Radiol Oncol 2006; 40(2): 115-24.

Complete yearly life tables by sex for Slovenia, 1982-2004, and their use in public health

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Life tables are an important tool in statistical analysis in many branches of science including public health and epidemiology. In Slovenia, they are recently mostly used in relative survival analyses. For this purpose, we need complete period life tables for each calendar year. Since such life tables have not been available for Slovenia, we calculated our own life tables for years in 1982-2004, stratified by sex. In the article we describe the methodology used for calculation and present some examples on the use of these life tables. The complete life tables are freely available by contacting register@onko-i.si or through the international Human Life-Table Database (http://www.lifetable.de/). We intend to produce life tables for following years as soon the necessary data will be available.

Key words: public health; life tables; survival analysis

Introduction

Life tables are the oldest demographic tool and still among the most important instruments for mortality analysis and other investigations concerning the length of life.[1] As suggested by some classical papers, already in Babylonian civilization individuals understood the idea of likelihood of death assessment.[2] First simple life tables were composed by the roman perfect Domitius Ulpianus in the third century. His technique of life table calculation was in use in the northern Italy till 1814.[2] English insurer Milne computed first totally regular life tables for the period 1779-1787.[3] In Slovenia this spadework was performed by dr. Ivo Lah who computed the life tables for Drava province for the years 1931-1933.[4] After the Second World War, life tables were produced by Yugoslavian and Slovenian statistical office. Today the life tables are used for statistical analysis in numerous branches of science as: demography, insurance, judiciary, public administration, public health, epidemiology, biology and other.[5]

Various forms of life tables are known. According to the age groups used they are divided into complete and abridged life tables.[6] The first are calculated for one-year age groups, from the age of zero to the last

Received 25 April 2006
Accepted 30 May 2006

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defined age. On the contrary, the abbreviated life table combines several years, as they presume the mortality rates in adjacent age groups are similar.[7] The second classification is distinguishing between cohort and period life table.[6] During the preparation of cohort life table a selected cohort is followed from its first birth till its last death. The procedure is very time consuming, and on the other hand, such data are rarely available, so cohort life tables are mostly produced for historical purposes. Instead of following one cohort life-long, we model what would happen to a hypothetical cohort if a certain set of mortality conditions pertained throughout its life in period life table. There are many additional forms of life tables, as exact and approximate life tables, adjusted and unadjusted life tables or life tables for population and subpopulations (by gender, occupation, social status etc.).[6]

This paper is focusing on the complete period life tables for the population of the Republic of Slovenia for each year from 1982 to 2004. Currently, the complete period life tables are available for four three-year periods only: 1980-1982, 1990-1992, 1993-1995 [5] and 2000-2002.[8] In addition, there are abbreviated life tables (five-year age groups) for all two-year periods between 1981 and 2001.[5,9] All these life tables were prepared by the Statistical Office of the Republic of Slovenia (SORS). They combine several years, as the Slovenian population is rather small, hence the probability of dying in certain age group tends to fluctuate. For the same reason SORS's life tables are adjusted as well.[5] Further on, World Health Organization published the abbreviated gender stratified life tables for Slovenia for years 2000 and 2001 separately.[10]

In public health, especially for the purpose of relative survival analysis, complete, unadjusted and gender specific life tables for single year are needed. These life tables cannot be used to evaluate the demographic attributes of Slovenian population, but only to compare a group of patients with their origin population. Therefore the exact probability of dying is required in relative survival analysis. For this purpose the complete, unadjusted and gender specific period life tables for Slovenia for each year in the period 1982-2004 were prepared in our study. The methodology applied is identical for all the tables provided, which makes them intercomparable.

Material and methods

The data needed for calculating the life tables were obtained from SORS:

- aggregated number of deaths by age, sex, year of birth and year of death for deaths in period 1982-2004 and
- aggregated number of residents by age and sex at the beginning of each year in period 1982-2004.

Information regarding data collection and population definition is published in Statistical Yearbook of the Republic of Slovenia by SORS.[11]

Probability of dying (q_x) is the basic indicator for mortality of population. This is conditional probability for person aged x years at the beginning of the year to die during the year conditionally on surviving x years in the first place. Probability of dying for age x is calculated as the ratio between the number of people that died during the observed calendar year and were aged x at the beginning of the year and the number of all living aged x at the beginning of the same calendar year.[7,12] Probability of dying is always one for selected highest age interval, which is hundred years and more in our case.

All the other variables in life tables are calculated from the probability of dying. Standard methods and notations were used

that are well known and easily found in literature [2,6,7,13], so they will not be explained here, but listed only. The notations used in life tables are given in brackets after the name of the variable.

