

Life Tables

x	l_x	d_x	p_x	q_x	e_x	\dot{e}_x
30	1000	300	0.7	0.3		
31	700					

Life table symbols:

- Age = x
- Number of living persons at age $x = l_x$

- Number of deaths between age x and $x+1 = d_x$
- Probability that a person at age x survives one year $= p_x$

- Probability that a person dies between age x and $x+1 = q_x$
- Curtate expectation of life = e_x
- Complete expectation of life = \dot{e}_x

Life table formulas

- Number of deaths between ages x and $x+1$

$$d_x = l_x - l_{x+1}$$

- Number of living persons at age x

$$l_x = d_x + l_{x+1}$$

- Probability that a person aged x will live the next year to attain the age $x+1$

$$p_x = l_{x+1} / l_x$$

Note: $p_x + q_x = 1$

- Probability the a person aged x will die between ages x and $x+1$

$$q_x = d_x / l_x = (l_x - l_{x+1}) / l_x$$

- The curtate expectation of life of (x)

$$e_x = (l_{x+1}) + (l_{x+2}) + (l_{x+3}) + \dots / l_x$$

- The complete expectation of life of x

$$\dot{e}_x = e_x + 1/2$$

- Probability that a person aged x will live to reach $x+n$

$${}_np_x = l_{x+n} / l_x$$

- Probability that a person aged x will die during the next n years

$${}_nq_x = (l_x - l_{x+n}) / l_x$$

- Probability that a person aged x will die between ages $x+m$ and $x+m+n$

$${}_m/nq_x = (l_{x+m} - l_{x+m+n}) / l_x$$