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# Appendix

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## Sample Design and Sampling Variability

### Sample Design and Selection

The sample for the General Household Survey (GHS) 2025 was selected from a sampling frame comprising all residential dwelling units in Singapore. As the sample survey of the GHS 2025 covered only households in residential dwellings, institutions such as military camps, hostels and hotels were excluded from the frame.

The sample was selected based on a stratified design. Dwelling units in the sampling frame were divided into different groups, defined based on the planning areas demarcated by the Urban Redevelopment Authority and broad dwelling type groups. A random sample was then selected from the different groups using systematic sampling with a random start. The samples selected from each group were combined to form the required sample of about 33,000 dwelling units.

### Sampling Variability

The precision of estimates derived from the sample survey are affected by sampling errors since the estimates are based on information obtained from a fraction of the population instead of the whole population. Sampling errors refer to the difference between the estimate based on a sample and its 'true' population value that would result if the whole population has been surveyed.

The extent of sampling error of an estimate under a particular sample design is assessed by the variability of the estimate across all possible samples under the design. One common measure of this variability is given by the standard error (SE), which is the standard deviation of the sampling distribution of the estimate. Another measure is the relative standard error (RSE), which is obtained by expressing the standard error as a percentage to the estimate. The smaller the RSE, the more precise is the estimate.

## Generalised Sampling Errors Tables

From Table A1, the Design Factor (DEFT)<sup>1</sup> for most of the selected attributes ( $T_Y$ ) is about 1. As it is impractical to compute and display the sampling error for each and every possible estimate such as the total number of elements in the population with a given attribute Y from the GHS 2025, generalised sampling error tables are provided instead. These tables guide data users in estimating the errors for the GHS 2025 survey estimates.

Table A2 provides the generalised sampling errors of a selected range of estimates with DEFT value of 1. The smaller the estimate, the larger is the RSE. This implies that sample estimates of a rare characteristic would have high RSEs and users would have to be careful in drawing inferences based on the sample estimates.

**Table A1 Sampling Errors and DEFT of  $T_Y$  for Selected Attributes, GHS 2025**

|                                                       | Sample<br>Estimate | Standard<br>Error | Relative<br>Standard<br>Error | 95% Confidence<br>Interval<br>(‘000) |         | DEFT      |
|-------------------------------------------------------|--------------------|-------------------|-------------------------------|--------------------------------------|---------|-----------|
|                                                       | (‘000)             | ( $T_Y$ )         | ( $T_Y$ )                     | Lower                                | Upper   | ( $T_Y$ ) |
| <u>Residents Aged 15 Years &amp; Over</u>             |                    |                   |                               |                                      |         |           |
| Single                                                | 1,035.9            | 8,538             | 0.8                           | 1,019.2                              | 1,052.6 | 1.16      |
| Married                                               | 2,240.0            | 10,382            | 0.5                           | 2,219.7                              | 2,260.4 | 1.10      |
| Widowed                                               | 196.8              | 3,364             | 1.7                           | 190.2                                | 203.4   | 1.03      |
| Divorced/Separated                                    | 152.2              | 3,051             | 2.0                           | 146.2                                | 158.2   | 1.04      |
| <u>Residents Aged 15 Years &amp; Over</u>             |                    |                   |                               |                                      |         |           |
| Christianity                                          | 621.3              | 8,936             | 1.4                           | 603.8                                | 638.8   | 1.56      |
| Buddhism                                              | 1,120.2            | 11,458            | 1.0                           | 1,097.7                              | 1,142.6 | 1.59      |
| Taoism <sup>2</sup>                                   | 266.0              | 6,054             | 2.3                           | 254.1                                | 277.8   | 1.55      |
| Islam                                                 | 543.4              | 9,276             | 1.7                           | 525.2                                | 561.5   | 1.67      |
| Hinduism                                              | 194.2              | 5,837             | 3.0                           | 182.8                                | 205.7   | 1.72      |
| Other Religions                                       | 14.8               | 1,546             | 10.4                          | 11.8                                 | 17.9    | 1.62      |
| No Religion                                           | 865.1              | 9,772             | 1.1                           | 845.9                                | 884.3   | 1.50      |
| <u>Ever-Married Resident Females Aged 40-49 Years</u> |                    |                   |                               |                                      |         |           |
| With No Children Born                                 | 45.3               | 1,740             | 3.8                           | 41.9                                 | 48.8    | 1.06      |
| With 1 Child Born                                     | 71.9               | 2,184             | 3.0                           | 67.6                                 | 76.1    | 1.05      |
| With 2 Children Born                                  | 114.3              | 2,679             | 2.3                           | 109.1                                | 119.6   | 1.00      |
| With 3 Children Born                                  | 36.5               | 1,542             | 4.2                           | 33.5                                 | 39.5    | 1.02      |
| With 4 or More Children Born                          | 14.0               | 950               | 6.8                           | 12.1                                 | 15.8    | 1.02      |

<sup>1</sup> The DEFT is the ratio of the standard error of the estimate, under the sample design used, to that of a simple random sample. This ratio measures the effect of the complexity of the sample design and weighting on the standard error.