Probability of surviving (p_x) is the probability of a person aged x years to survive exact age x+1. The number of persons surviving (l_x) is the number of persons who reach age x out of 100,000 live births. The number of deaths (d_x) is the annual number of deaths between ages x and x+1. The number of person–years (L_x) is the number of persons alive at any point in time between ages x and x+1. The total number of person–years (T_x) is the total number of years lived from age x to death. Life expectancy (e_x) is the average number of years a person aged x years can expect to live assuming that mortality rates by age will remain unchanged since the year of observation. Life expectancy at birth (e_0) is the mean age at death for persons dying in any particular year and is the most important indicator for population mortality.[1]

Probability of dying, probability of surviving, number of persons surviving and number of deaths are frequency (or intensity) measures since they show frequencies of events (deaths or survival). They are all defined within elementary age interval [x, x+1). Number of person–years, total number of person–years and life expectancy at birth are duration measures since they show amounts of lifetime and are measured in person-years.[13]

Results

The results of our calculations are complete, unadjusted and gender specific period life tables for Slovenia for each calendar year in the period 1982-2004. We calculated life tables separately for men and women, as generally there is significant difference in mortality by sex.[7] As an example, there are life tables for men and women for calendar year 2004 in Appendix. The life tables for all calendar years are freely available by contacting register@onko-i.si. Since our methodology is consistent with the methodology of Human Life-Table Database[13], our life tables are also included in their database available on Internet (http://www.lifetable.de/). We intend to produce life tables for following years as soon as we get the necessary data.

When calculating life table, special caution should be given to the age group zero years. In order to illustrate this problem we take a closer look at the year 2004. As there are no data on the number of residents at the beginning of 2004 available, we use instead the number of residents on December 31, 2003, published in the Statistical Yearbook of the Republic of Slovenia 2004.[11] However, newborns born for example in April 2004 and died in May 2004 are not accounted for in this report and have to be added extra in the denominator when calculating probability of dying for age group zero years. Data on newborns provided by Institute of Public Health of the Republic of Slovenia (IPH) cannot be applied in life table analysis since IPH has different population definition - only the number of babies born to Slovenian mothers in the territory of the Republic of Slovenia is reported by IPH. [14] However, in the SORS database the number of children aged zero to one year also includes all emigrant newborn babies and those who were born to Slovenian mothers abroad.[11] The difference is about 300 (or about two percent) newborn children each year.

Demographic data by age, year of birth and year of death are properly presented on Lexis diagram [15]. A cut out from Lexis diagram for males in 2004 is presented on Figure 1. We can see that there were 8909 males aged less than one year out of which 30 newborns were born in 2004 and also died in 2004. Additionally, 2 children were

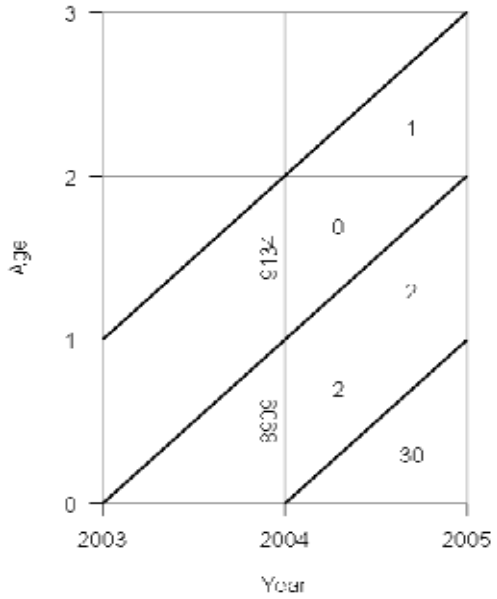

Figure 1. Lexis diagram with data on alive and deceased for males by age, year of birth and year of death.

born in 2003 and died in 2004 still aged zero years. However, 2 children of those born in 2003 had a birthday before their death. From this data we can calculate probability of dying for 2004 for children aged zero years as $q_0 = (30+2+2)/8909 = 0.003816$. From data on Figure 1 we can also calculate probability of dying for children aged one year as $q_1 = (0+1)/9134 = 0.000109$.

For general public, the most interesting function is life expectancy. It is also the most important indicator for population mortality[1] and is consequently the population health estimation. On Figure 2, one can observe how life expectancy is improving with time in Slovenia. Moreover, one can observe how the difference between men and women gets smaller with age.

Discussion

The methodology of life tables computation and their reliability

The important advantage of our life tables is the precision of data applied in their calculation. In the Republic of Slovenia birth and death certificates are automatically gathered in the Government Centre for Informatics database in digital form, so complete and updated birth and death dates are available for every period.[16]

