point estimate for Ontario than that of KFL&A. This is because more people were sampled to provide the Ontario estimate providing a more precise estimate and a narrower confidence interval. The wider confidence interval for KFL&A indicates that there is more variability in the sample, leading to a less precise point estimate.

The wider the confidence interval is, the more variability in the sample, and the less precise the point estimate.

Confidence Intervals within Figures

Confidence intervals are presented using the notation shown in Figure 2. The point estimate of overweight people in KFL&A is 36.7%. The upper limit of the confidence interval is 41.8% and the lower limit of confidence interval is 31.6%.

Figure 2. Example of Upper and Lower Limits of a Confidence Interval



Statistical Significance

In the above example, CCHS 2.1 reported a point estimate of 36.7% (95% CI: 31.6, 41.8) for the overweight population in KFL&A and 32.3% (95% CI: 31.5, 33.1) in Ontario. At first glance, one might conclude that KFL&A has a higher proportion of overweight individuals than does Ontario. Is this correct? (Please continue reading to find out the answer!)

When comparing point estimates, we refer to the difference in the point estimates as being statistically significant or non-significant. A difference in point estimates which is “statistically significant” means that the difference between the two estimates is unlikely to have occurred by chance alone. In this report, we determine statistical significance by looking at the confidence intervals of each point estimate.

A difference which is statistically significant means that the difference is unlikely to have occurred by chance alone.

Figure 3 displays a situation where the confidence intervals of two point estimates do not overlap. When confidence intervals DO NOT overlap, we are at least 95% sure that there is a statistically significant difference between the two estimates.

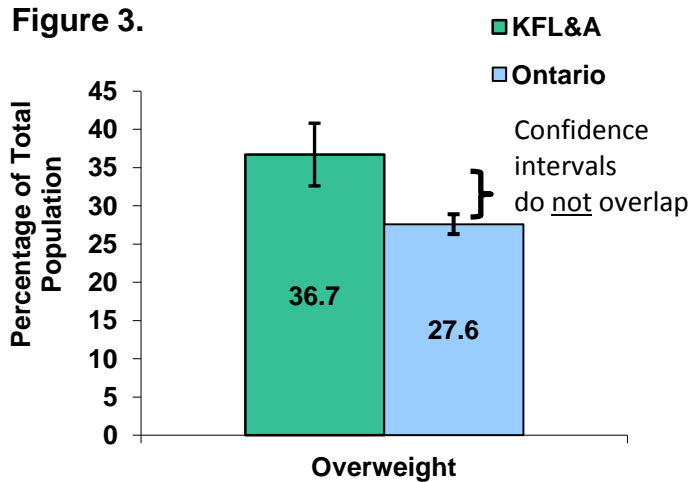
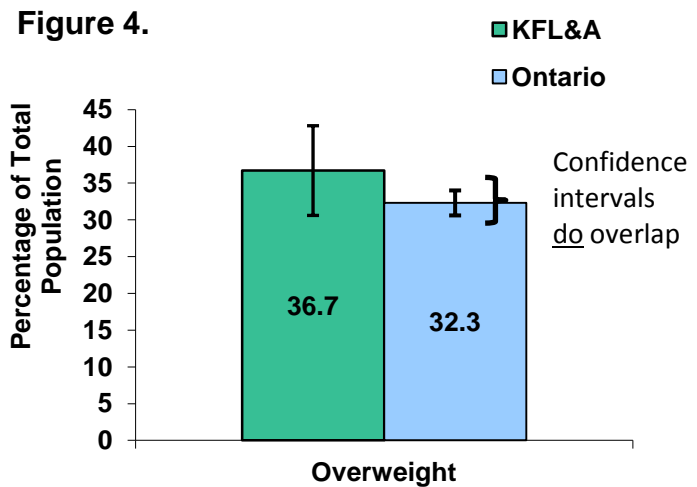


Figure 4 displays a situation in which two confidence intervals actually overlap one another. Therefore, we cannot conclude that these two point estimates are significantly different from one another. An exception to this is when the confidence intervals overlap only slightly. Then a chi-square test can be completed to determine statistical significance.



Coming back to our example from Figure 1, the confidence intervals for the point estimates for KFL&A's and Ontario's overweight population DO overlap. Thus, we can conclude that the two estimates are NOT statistically significantly different from one another.

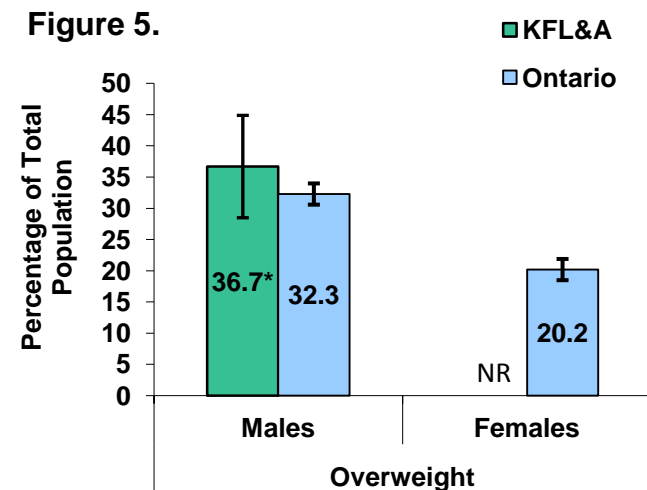
Co-efficient of Variation

The co-efficient of variation (C.V.) is used to measure the dispersion (or amount of variability) of data points around a point estimate. In Facts & Figures (and other reports), we use the C.V. as another indicator (in addition to the confidence interval) of how reliable or precise a point estimate is.

If there is too much variation around an estimate (a high C.V., which would also mean a wide confidence interval), the estimate is thought to be too unstable to report. When that happens, the point estimate is said to be ‘not releasable’ – and in the figure, instead of a number being shown for the point estimate, it will be replaced with “NR”. (Figure 5)

If there is a high degree of variability around the point estimate, but the variability is not so much that the point estimate cannot be released, we say that you can use this point estimate, but with caution – as there is a high sampling variability. In a Figure, the point estimate will have an “*” beside it and the note at the bottom of the figure will say “*Use with caution”. (Figure 5) Usually, the point estimate will also have a wider confidence interval associated with it.

Use with caution acknowledges that these estimates are less precise, and less certain, than those with a lower C.V. These results may not accurately reflect the true population trends. Your language should reflect this uncertainty. One way to do this is to report the 95% confidence interval, which will indicate the variability in the estimate.



*Use with caution
NR: Not releasable