<sup>2</sup> Taoism includes Chinese Traditional Beliefs.

**Table A1 Sampling Errors and DEFT of T<sub>y</sub> for Selected Attributes, GHS 2025 (cont'd)**

|                                                                          | Sample<br>Estimate  | Standard<br>Error | Relative<br>Standard<br>Error | 95% Confidence<br>Interval<br>( <sup>'000</sup> ) |         | DEFT              |
|--------------------------------------------------------------------------|---------------------|-------------------|-------------------------------|---------------------------------------------------|---------|-------------------|
|                                                                          | ( <sup>'000</sup> ) | (T <sub>y</sub> ) | (T <sub>y</sub> )             | Lower                                             | Upper   | (T <sub>y</sub> ) |
| <u>Residents<sup>3</sup> Aged 25 Years &amp; Over</u>                    |                     |                   |                               |                                                   |         |                   |
| With Below Secondary                                                     | 660.0               | 6,682             | 1.0                           | 646.9                                             | 673.1   | 1.18              |
| With Secondary                                                           | 467.5               | 5,765             | 1.2                           | 456.2                                             | 478.8   | 1.15              |
| With Post-Secondary (Non-Tertiary)                                       | 328.5               | 4,722             | 1.4                           | 319.2                                             | 337.8   | 1.10              |
| With Diploma and Professional Qualification                              | 540.5               | 5,977             | 1.1                           | 528.7                                             | 552.2   | 1.10              |
| With University                                                          | 1,202.2             | 8,675             | 0.7                           | 1,185.2                                           | 1,219.2 | 1.14              |
| <u>Residents Aged 5 Years &amp; Over<sup>4</sup></u>                     |                     |                   |                               |                                                   |         |                   |
| English Most Frequently Spoken at Home                                   | 2,048.7             | 15,865            | 0.8                           | 2,017.6                                           | 2,079.8 | 1.55              |
| Mandarin Most Frequently Spoken at Home                                  | 937.4               | 11,268            | 1.2                           | 915.3                                             | 959.5   | 1.55              |
| Malay Most Frequently Spoken at Home                                     | 246.0               | 6,693             | 2.7                           | 232.9                                             | 259.1   | 1.68              |
| Tamil Most Frequently Spoken at Home                                     | 76.6                | 3,879             | 5.1                           | 69.0                                              | 84.2    | 1.73              |
| <u>Residents Aged 15 Years &amp; Over</u>                                |                     |                   |                               |                                                   |         |                   |
| Literate in English                                                      | 3,139.4             | 12,942            | 0.4                           | 3,114.0                                           | 3,164.7 | 1.44              |
| Literate in Two or More Languages                                        | 2,808.4             | 13,109            | 0.5                           | 2,782.7                                           | 2,834.1 | 1.36              |
| <u>Employed Residents Aged 15 Years &amp; Over<sup>5</sup></u>           |                     |                   |                               |                                                   |         |                   |
| Travel to Work by Public Bus Only                                        | 303.2               | 4,719             | 1.6                           | 294.0                                             | 312.5   | 1.13              |
| Travel to Work by Rail (MRT/LRT) Only                                    | 372.5               | 5,358             | 1.4                           | 362.0                                             | 383.0   | 1.17              |
| Travel to Work by Rail (MRT/LRT) & Public Bus Only                       | 713.0               | 7,250             | 1.0                           | 698.8                                             | 727.2   | 1.18              |
| Travel to Work by Car Only                                               | 499.0               | 5,973             | 1.2                           | 487.3                                             | 510.7   | 1.12              |
| <u>Residents Aged 5 Years &amp; Over</u>                                 |                     |                   |                               |                                                   |         |                   |
| Unable to Perform/ with A Lot of Difficulty in At Least 1 Basic Activity | 93.6                | 2,571             | 2.7                           | 88.6                                              | 98.7    | 1.09              |
| <u>Resident Households</u>                                               |                     |                   |                               |                                                   |         |                   |
| With 1 Person                                                            | 247.9               | 2,816             | 1.1                           | 242.4                                             | 253.4   | 0.88              |
| With 2 Persons                                                           | 354.2               | 3,504             | 1.0                           | 347.4                                             | 361.1   | 0.97              |
| With 3 Persons                                                           | 335.8               | 4,534             | 1.4                           | 326.9                                             | 344.7   | 1.12              |
| With 4 Persons                                                           | 296.6               | 4,513             | 1.5                           | 287.8                                             | 305.5   | 1.15              |
| With 5 Persons                                                           | 161.6               | 3,553             | 2.2                           | 154.6                                             | 168.5   | 1.19              |
| With 6 or More Persons                                                   | 91.0                | 2,762             | 3.0                           | 85.6                                              | 96.4    | 1.22              |

<sup>3</sup> Data pertain to residents who were not attending educational institutions as full-time students and include those who were upgrading their qualifications through part-time courses.