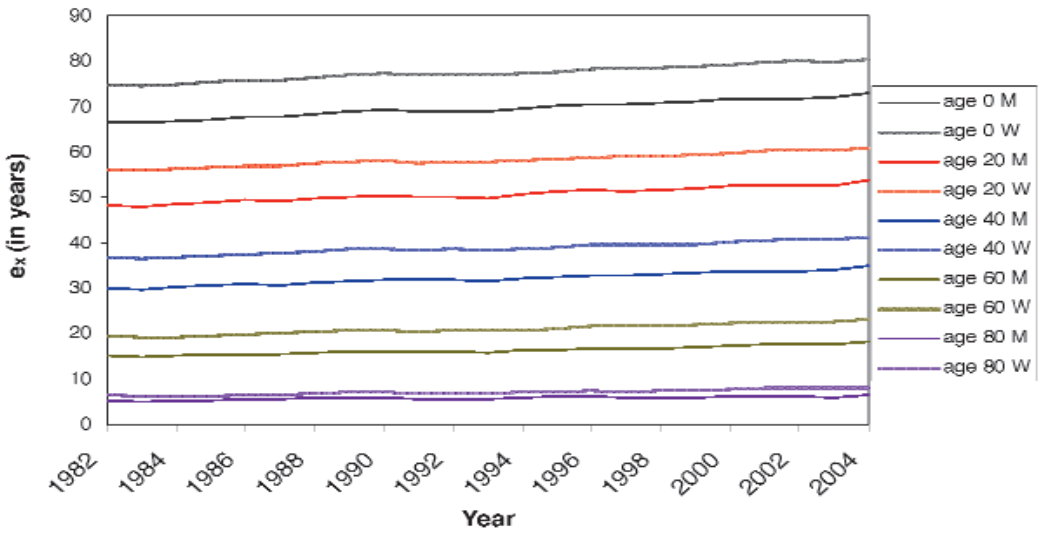

Figure 2. Life expectancy in years for selected age groups by sex (M stands for men and W stands for women), Slovenia 1982-2004.

It is of special importance to pay attention on population definitions, which are not consistent in Slovenian official statistics over different databases or time periods. By comparing the IPH and SORS population definitions, one of such inconsistencies has already been mentioned regarding newborns. Moreover, the SORS population definition by itself is inconsistent across different time periods. It was changed after the Republic of Slovenia's independence; since June 30, 1995 population data are reported according to the new definition.[11]

Data quality and complete understanding of their definitions are of major importance in all medical investigations. One of the essentials is to assure maximal feasible coherency among medical (patients) and official (population) data. Errors or discordances of official data cannot be abolished, however it is possible to adjust the analysis and minimize the possible biases by applying the adequate methodology.

The application of life tables in public health

From public health point of view life tables are basic tool for population health estimation. World Health Organization is preparing life tables for each of its state members and uses them for the major health indicator computation (e.g. health life expectancy – HALE). Life tables are indispensable also in most cost-benefit analyses, as the assessment of the effectiveness of screening programmes or some other public health interventions.

In addition to above mentioned fundamental public health research, life tables are an essential component in relative survival analysis. The relative survival analysis is not applied frequently in Slovenia. The unavailability of life tables in a proper format is certainly one of the main reasons for that. Only SORS's life tables were available until now for calculation of relative survival of cancer patients in Slovenia.[17,18] In these analyses the same life tables were used for several years. Data on Slovenian cancer patients are included in the second and in the third European study of cancer patient's survival EUROCARE.[19,20] In the EUROCARE project some census data were used for the interpolation of SORS's abbreviated life tables. Moreover, in the field of relative survival methodology, Slovenian authors recently developed a unique statistical approach and illustrated it by the investigation of survival in a myocardial infarction patient cohort.[21,22] Life tables are also required in public health studies evaluating years of potential life lost. Such studies gained on its applicability in Slovenia recently.[23,24] We believe that annual releases of life tables in applicable format will smooth the way for public health investigations in the future.

Cancer survival data provide comprehensive and complex measure of cancer burden in the observed population. They reflect the impact of all measures in cancer control programmes, from mass screening to treatment, follow-up and rehabilitation of cancer patients. There are several options and methods of the survival rates calculation. Observed and relative survival rates are the two fundamental forms. The observed survival indicates the actual mortality in a patient group. The causes of death other than cancer may differ from group to group and depend on cancer site, patient's age, sex, socio-economic position and the health care provided. Thus younger patients usually live longer in comparison with older patients with the same cancer or on the contrary survival of patients with certain cancers is short regardless of their age at diagnosis.[18]

Death notification in Slovenia is precisely prescribed. Rule of the coroner's inquests (Official Gazette of RS, No. 56/93 - 25) strictly defines among other also coroner's duties with documentation structure and its arrangement. Data protection laws are

implemented in the rule as well. In spite of all the efforts, death certificate data are often inaccurate as the primary cause of death is often indeterminable. Primic Žakelj with co-authors investigated the accuracy of official causes of death in a cohort of cervical cancer patients between 1985 and 1999. They concluded that the official Slovenian mortality rate of cervical cancer is underestimated for more than 25%.[26] Obviously the cause specific observed survival rate would be underestimated in that example as well. In this case, the relative survival analysis, which takes into account only dates of death and no causes of death, will lead us to more adequate result.

