Get every one in the picture

Summary measures of mortality

– Using life tables

Data analysis and Report writing workshop for Civil registration and vital statistics data.

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

Adapted from Pacific Community's Data analysis and report writing Workshop for the North Pacific

Calculating abridged life tables

Age interval	Years in interval	Linearity Adjust-ment	Reported pop/ births	Adjusted deaths	Mortality rate	Probability of dying	Probability of surviving	Pop surviving (expected)	Deaths (expected)	Years lived in interval	Cumulative yrs lived in interval	LE: Life Expectancy
(years)	n_x	a_x	N_x	$d_{(adj)}$	m_x	q_x	p_x	l_x	d_x	L_x	T_x	e_x
<1	1	0.1	141158	678.1	0.00480	0.00478	0.99522	100000	478	99570	7828154	78.28
1-4	4	0.5	531025	153.0	0.00029	0.00115	0.99885	99522	115	397858	7728585	77.66
5-9	5	0.5	687357	88.0	0.00013	0.00064	0.99936	99407	64	496876	7330727	73.74
10-14	5	0.5	719258	86.0	0.00012	0.00060	0.99940	99343	59	496569	6833851	68.79
15-19	5	0.5	726266	446.0	0.00061	0.00307	0.99693	99284	304	495659	6337282	63.83
20-24	5	0.5	747927	621.1	0.00083	0.00414	0.99586	98980	410	493873	5841623	59.02
25-29	5	0.5	708376	695.1	0.00098	0.00489	0.99511	98570	482	491642	5347750	54.25
30-34	5	0.5	743386	799.1	0.00107	0.00536	0.99464	98087	526	489121	4856108	49.51
35-39	5	0.5	759543	957.1	0.00126	0.00628	0.99372	97561	613	486275	4366987	44.76
40-44	5	0.5	762579	1344.1	0.00176	0.00877	0.99123	96949	851	482616	3880712	40.03
45-49	5	0.5	741136	1788.2	0.00241	0.01199	0.98801	96098	1152	477609	3398096	35.36
50-54	5	0.5	679033	2250.2	0.00331	0.01643	0.98357	94946	1560	470827	2920487	30.76
55-59	5	0.5	636723	3393.3	0.00533	0.02630	0.97370	93385	2456	460787	2449660	26.23
60-64	5	0.5	496072	4223.4	0.00851	0.04168	0.95832	90930	3790	445173	1988872	21.87
65-69	5	0.5	385226	5691.6	0.01477	0.07124	0.92876	87140	6208	420178	1543699	17.72
70-74	5	0.5	302778	8290.8	0.02738	0.12814	0.87186	80932	10371	378731	1123522	13.88
75-79	5	0.5	252158	11004.1	0.04364	0.19674	0.80326	70561	13882	318100	744791	10.56
80-84	5	0.5	166000	11358.2	0.06842	0.29214	0.70786	56679	16558	242000	426691	7.53
≥85	14	0.5	104337	14453.5	0.13853	1.00000	0.00000	40121	40121	184691	184691	4.60

Life expectancy at 40

- Key indicator of premature adult mortality
- can be read directly from a life table if it has been set up using 5 year age intervals.
- If the life table uses ten year age groups, then LE 40 must be calculated by averaging life expectancy at 35 and 45.

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Probability of surviving to age 40

- Important in the calculation of the Human Development Index.

- Calculated by l_{40} or the number of survivors in our theoretical cohort at age 40 divided by the radix, or the original size of the cohort.
- l_{40}/l_0

Calculating abridged life tables

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Child and adult mortality

- ${}_5q_0$ – probability of dying from 0 years of age to 5 years
- ${}_{45}q_{15}$ – probability of dying between age 15 and 60 years (15+45 years)

- Add the years from right to left
- Consistent for all measures

Adult mortality $_{45}q_{15}$

- Measure of the impact of premature adult mortality.
- It is the probability of dying between the ages of 15 and 60
- The total deaths in the theoretical cohort (not the real numbers of deaths in each age group) are added together and divided by the number of people who were alive at age 15.
- $_{45}q_{15} = {}_{45}d_{15} / l_{15}$

Adult mortality

$_{45}q_{15} = {}_{45}d_{15} / l_{15}$

The deaths from ages 15 to 60 can be calculated by adding the cells for each age group in this interval.

In the table shown: our calculation would look like:

$$_{45}q_{15} = \frac{(304 + 410 + 482 + 526 + 613 + 851 + 1152 + 1160 + 2456)}{99284} = 0.084$$

For every 1,000 men alive at age 15 years, 84 will die before reaching their 60th birthday

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Infant mortality

- Infant and child mortality are both measures of probability that can be estimated from a life table
- To calculate the IMR,
  - the life table must have 0-1 age group
  - probability of dying or ${}_1q_0$ is read directly off the table
  - multiplied by 1,000 in order to report the figure per 1,000 live births. IMR = 4.78

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Under 5 mortality

To calculate U5M

- ${}_5d_0$ = theoretical deaths in these age groups under 5/ divided by the radix
- = $({}_1d_0 + {}_4d_1)$ /100,000

(478+115)/100,000 per 1,000 = 5.93

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Years of Life Lost (YLL)

- This is a measure of the time lost to early deaths in comparison to an “expected norm”.
- calculated by adding up for each age group:
  - the real deaths (d) in the age group multiplied by (the standard life expectancy minus the calculated life expectancy for each age group).
- The choice the standard is usually
  - a comparison population considered to have the “best possible” life expectancy (Japanese usually used for this standard). or
  - a theoretical “potential limit to life”

When using measures from life tables

- Consider and comment on their plausibility
- How do these compare with other data sources such as a census?
- Why might these estimates be different?
- What is happening in terms of trend?

Lab 2: Using the life table

- What is life expectancy at birth for males and females?
  - How does this compare?
  - Are the results plausible i.e. females < males?
- What is life expectancy at age 40?
- Adult mortality – what is the probability of dying between the ages of 15 and 60?
- What is the IMR from the life table? (Note you will have to make a table with both sexes combined to get a total IMR)
- What is the under 5 mortality rate from the life table?
- Repeat the analysis for your country data. Graph life expectancies (each sex on separate graphs) compared to results from other sources such as the census over time.
  - What is happening to life expectancy?
  - Are you results plausible compared to other sources?
  - How does IMR and U5M compare to your direct calculations? Why are they different?