

Sample Design and Sampling Variability

Sample Design and Selection

The sample for the General Household Survey (GHS) 2015 was selected from a sampling frame comprising all residential dwelling units in Singapore. As the sample survey of the GHS 2015 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 with proportional allocation. Dwelling units in the sampling frame were divided into different groups (or strata). The groups are defined based on the planning areas demarcated by the Urban Redevelopment Authority and broad dwelling type groups. A random sample was then selected proportionally from the different groups by systematic sampling with a random start. The samples selected from each group were combined to form the required sample of 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.

Generalized Sampling Errors Table

From Table A1, the DEFT¹ for most of the selected attributes (T_Y) is about 1. It is impractical to compute and display the sampling error for each and every of the possible estimates such as the total number of elements in the population with a given attribute Y from the GHS 2015. Thus, a generalized sampling errors table is provided instead as a guide to data users for estimating the errors of any 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 2015

	Sample Estimate (‘000)	Standard Error (T_Y)	Relative Standard Error (T_Y)	95% Confidence Interval (‘000)		DEFT (T_Y)
				Lower	Upper	
<u>Residents Aged 15 Years & Over</u>						
Single	1,034.5	7,224	0.7	1,020.4	1,048.7	1.13
Married	1,945.6	8,157	0.4	1,929.7	1,961.6	1.07
Widowed	172.1	2,645	1.5	166.9	177.3	0.91
Divorced/Separated	123.6	2,399	1.9	118.9	128.3	0.96
<u>Residents Aged 15 Years & Over</u>						
Buddhism	1,087.3	9,989	0.9	1,067.7	1,106.9	1.53
Taoism	326.4	6,089	1.9	314.4	338.3	1.54
Christianity	616.1	7,796	1.3	600.8	631.4	1.49
Islam	459.8	8,202	1.8	443.7	475.8	1.78
Hinduism	162.5	4,606	2.8	153.5	171.5	1.62
Other Religions	19.4	1,560	8.0	16.3	22.5	1.56
No Religion	604.5	7,293	1.2	590.2	618.8	1.40
<u>Ever-Married Resident Females Aged 40-49 Years</u>						
With No Children Born	31.5	1,222	3.9	29.1	33.9	0.96
With 1 Child Born	60.6	1,689	2.8	57.3	63.9	0.96
With 2 Children Born	115.2	2,249	2.0	110.8	119.6	0.94
With 3 Children Born	49.0	1,493	3.0	46.1	52.0	0.95
With 4 or More Children Born	15.2	838	5.5	13.6	16.9	0.95

¹ 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 on the standard error.

Table A1 Sampling Errors and DEFT of TY for Selected Attributes, GHS 2015 (cont'd)

	Sample Estimate (‘000)	Standard Error (T _y)	Relative Standard Error (T _y)	95% Confidence Interval (‘000)		DEFT (T _y)
				Lower	Upper	
<u>Residents* Aged 25 Years & Over</u>						
With Below Secondary Qualifications	800.0	6,351	0.8	787.5	812.4	1.09
With Secondary Qualifications	519.2	4,958	1.0	509.4	528.9	1.02
With Post-Secondary (Non-Tertiary) Qualifications	250.5	3,494	1.4	243.6	257.3	1.00
With Diploma and Professional Qualifications	405.5	4,453	1.1	396.7	414.2	1.02
With University Qualifications	775.8	6,637	0.9	762.8	788.8	1.15
<u>Residents Aged 5 Years & Over</u>						
English Most Frequently Spoken at Home	1,303.0	11,661	0.9	1,280.1	1,325.9	1.68
Mandarin Most Frequently Spoken at Home	1,231.9	11,288	0.9	1,209.7	1,254.0	1.66
Malay Most Frequently Spoken at Home	378.7	8,078	2.1	362.8	394.5	1.91
Tamil Most Frequently Spoken at Home	117.1	4,333	3.7	108.6	125.5	1.79
<u>Residents Aged 15 Years & Over</u>						
Literate in English	2,634.3	10,293	0.4	2,614.1	2,654.4	1.36
Literate in Two or More Languages	2,321.6	10,200	0.4	2,301.6	2,341.6	1.33
<u>Resident Working Persons Aged 15 Years & Over</u>						
Travel to Work by Public Bus Only	353.6	4428	1.3	345.0	362.3	1.08
Travel to Work by MRT Only	257.7	3884	1.5	250.1	265.3	1.10
Travel to Work by MRT and Public Bus Only	533.4	5467	1.0	522.7	544.1	1.11
Travel to Work by Car Only	470.0	5024	1.1	460.1	479.8	1.08
<u>Resident Households</u>						
With 1 Person	146.0	2,479	1.7	141.2	150.9	0.96
With 2 Persons	259.2	3,113	1.2	253.1	265.3	0.95
With 3 Persons	256.2	3,104	1.2	250.1	262.3	0.95
With 4 Persons	282.2	3,219	1.1	275.9	288.5	0.95
With 5 Persons	164.0	2,617	1.6	158.9	169.2	0.96
With 6 or More Persons	117.6	2,269	1.9	113.1	122.0	0.97

* Data pertain to residents who are not attending educational institutions as full-time students. The data include those who are upgrading their qualifications through part-time courses while working.

Table A2 Sampling Errors for Square Root of Design Effect (DEFT) Equals 1

Size of Estimates	Proportion of Total Population (%)	Standard Error	Relative Standard Error (%)	95% Confidence Interval	
				Lower	Upper
PERSONS					
4,000,000	87.18	5,086	0.1	3,990,031	4,009,969
3,500,000	76.28	6,471	0.2	3,487,317	3,512,683
3,000,000	65.38	7,237	0.2	2,985,815	3,014,185
2,500,000	54.48	7,575	0.3	2,485,152	2,514,848
2,000,000	43.59	7,543	0.4	1,985,215	2,014,785
1,500,000	32.69	7,136	0.5	1,486,014	1,513,986
1,000,000	21.79	6,280	0.6	987,691	1,012,309
750,000	16.35	5,625	0.8	738,975	761,025
500,000	10.90	4,740	0.9	490,710	509,290
250,000	5.45	3,453	1.4	243,233	256,767
100,000	2.18	2,221	2.2	95,647	104,353
75,000	1.63	1,929	2.6	71,219	78,781
50,000	1.09	1,579	3.2	46,905	53,095
25,000	0.54	1,120	4.5	22,805	27,195
10,000	0.22	709	7.1	8,610	11,390
7,500	0.16	615	8.2	6,296	8,704
5,000	0.11	502	10.0	4,016	5,984
2,500	0.05	355	14.2	1,804	3,196
1,000	0.02	225	22.5	560	1,440
500	0.01	159	31.8	189	811
HOUSEHOLDS					
1,150,000	81.35	3,270	0.3	1,143,592	1,156,408
850,000	60.13	4,110	0.5	841,944	858,056
550,000	38.91	4,092	0.7	541,979	558,021
250,000	17.68	3,203	1.3	243,723	256,277
100,000	7.07	2,152	2.2	95,782	104,218
75,000	5.31	1,881	2.5	71,312	78,688
50,000	3.54	1,550	3.1	46,961	53,039
25,000	1.77	1,106	4.4	22,832	27,168
10,000	0.71	703	7.0	8,621	11,379
7,500	0.53	610	8.1	6,305	8,695
5,000	0.35	498	10.0	4,023	5,977
2,500	0.18	353	14.1	1,809	3,191
1,000	0.07	223	22.3	563	1,437
500	0.04	158	31.6	191	809