Because of strict personal data protection laws, collection of vital status or date of death data is very limited for individual investigators in Slovenia. Consequently, a simultaneous linkage between population diseases registries and Central Population Registry of Slovenia for patient's vital status update is of special importance and is protected by law.[27]

Relative survival analysis provides rather unbiased estimation of population disease burden even if the cause of death is unavailable. Anyway, relative survival is not applicable in all occasions. Observed survival should still be used as a golden standard in all clinical studies as they deal with selected population which characteristics are not necessary in accordance with general population attributes. An application of population life tables would in such a case bias the results. That is why relative survival analyses are limited to population studies and apply data from population based disease registries.

In relative survival analysis the disease unrelated death risks are removed by the usage of population life tables.[28] These tables are based on official mortality data stratified by age and sex, so only these two diseases unrelated death risks can be omitted by the relative survival analysis in Slovenia. If the influence of some other demographic characteristic on survival rates is supposed to be of practical importance, the life tables applied in relative survival analysis should be stratified by this attribute. Life tables stratified by socio-economic status are available in Finland.[29] A relative survival analysis was performed by Finish investigators to examine the influence of social class on the survival of cancer patient cohort. In comparison with observed or cause specific survival, relative survival adjusted to social class gave the most adequate results.

Laura M. Woods with co-authors [30] confirmed that geographical patterns of life expectancy identified for England and Wales in 1998 are mainly attributable to variations in deprivation status. Life expectancy is highest in most affluent groups with clear north-south gradient. For conducting this analysis they first had to construct life tables describing age specific mortality rates and life expectancy at birth for (a) quintiles if income deprivation, (b) each government office region and (c) every combination of deprivation index and geography.

Medical example

To understand the implications of relative survival techniques we look at the results of a study of survival of patients after myocardial infarction.[21] Having taken into account the age and calendar year, the observed survival after infarction does not differ significantly ($p = 0.15$) with respect to sex (Figure 3).

However, the problem of this study is that we do not have information on cause of death (a common situation in all the long term studies) and we are forced to consider all deaths as events. But as the observed group was on average 62 years old at diagnosis, we can expect that many of these deaths we-

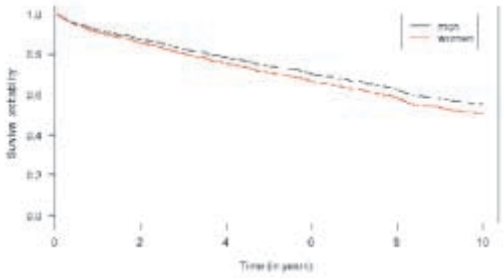

Figure 3. Observed survival by sex, adjusted for age and calendar year (age 62, year 1984).

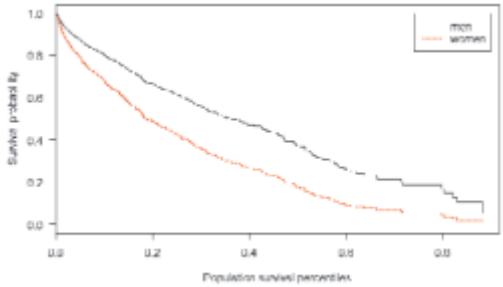

Figure 4. Relative survival by sex, adjusted for age and calendar year (age 62, year 1984)

re not necessarily due to infarction. When considering all deaths as events, we will thus always notice a strong effect of age, regardless whether the age is connected with the disease in question or not. The same is true for the year of diagnosis. As the population survival is constantly improving, this will be reflected in any long term study that doesn't have information on cause of death.

The relative survival comes as a solution whenever we wish to get information on the specific disease risk of a variable that has a known effect on the population risks. In our myocardial infarction study, sex is such an example. While men and women have an equal observed survival, the population hazards tell us that the women of this age should actually do much better, and we can therefore conclude that the mortality after infarction is connected with sex. The results of the relative survival are shown on Figure 4. We can see that sex (taking into account age and year) is strongly significant ($p < 0{,}001$). We can conclude that the hazard of dying of infarction related causes are much larger for women than for men (the hazard ratio is 1.77).

Conclusion

Slovenia is comparable to Scandinavian countries by its register orientation.[16] Population and mortality data are up to date thanks to its electronical collection in Central Register of Population so we don't have to wait for yearbooks to obtain necessary data for calculating life tables.

We calculated life tables presented exclusively for needs of relative survival analyses. In order to promote this and other already mentioned statistical analyses in public health where life tables are an essential tool, we have presented them in this article and put them available for public use. The warning should be given at this point for all potential users of our life tables. They contain crude probability of dying and so they require some adjustment regarding the purpose of use. For example smoothing of crude probability of dying is needed for demographic use.[5,6] If needed, one can also calculate abbreviated life tables or tables for several years combined from our exact life tables.

In very specific medical research separate life tables for occupational (social status, religious etc.) groups would be useful. However, such data are not collected at population level, as registering them is very costly and laborious.

