Formulas

The asymptotic variance of an MLE estimate $\hat{\theta}$ is $\frac{1}{(nI(\theta_0))}$ where $I(\theta)$ is the Fisher information which can be solved using either of the following:

Define $I(\theta)$ by

$$I(\theta) = E\left[\frac{\partial}{\partial\theta}\log f(X|\theta)\right]^2$$

Under appropriate smoothness conditions on f, $I(\theta)$ may also be expressed as

$$I(\theta) = -E\left[\frac{\partial^2}{\partial\theta^2}\log f(X|\theta)\right]$$

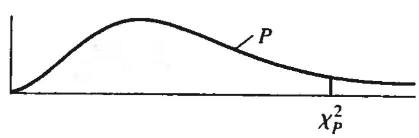
For a simple random sample,

Population Parameter	Estimate	Variance of Estimate	Estimated Variance
μ	$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$	$\sigma_{\overline{X}}^2 = \frac{\sigma^2}{n}\left(\frac{N-n}{N-1}\right)$	$s_{\overline{X}}^2 = \frac{s^2}{n}\left(1 - \frac{n}{N}\right)$
p	$\hat{p}$ = sample proportion	$\sigma_{\hat{p}}^2 = \frac{p(1-p)}{n}\left(\frac{N-n}{N-1}\right)$	$s_{\hat{p}}^2 = \frac{\hat{p}(1-\hat{p})}{n-1}\left(1 - \frac{n}{N}\right)$
τ	$T = N\overline{X}$	$\sigma_T^2 = N^2\sigma_{\overline{X}}^2$	$s_T^2 = N^2 s_{\overline{X}}^2$
σ^2	$\left(1 - \frac{1}{N}\right)s^2$		

TABLE 3.4. Summary of variances for different sampling techniques (ignoring the finite population correction factor).

Sampling method	Variance	Difference
Simple	$\frac{1}{n}\sigma^2$	
		Simple−Proportional $\frac{1}{n}\sum_{j=1}^{J} w_j(\mu_j - \mu)^2$
Proportional	$\frac{1}{n}\sum_{j=1}^{J} w_j\sigma_j^2$	
		Proportional−Optimal $\frac{1}{n}\sum_{j=1}^{J} w_j(\sigma_j - \bar{\sigma})^2$
Optimal	$\frac{1}{n}(\sum_{j=1}^{J} w_j\sigma_j)^2$	

TABLE 3 Percentiles of the χ^2 Distribution—Values of χ_P^2 Corresponding to P



df	$\chi^2_{.005}$	$\chi^2_{.01}$	$\chi^2_{.025}$	$\chi^2_{.05}$	$\chi^2_{.10}$	$\chi^2_{.90}$	$\chi^2_{.95}$	$\chi^2_{.975}$	$\chi^2_{.99}$	$\chi^2_{.995}$
1	.000039	.00016	.00098	.0039	.0158	2.71	3.84	5.02	6.63	7.88
2	.0100	.0201	.0506	.1026	.2107	4.61	5.99	7.38	9.21	10.60
3	.0717	.115	.216	.352	.584	6.25	7.81	9.35	11.34	12.84
4	.207	.297	.484	.711	1.064	7.78	9.49	11.14	13.28	14.86
5	.412	.554	.831	1.15	1.61	9.24	11.07	12.83	15.09	16.75
6	.676	.872	1.24	1.64	2.20	10.64	12.59	14.45	16.81	18.55
7	.989	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09	21.96
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21	25.19