

Yukon Bureau of Statistics' Response to the Questions of the Standing Committee on Public Accounts, Yukon Legislative Assembly

In the course of considering the report by the Office of the Auditor General of Canada on procurement and contracting, the Standing Committee on Public Accounts (SCPA) of the Yukon Legislative Assembly has requested that Yukon Bureau of Statistics (YBS) respond to three specific questions. The questions and YBS' responses with an outline of the calculation method are provided below.

SCPA questions and YBS responses

Q1. What would the required sample size be to achieve a representative sample for a population of 47, 041, with a confidence level of 90% and a margin of error of $\pm 10\%$?

- Assuming a 100% response rate — identical to sourcing all data from administrative files — the minimum sample size required to achieve the specified precision level is 68 for a population of 47, 041 without any stratification.

Q2. What would the required sample size be to achieve a representative sample for a population of 47, 041, with a confidence level of 90% and a margin of error of $\pm 5\%$?

- Assuming a 100% response rate — identical to sourcing all data from administrative files — the minimum sample size required to achieve the specified precision level is 271 for a population of 47, 041 without any stratification.

Q3. What would the required sample size be to achieve a representative sample for a population of 47, 041 if desire is to sample across all 16 Yukon government departments, as identified on page 4 of 22 of the report?

- It is reasonable to assume that the contracts differ in terms of value, type, effectiveness, etc., across all 16 Yukon government departments. Also, the number of contracts varies significantly across departments. Therefore, a stratified Simple Random Sample (SRS) derivation method is adopted to produce representative estimates by stratum, in this case, Yukon government department.
- The required sample size to generate representative estimates by department is calculated using $p = 0.5$ as the expected proportion of the population with the attribute of interest is unknown (Table 1). Any change in the p -value in either direction will result in a decrease in the number of the required sample.
- Assuming a 100% response rate — identical to sourcing all data from administrative files — the required stratified Simple Random Sample (SRS) size is approximately 850 at the 90% confidence level with a 10% margin of error, and approximately 3,570 at the 95% confidence level with a 5% margin of error, assuming $p = 0.5$.

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Calculation method

In statistical domains, the determination of an optimal sample size is always a trade-off between precision and other operational constraints. However, the following formula is used to calculate the minimum size of a Simple Random Sample (SRS):

$$n = \frac{Z^2 p(1-p)}{e^2 + \frac{Z^2 p(1-p)}{N}}$$

Where —

- n is the minimum sample size required to achieve the given precision level;
- Z is the Z-score corresponding to the desired confidence level;
- p is the proportion of the population for the attribute of interest (for an unknown proportion, the value of p should be set to 0.5 (i.e., 50%) to avoid potential risk of low-quality estimates); and
- e is the desired margin of error, and N is the size of the population.

Table 1 provides the calculated sample size of contract numbers by department and for the Yukon government total.

Table 1. Minimum sample size by department at two precision levels.

Yukon government organization	Number of contracts	Sample Size at 90% Confidence level, 10% Margin of Error (p=0.5)	Sample Size at 95% Confidence level, 5% Margin of Error (p=0.5)
Dept. of Community Services	3,745	66	348
Dept. of Economic Development	189	50	127
Dept. of Education	2,135	66	326
Dept. of Energy, Mines and Resources	1,594	65	310
Dept. of Environment	2,410	66	331
Executive Council Office	384	58	192
Dept. of Finance	145	46	105
French Language Services Directorate	24	18	23
Dept. of Health and Social Services	4,183	67	352
Dept. of Highways and Public Works	28,033	67	379
Dept. of Justice	1,213	64	292
Public Service Commission	819	62	262
Dept. of Tourism and Culture	1,857	65	318
Women and Gender Equity Directorate	49	28	43
Yukon Development Corporation	12	10	12
Yukon Liquor Corporation	249	53	151
Total (Yukon government)	47,041	68	381