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Appendix

Table 1. Complete life table for men, Slovenia 2004

x	q_x	l_x	d_x	L_x	T_x	e_x
0	0,003816	100000, 0	381, 6	99675, 6	7302946, 1	73, 03
1	0,000109	99618, 4	10, 9	99612, 9	7203270, 5	72, 31
2	0,000544	99607, 5	54, 2	99580, 4	7103657, 6	71, 32
3	0,000315	99553, 3	31, 3	99537, 6	7004077, 2	70, 36
4	0,000109	99521, 9	10, 9	99516, 5	6904539, 7	69, 38
5	0,000213	99511, 0	21, 2	99500, 4	6805023, 2	68, 38
6	0,000211	99489, 9	21, 0	99479, 3	6705522, 7	67, 40
7	0,000101	99468, 8	10, 1	99463, 8	6606043, 4	66, 41
8	0,000102	99458, 8	10, 1	99453, 7	6506579, 6	65, 42
9	0,000099	99448, 6	9, 9	99443, 7	6407125, 9	64, 43
10	0,000097	99438, 8	9, 7	99433, 9	6307682, 2	63, 43
11	0,000096	99429, 1	9, 5	99424, 3	6208248, 3	62, 44
12	0,000000	99419, 6	0, 0	99419, 6	6108823, 9	61, 44
13	0,000349	99419, 6	34, 7	99402, 2	6009404, 3	60, 44
14	0,000580	99384, 9	57, 7	99356, 0	5910002, 1	59, 47
15	0,000230	99327, 2	22, 9	99315, 8	5810646, 1	58, 50
16	0,000383	99304, 4	38, 1	99285, 3	5711330, 3	57, 51
17	0,001092	99266, 3	108, 4	99212, 1	5612045, 0	56, 54
18	0,001049	99157, 8	104, 0	99105, 8	5512832, 9	55, 60
19	0,001036	99053, 8	102, 6	99002, 5	5413727, 1	54, 65
20	0,000647	98951, 2	64, 0	98919, 2	5314724, 6	53, 71
21	0,001365	98887, 2	135, 0	98819, 6	5215805, 4	52, 75
22	0,001368	98752, 1	135, 1	98684, 6	5116985, 8	51, 82
23	0,001417	98617, 0	139, 7	98547, 2	5018301, 2	50, 89
24	0,000875	98477, 3	86, 2	98434, 2	4919754, 0	49, 96
25	0,000997	98391, 1	98, 1	98342, 1	4821319, 8	49, 00
26	0,000765	98293, 0	75, 2	98255, 4	4722977, 7	48, 05
27	0,001263	98217, 8	124, 0	98155, 8	4624722, 3	47, 09
28	0,001298	98093, 8	127, 3	98030, 2	4526566, 5	46, 15
29	0,000787	97966, 5	77, 1	97928, 0	4428536, 4	45, 20
30	0,001054	97889, 4	103, 2	97837, 8	4330608, 4	44, 24
31	0,000931	97786, 2	91, 1	97740, 7	4232770, 6	43, 29
32	0,001154	97695, 2	112, 8	97638, 8	4135029, 9	42, 33
33	0,001143	97582, 4	111, 5	97526, 6	4037391, 1	41, 37
34	0,000826	97470, 9	80, 5	97430, 6	3939864, 5	40, 42
35	0,000937	97390, 3	91, 3	97344, 7	3842433, 9	39, 45
36	0,001588	97299, 1	154, 5	97221, 8	3745089, 2	38, 49
37	0,001985	97144, 5	192, 9	97048, 1	3647867, 4	37, 55
38	0,002633	96951, 7	255, 3	96824, 1	3550819, 3	36, 62
39	0,002317	96696, 4	224, 0	96584, 4	3453995, 2	35, 72
40	0,002168	96472, 4	209, 2	96367, 8	3357410, 8	34, 80
41	0,002697	96263, 2	259, 6	96133, 5	3261043, 0	33, 88
42	0,003833	96003, 7	368, 0	95819, 7	3164909, 5	32, 97
43	0,003811	95635, 6	364, 5	95453, 4	3069089, 9	32, 09
44	0,003573	95271, 2	340, 4	95101, 0	2973636, 5	31, 21
45	0,003497	94930, 8	332, 0	94764, 8	2878535, 5	30, 32
46	0,005372	94598, 8	508, 2	94344, 7	2783770, 7	29, 43
47	0,005003	94090, 6	470, 8	93855, 2	2689426, 0	28, 58
48	0,005701	93619, 9	533, 8	93353, 0	2595570, 7	27, 72
