**Noncentral F distribution** (from http://www.math.wm.edu/~leemis/chart/UDR/UDR.html) The shorthand $X \sim$ noncentral F$(n_1, n_2, \delta)$ is used to indicate that the random variable $X$ has the noncentral F distribution with positive integer parameters $n_1$, $n_2$, and positive noncentrality parameter $\delta$. A noncentral F random variable $X$ with parameters $n_1$, $n_2$, and $\delta$ has probability density function

$$f(x) = \sum_{i=0}^{\infty} \frac{\Gamma\left(\frac{2i+n_1+n_2}{2}\right)\left(\frac{n_1}{n_2}\right)^{(2i+n_1)/2} x^{(2i+n_1-2)/2} e^{-\delta/2}\left(\frac{\delta}{2}\right)^i}{\Gamma\left(\frac{n_2}{2}\right)\Gamma\left(\frac{2i+n_1}{2}\right) i!\left(1+\frac{n_1}{n_2}x\right)^{(2i+n_1+n_2)/2}} \qquad x > 0$$

for all $\delta > 0$ and positive integers $n_1$ and $n_2$.

The cumulative distribution, survivor, hazard, cumulative hazard, inverse distribution, moment generating, and characteristic functions on the support of $X$ are mathematically intractable.

The population mean and variance of $X$ are

$$E[X] = \frac{n_2(n_1+\delta)}{n_1(n_2-2)} \qquad n_2 > 2$$

$$V[X] = 2\frac{(n_1+\delta)^2 + (n_1+2\delta)(n_2-2)}{(n_2-2)^2(n_2-4)}\left(\frac{n_2}{n_1}\right)^2 \qquad n_2 > 4.$$