<sup>4</sup> Data exclude persons who were unable to speak, and those in one-person households and households comprising only unrelated persons.

<sup>5</sup> Data exclude employed persons who were overseas for at least 6 months.

**Table A2 Sampling Errors for Square Root of DEFT Equals 1**

| Size of Estimates | Proportion of Total Population (%) | Standard Error | Relative Standard Error (%) | 95% Confidence Interval |           |
|-------------------|------------------------------------|----------------|-----------------------------|-------------------------|-----------|
|                   |                                    |                |                             | Lower                   | Upper     |
| PERSONS           |                                    |                |                             |                         |           |
| 4,000,000         | 88.49                              | 5,329          | 0.1                         | 3,989,555               | 4,010,445 |
| 3,500,000         | 77.43                              | 6,981          | 0.2                         | 3,486,318               | 3,513,682 |
| 3,000,000         | 66.37                              | 7,889          | 0.3                         | 2,984,538               | 3,015,462 |
| 2,500,000         | 55.31                              | 8,302          | 0.3                         | 2,483,729               | 2,516,271 |
| 2,000,000         | 44.24                              | 8,293          | 0.4                         | 1,983,745               | 2,016,255 |
| 1,500,000         | 33.18                              | 7,863          | 0.5                         | 1,484,589               | 1,515,411 |
| 1,000,000         | 22.12                              | 6,931          | 0.7                         | 986,416                 | 1,013,584 |
| 750,000           | 16.59                              | 6,212          | 0.8                         | 737,825                 | 762,175   |
| 500,000           | 11.06                              | 5,237          | 1.0                         | 489,735                 | 510,265   |
| 250,000           | 5.53                               | 3,817          | 1.5                         | 242,519                 | 257,481   |
| 100,000           | 2.21                               | 2,456          | 2.5                         | 95,186                  | 104,814   |
| 75,000            | 1.66                               | 2,133          | 2.8                         | 70,819                  | 79,181    |
| 50,000            | 1.11                               | 1,746          | 3.5                         | 46,577                  | 53,423    |
| 25,000            | 0.55                               | 1,238          | 5.0                         | 22,573                  | 27,427    |
| 10,000            | 0.22                               | 785            | 7.8                         | 8,462                   | 11,538    |
| 7,500             | 0.17                               | 680            | 9.1                         | 6,168                   | 8,832     |
| 5,000             | 0.11                               | 555            | 11.1                        | 3,912                   | 6,088     |
| 2,500             | 0.06                               | 393            | 15.7                        | 1,731                   | 3,269     |
| 1,000             | 0.02                               | 248            | 24.8                        | 513                     | 1,487     |
| 500               | 0.01                               | 176            | 35.1                        | 156                     | 844       |
| HOUSEHOLDS        |                                    |                |                             |                         |           |
| 1,150,000         | 77.33                              | 3,882          | 0.3                         | 1,142,392               | 1,157,608 |
| 850,000           | 57.16                              | 4,588          | 0.5                         | 841,008                 | 858,992   |
| 550,000           | 36.99                              | 4,476          | 0.8                         | 541,228                 | 558,772   |
| 250,000           | 16.81                              | 3,467          | 1.4                         | 243,204                 | 256,796   |
| 100,000           | 6.72                               | 2,322          | 2.3                         | 95,449                  | 104,551   |
| 75,000            | 5.04                               | 2,029          | 2.7                         | 71,023                  | 78,977    |
| 50,000            | 3.36                               | 1,671          | 3.3                         | 46,724                  | 53,276    |
| 25,000            | 1.68                               | 1,192          | 4.8                         | 22,664                  | 27,336    |
| 10,000            | 0.67                               | 758            | 7.6                         | 8,515                   | 11,485    |
| 7,500             | 0.50                               | 657            | 8.8                         | 6,213                   | 8,787     |
| 5,000             | 0.34                               | 537            | 10.7                        | 3,948                   | 6,052     |
| 2,500             | 0.17                               | 380            | 15.2                        | 1,756                   | 3,244     |
| 1,000             | 0.07                               | 240            | 24.0                        | 529                     | 1,471     |
| 500               | 0.03                               | 170            | 34.0                        | 167                     | 833       |

### **Simple Guide on Using Relative Standard Error and Confidence Interval**

As an illustration, to compute the 95% confidence interval for an estimate of 1,100,000 persons reported in the sample survey,

Step 1: From Table A2, the RSE of this estimate is close to 0.7%

Step 2: To compute 95% confidence interval of the estimate

$$\text{Lower Confidence Interval} = 1,100,000 - 1.96 \times 0.7\% \times 1,100,000 = 1,084,908$$

$$\text{Upper Confidence Interval} = 1,100,000 + 1.96 \times 0.7\% \times 1,100,000 = 1,115,092$$

$$\text{95\% Confidence Interval} = (1,084,908, 1,115,092)$$

i.e. We are 95% confident that the true population value lies between 1,084,908 and 1,115,092.