49	0,006444	93086, 1	599, 9	92786, 2	2502217, 8	26, 88
50	0,005466	92486, 2	505, 6	92233, 5	2409431, 6	26, 05
51	0,006952	91980, 7	639, 4	91661, 0	2317198, 1	25, 19
52	0,009189	91341, 3	839, 4	90921, 6	2225537, 2	24, 37
53	0,008580	90501, 9	776, 5	90113, 6	2134615, 6	23, 59
54	0,008780	89725, 4	787, 8	89331, 5	2044502, 0	22, 79
55	0,010874	88937, 6	967, 1	88454, 0	1955170, 5	21, 98
56	0,011733	87970, 5	1032, 2	87454, 4	1866716, 4	21, 22
57	0,012437	86938, 3	1081, 2	86397, 7	1779262, 0	20, 47
58	0,013764	85857, 1	1181, 8	85266, 2	1692864, 3	19, 72
59	0,014149	84675, 3	1198, 0	84076, 3	1607598, 1	18, 99
60	0,012695	83477, 3	1059, 7	82947, 4	1523521, 8	18, 25
61	0,016026	82417, 6	1320, 8	81757, 1	1440574, 4	17, 48
62	0,018685	81096, 7	1515, 3	80339, 1	1358817, 2	16, 76
63	0,020545	79581, 4	1635, 0	78763, 9	1278478, 1	16, 07
64	0,020086	77946, 5	1565, 7	77163, 6	1199714, 2	15, 39
65	0,022566	76380, 8	1723, 6	75519, 0	1122550, 6	14, 70
66	0,026644	74657, 2	1989, 2	73662, 6	1047031, 6	14, 02
67	0,026450	72668, 1	1922, 1	71707, 0	973368, 9	13, 39
68	0,029052	70746, 0	2055, 3	69718, 3	901661, 9	12, 75
69	0,031774	68690, 7	2182, 6	67599, 4	831943, 6	12, 11
70	0,039502	66508, 1	2627, 2	65194, 5	764344, 2	11, 49
71	0,040692	63880, 9	2599, 4	62581, 2	699149, 7	10, 94
72	0,047181	61281, 4	2891, 3	59835, 8	636568, 5	10, 39
73	0,044080	58390, 1	2573, 8	57103, 2	576732, 7	9, 88
74	0,053367	55816, 3	2978, 8	54326, 9	519629, 5	9, 31
75	0,057874	52837, 5	3057, 9	51308, 6	465302, 6	8, 81
76	0,065789	49779, 6	3275, 0	48142, 1	413994, 0	8, 32
77	0,076589	46504, 6	3561, 8	44723, 8	365851, 9	7, 87
78	0,071369	42942, 9	3064, 8	41410, 5	321128, 1	7, 48
79	0,087725	39878, 1	3498, 3	38128, 9	279717, 6	7, 01
80	0,090664	36379, 8	3298, 3	34730, 6	241588, 7	6, 64
81	0,102819	33081, 5	3401, 4	31380, 7	206858, 1	6, 25
82	0,100904	29680, 0	2994, 8	28182, 6	175477, 3	5, 91
83	0,125664	26685, 2	3353, 4	25008, 5	147294, 7	5, 52
84	0,128308	23331, 9	2993, 7	21835, 0	122286, 2	5, 24
85	0,122419	20338, 2	2489, 8	19093, 3	100451, 1	4, 94
86	0,153310	17848, 4	2736, 3	16480, 2	81357, 8	4, 56
87	0,135827	15112, 1	2052, 6	14085, 8	64877, 6	4, 29
88	0,161417	13059, 4	2108, 0	12005, 4	50791, 8	3, 89
89	0,202786	10951, 4	2220, 8	9841, 0	38786, 4	3, 54
90	0,216891	8730, 6	1893, 6	7783, 8	28945, 4	3, 32
91	0,257732	6837, 0	1762, 1	5956, 0	21161, 5	3, 10
92	0,238411	5074, 9	1209, 9	4470, 0	15205, 6	3, 00
93	0,289340	3865, 0	1118, 3	3305, 9	10735, 6	2, 78
94	0,262411	2746, 7	720, 8	2386, 3	7429, 8	2, 70
95	0,276316	2025, 9	559, 8	1746, 0	5043, 4	2, 49
96	0,254545	1466, 1	373, 2	1279, 5	3297, 4	2, 25
97	0,343750	1092, 9	375, 7	905, 1	2017, 9	1, 85
98	0,411765	717, 2	295, 3	569, 6	1112, 8	1, 55
99	0,437500	421, 9	184, 6	329, 6	543, 2	1, 29
100+	1,000000	237, 3	237, 3	213, 6	213, 6	0, 90

