

RULES FOR ROUNDING FOR APS 2001

TYPE OF STATISTIC	RULE FOR ROUNDING
Population counts	<p>Standard deterministic rounding to the nearest multiple of 10.</p> <p><i>Examples</i> 2,535.138 becomes 2,540 when rounded 2,534.123 becomes 2,530 when rounded</p>
Totals or sub-totals (marginal)	<p>The estimation is calculated on the unrounded counts and then rounded to the nearest multiple of 10. However, it is also acceptable, from a confidentiality point of view, to calculate the marginal using the rounded counts.</p> <p>Totals calculated from standardized weights (weights divided by the average weight) should be considered as the product of the sample size by the ratio of the estimation over the sum of weights. The first rule for rounding of ratios (Step 1 below) should be applied to the ratio and then multiplied by the unrounded sample size. Step 2 (below) is not required in this case.</p>
Ratios or percentages	<p>Rounding of ratios or percentages should be done in two steps:</p> <p>Step 1: The ratio or the percentage must be calculated from the numerator and the denominator both rounded to the nearest multiple of 10.</p> <p><i>Example</i> 546.23 is the numerator and 2,535.138 is the denominator. The ratio is calculated with 550 and 2540 and the result is: 0.21653543...</p> <p>Step 2: Then the ratio must be rounded according to the standard deterministic rounding, to one decimal place in the case where the estimation is presented as a percentage or three decimal places in the case where the estimation is presented in a decimal form.</p> <p><i>Example</i> 0.21653543... should be presented as 21.7% or 0.217</p> <p>However, if this last rounding makes the analysis difficult (for example, if it causes problems when calculating a difference of proportions), it is possible to omit to do it only if both numerator and denominator were previously rounded.</p>
Averages	<p>In the calculation of an average, both the total (numerator) and the population size (denominator) should be rounded to the nearest multiple of 10.</p> <p>The average of a dichotomous variable is, in fact, a proportion. In this case, the rules for ratios or percentages should be applied.</p>

<p>Other statistics</p>	<p>In the case of complex statistics where the interpretation is difficult, the rounding may not be necessary.</p> <p>Previous types of statistics apply mainly to the content of tables. In the case of analysis as regression or other data analysis techniques, the rounding may be inappropriate to the point to give unusable results. In such situations the rounding is not absolutely required.</p>
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Rounding of the results is needed for quality or “cosmetic” purposes, but above all it is needed to reduce the risk of disclosure.

The first reason why rounding is important is for the **protection of confidentiality in small cells**. When the unweighted count for a particular cell is lower or equal to 10, the cell must be suppressed as well as all proportions or ratios calculated from this cell. In a table where such a cell has been suppressed, omitting the rounding of the other non-suppressed values generally allows to deduce the exact value in the cell that has been suppressed. This could be achieved by using the marginal in combination with the other lines or columns of the table. When rounding all values in-the table, the exact value of the suppressed cell cannot be deduced, only an interval of values can be obtained.

Considering the existence of a Public Use Microdata File (PUMF), it would be possible to isolate units from the unrounded result tables coming from the analytic file and then **identify specific respondents on the PUMF**. In the creation of the PUMF, a certain number of measures have been taken to avoid that individuals can be identified on the file. Thus, some characteristics of the respondents that presented a risk of disclosure have been disrupted. Also, the weight of a certain number of units of the PUMF has been disrupted for confidentiality purposes. But a certain number of units still have exactly the same weight in the analytic file than in the PUMF. Therefore, the weight could act as a matching key between results of the two sources. The rounding of results published from the analytic file is therefore a measure to reduce the risk of identification of particular individuals in the PUMF.

In the case of ratios or percentages, they must be calculated from the numerator and the denominator both rounded in order to **avoid giving more information than the numerator and the denominator rounded themselves**. The additional rounding to the decimal place constitutes a supplementary protection measure.

Concerning averages, the consequence of the omission of rounding the numerator and the denominator is the increased risk of disclosure, especially in the case of small population or subpopulations.