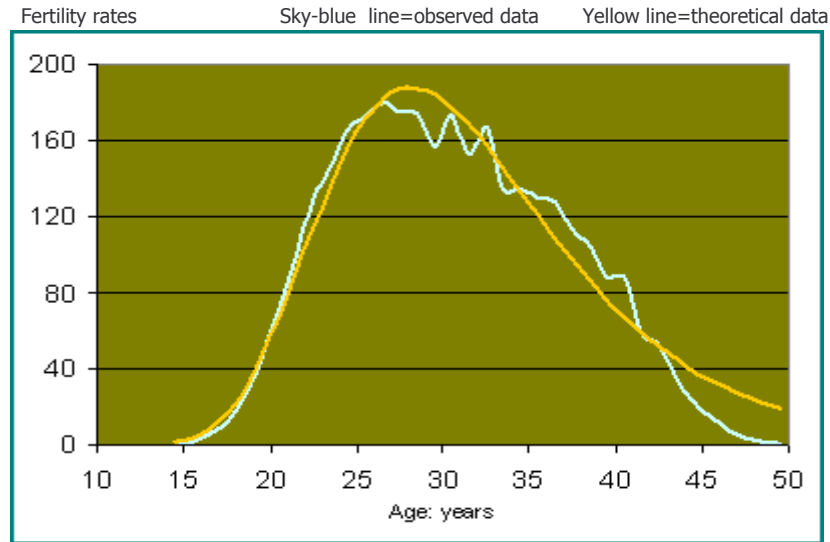


# FERTILITY FUNCTIONS

(Source: Petrioli Luciano, "PRODEMOG 3.0-Demographic software for Windows", EMMECI-SIENA-ITALY,(2000).

## G O M P E R T Z



**Age-specific fertility rates: Italy, year 1932**

The distribution of the Gompertz function is:

$$F(X) = C \cdot A^{B^{(x-TV)}} \quad [1]$$

while the density function is defined by:

$$f(x) = C \cdot \ln(A) \cdot \ln(B) \cdot B^{(x-TV)} \cdot A^{B^{(x-TV)}} \quad [2]$$

where A, B, and C represent the parameters of the distribution. In particular, the value of C should be equal to the total theoretic reproduction; but in the program it is indicated, in general, by the total observed reproduction rate.

Mean and variance (indicated by its numeric value equivalent to 0.577215, the constant of Euler) are:

$$MED = TV - [\ln(\ln(1/A)) + 0.577215] / \ln(B) \quad [3]$$

$$DS = \left[ -\pi / (\ln B \sqrt{6}) \right]^2$$

from which the values of parameters A and B are:

$$A = 1 / \left[ e^{e^{-(MED-TV) \cdot \ln B - 0.577215}} \right]; \quad B = e^{-\pi / \sqrt{6DS}} \quad [4]$$

having indicated TV as the transformation variable which, in the applications for the fertility distributions (at least for those observed), it is convenient to make it equal to 24.