Table 2. Complete life table for women, Slovenia 2004

x	q_x	l_x	d_x	L_x	T_x	e_x
0	0,004193	100000, 0	419, 3	99643, 6	8026359, 0	80, 26
1	0,000116	99580, 7	11, 5	99574, 9	7926715, 4	79, 60
2	0,000233	99569, 2	23, 2	99557, 6	7827140, 5	78, 61
3	0,000112	99546, 0	11, 1	99540, 4	7727583, 0	77, 63
4	0,000000	99534, 9	0, 0	99534, 9	7628042, 5	76, 64
5	0,000000	99534, 9	0, 0	99534, 9	7528507, 7	75, 64
6	0,000223	99534, 9	22, 2	99523, 8	7428972, 8	74, 64
7	0,000108	99512, 7	10, 7	99507, 3	7329449, 1	73, 65
8	0,000107	99501, 9	10, 7	99496, 6	7229941, 7	72, 66
9	0,000000	99491, 3	0, 0	99491, 3	7130445, 1	71, 67
10	0,000307	99491, 3	30, 6	99476, 0	7030953, 8	70, 67
11	0,000000	99460, 7	0, 0	99460, 7	6931477, 8	69, 69
12	0,000189	99460, 7	18, 8	99451, 3	6832017, 1	68, 69
13	0,000091	99441, 9	9, 1	99437, 4	6732565, 8	67, 70
14	0,000441	99432, 9	43, 8	99410, 9	6633128, 4	66, 71
15	0,000081	99389, 0	8, 1	99385, 0	6533717, 5	65, 74
16	0,000159	99380, 9	15, 8	99373, 0	6434332, 5	64, 74
17	0,000244	99365, 1	24, 2	99353, 0	6334959, 5	63, 75
18	0,000394	99340, 9	39, 1	99321, 3	6235606, 5	62, 77
19	0,000307	99301, 7	30, 5	99286, 5	6136285, 1	61, 79
20	0,000300	99271, 3	29, 7	99256, 4	6036998, 6	60, 81
21	0,000290	99241, 5	28, 8	99227, 1	5937742, 2	59, 83
22	0,000630	99212, 7	62, 5	99181, 5	5838515, 1	58, 85
23	0,000134	99150, 2	13, 3	99143, 6	5739333, 6	57, 89
24	0,000408	99136, 9	40, 5	99116, 7	5640190, 1	56, 89
25	0,000273	99096, 5	27, 1	99082, 9	5541073, 3	55, 92
26	0,000274	99069, 4	27, 1	99055, 8	5441990, 4	54, 93
27	0,000268	99042, 3	26, 5	99029, 0	5342934, 6	53, 95
28	0,000544	99015, 8	53, 8	98988, 9	5243905, 6	52, 96
29	0,000142	98961, 9	14, 0	98954, 9	5144916, 7	51, 99
30	0,000280	98947, 9	27, 7	98934, 1	5045961, 8	51, 00
31	0,000422	98920, 2	41, 7	98899, 4	4947027, 7	50, 01
32	0,000433	98878, 5	42, 9	98857, 1	4848128, 4	49, 03
33	0,000729	98835, 6	72, 1	98799, 6	4749271, 3	48, 05
34	0,000999	98763, 6	98, 6	98714, 2	4650471, 7	47, 09
35	0,000210	98664, 9	20, 7	98654, 5	4551757, 5	46, 13
36	0,001045	98644, 2	103, 0	98592, 6	4453103, 0	45, 14
37	0,000834	98541, 1	82, 2	98500, 0	4354510, 3	44, 19
38	0,000754	98458, 9	74, 2	98421, 8	4256010, 3	43, 23
39	0,000458	98384, 7	45, 0	98362, 1	4157588, 5	42, 26
40	0,000853	98339, 6	83, 8	98297, 7	4059226, 4	41, 28
41	0,001325	98255, 8	130, 2	98190, 7	3960928, 7	40, 31
42	0,001614	98125, 6	158, 3	98046, 4	3862738, 0	39, 37
43	0,001315	97967, 2	128, 8	97902, 8	3764691, 6	38, 43
44	0,001611	97838, 4	157, 6	97759, 6	3666788, 8	37, 48
45	0,001824	97680, 8	178, 1	97591, 7	3569029, 2	36, 54
46	0,001941	97502, 7	189, 3	97408, 0	3471437, 4	35, 60
47	0,003889	97313, 4	378, 5	97124, 2	3374029, 4	34, 67
48	0,002561	96935, 0	248, 2	96810, 9	3276905, 2	33, 81
49	0,002339	96686, 7	226, 2	96573, 7	3180094, 3	32, 89
50	0,003577	96460, 6	345, 0	96288, 1	3083520, 7	31, 97
51	0,003979	96115, 6	382, 4	95924, 3	2987232, 6	31, 08
52	0,003785	95733, 1	362, 4	95551, 9	2891308, 3	30, 20
53	0,004388	95370, 7	418, 5	95161, 5	2795756, 4	29, 31
54	0,004619	94952, 3	438, 6	94733, 0	2700594, 8	28, 44
55	0,004199	94513, 7	396, 9	94315, 2	2605861, 9	27, 57
56	0,004746	94116, 8	446, 7	93893, 5	2511546, 6	26, 69
57	0,005811	93670, 1	544, 4	93397, 9	2417653, 2	25, 81
58	0,004805	93125, 7	447, 5	92902, 0	2324255, 3	24, 96
59	0,006698	92678, 3	620, 8	92367, 9	2231353, 2	24, 08
60	0,005727	92057, 5	527, 3	91793, 9	2138985, 3	23, 24
61	0,006248	91530, 2	571, 9	91244, 3	2047191, 5	22, 37
62	0,006914	90958, 4	628, 9	90643, 9	1955947, 2	21, 50
63	0,008027	90329, 5	725, 1	89966, 9	1865303, 3	20, 65
64	0,008423	89604, 4	754, 7	89227, 0	1775336, 3	19, 81
65	0,009713	88849, 7	863, 0	88418, 1	1686109, 3	18, 98
66	0,010050	87986, 6	884, 3	87544, 5	1597691, 2	18, 16
67	0,010566	87102, 3	920, 3	86642, 2	1510146, 7	17, 34
68	0,012647	86182, 0	1090, 0	85637, 0	1423504, 5	16, 52
69	0,013750	85092, 1	1170, 0	84507, 1	1337867, 5	15, 72
70	0,017896	83922, 1	1501, 9	83171, 1	1253360, 4	14, 93
71	0,017768	82420, 2	1464, 4	81688, 0	1170189, 3	14, 20
72	0,022632	80955, 8	1832, 2	80039, 7	1088501, 3	13, 45
73	0,022714	79123, 6	1797, 2	78225, 0	1008461, 6	12, 75
74	0,023985	77326, 4	1854, 7	76399, 0	930236, 6	12, 03
75	0,031729	75471, 7	2394, 6	74274, 3	853837, 6	11, 31
76	0,032563	73077, 0	2379, 6	71887, 2	779563, 3	10, 67
77	0,039727	70697, 4	2808, 6	69293, 1	707676, 1	10, 01
78	0,040628	67888, 8	2758, 2	66509, 7	638382, 9	9, 40
79	0,046940	65130, 6	3057, 2	63602, 0	571873, 2	8, 78
80	0,056879	62073, 4	3530, 7	60308, 0	508271, 3	8, 19
81	0,069948	58542, 7	4094, 9	56495, 2	447963, 2	7, 65
82	0,070994	54447, 7	3865, 5	52515, 0	391468, 1	7, 19
83	0,083205	50582, 3	4208, 7	48477, 9	338953, 1	6, 70
84	0,085465	46373, 5	3963, 3	44391, 9	290475, 2	6, 26
85	0,100148	42410, 2	4247, 3	40286, 6	246083, 3	5, 80
86	0,108792	38162, 9	4151, 8	36087, 0	205796, 7	5, 39
87	0,121715	34011, 1	4139, 7	31941, 3	169709, 7	4, 99
88	0,149133	29871, 4	4454, 8	27644, 0	137768, 4	4, 61
89	0,142495	25416, 6	3621, 7	23605, 8	110124, 4	4, 33
90	0,179487	21794, 9	3911, 9	19838, 9	86518, 7	3, 97
91	0,178519	17883, 0	3192, 4	16286, 8	66679, 7	3, 73
92	0,214885	14690, 5	3156, 8	13112, 2	50393, 0	3, 43
93	0,210300	11533, 8	2425, 6	10321, 0	37280, 8	3, 23
94	0,226860	9108, 2	2066, 3	8075, 1	26959, 8	2, 96
95	0,268617	7041, 9	1891, 6	6096, 1	18884, 8	2, 68
96	0,271889	5150, 3	1400, 3	4450, 2	12788, 6	2, 48
97	0,305882	3750, 0	1147, 1	3176, 5	8338, 5	2, 22
98	0,250000	2603, 0	650, 7	2277, 6	5162, 0	1, 98
99	0,557692	1952, 2	1088, 7	1407, 8	2884, 4	1, 48
100+	1,000000	863, 5	863, 5	1476, 5	1476, 5	1, 71

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Popolne letne tablice umrljivosti za Slovenijo po spolu, 1982-2004, in možnosti uporabe v javnem zdravju

Žagar T, Zadnik V, Pohar M, Primic Žakelj M

Tablice umrljivosti se uporabljajo kot osnova za statistične izračune v mnogoterih znanstvenih strokah; tudi v javnemu zdravju in epidemiologiji. V zadnjih letih jih v Sloveniji uporabljamo predvsem v analizah relativnega preživetja, za kar potrebujemo popolne momentne tablice umrljivosti za posamezna koledarska leta in ločene po spolu. Ker takšne tablice umrljivosti za Slovenijo še niso na razpolago, smo jih pripravili sami za obdobje 1982-2004. V pričujočem prispevku je opisana metodologija po kateri smo tablice izračunali in primeri, v katerih so takšne tablice umrljivosti uporabne. Tablice so bralcu na razpolago, če pošlje prošnjo na naslov register@onko-i.si. Objavljene so tudi v mednarodni bazi tablic umrljivosti (angl. Human Life-Table Database), ki je dosegljiva na internetu (http://www.lifetable.de/). Tudi v prihodnje nameravamo računati tablice umrljivosti, takoj ko bomo dobili potrebne podatke.