Course EPIB-634: Survival Analysis and Related Topics [Winter 2007

Assignment 3

`Resource material in www.epi.mcgill.ca/hanley/c681/lifetables  so username/pw reruired`

1 Refer to the 2000-2002 Quebec lifetables (below). They (and some documentation) can be found at `http://dsp-psd.pwgsc.gc.ca/Collection/Statcan/84-537-X/84-537-XIE.html`

(i) 'Reliability measures' (cv's) are provided for both q_x and e_x. Why is the cv[e_0] for Quebec larger than that for Ontario and smaller than that for Saskatchewan? The cv's in these 2000-2002 lifetables are based on 3 years of data. How much bigger/smaller would you expect them to be if the lifetables were calculated from just 1 year of data (assuming no influenza epidemic, just the usual random variations)?

(ii) Based on these lifetables, what would be a [non-for-profit] premium for a 1-year 'term' insurance for $1,000 worth of life-insurance coverage for "average-risk" males and females aged 22 at last birthday? aged 42? 62? Explain your calculations.

(iii) Below are the monthly rates per $1,000 worth of coverage under the Optional Life Insurance plan offered to McGill Staff (so. 12 x 0.325 = $3.90 for $1,000 coverage for 1 year)

Age group:	20-34	35-39	40-44	45-49	50-54	55-59	60-64
Rates:	0.032	0.041	0.057	0.089	0.154	0.266	0.325

Assume that for McGill staff aged 62, the male:female mix is 50:50, and the premiums for the 60-64 age group are non-profit and reflect the actual mortality rates of staff aged 62. If so, how much different are the expected death rates of McGill staff aged 62 than those of a 50:50 mix of 62 year olds in the Quebec population? Give some reasons for the difference.

2 (i) Use the life-expectancy calculator available at
`http://www.insurancetoronto.com/calculators/lifexpcalc.html`
to calculate the remaining life-expectancy for 22, 42 and 62 years old non-smoking females of average health.

(ii) Explain why $22+e_{22} < 42+e_{42} < 62+e_{62}$ and (in the Quebec lifetables) $e_0 < 2 + e_2 < 22 + e_{22}$

Other calculators (some more/less specific) : Google*: `esperance de vie calculatrice`*

3 The reported PI rate for OB/GYN (Table 1 of Ayas et al) is 0.0975 injuries/Intern-Month.

(i) Calculate the probability that an average-risk ob/gyn resident would have no (or the complement, at least one), PI by the end of (i) 1 month (ii) 12 months of experience? i.e. what is the probability of 'surviving' these lengths of time without a PI? *The complement is often referred to as 'cumulative incidence' or 'risk.. Hint: either use the (more general) formula for the relationship between incidence density (or rate) and cumulative incidence, or in this case (since the rate is assumed to be constant over time), by treating the number of events in the (say 12 month) interval in question as a Poisson random variable with expectation E = μ = 12 x 0.0975, and calculating the probability of 0 events in that time interval.*

(ii) What would the 6- and 12-month 'injury-free-survival' be if the rates [injuries/intern-month] were

month:	1	2	3	4	5	6	7	8	9	10	11	12
(a)	.070	.075	.080	.085	.090	.095	.100	.105	.110	.115	.120	.125
(b)	.125	.120	.115	.110	.105	.100	.095	.090	.085	.080	.075	.070
(c)	.0003	.0003	.0004	.0004	.0005	.0006	.0006	.0007	.0007	.0010	.0010	.0010

(iii) What approximation suggests itself for (c)? Can you make it into a rule-of-thumb?

4 "Mastro estimated the probability of HIV-1 transmission, per sexual contact, from female prostitutes to male military prostitutes in Northern Thailand. His conservative estimate of the transmission probability, based on all men, was 0.031 (95% CI 0.025 - 0.040). In a subgroup of men not reporting a history of other sexually transmitted diseases (STDs) his estimate was 0.012 (0.006 - 0.025). He attributes this unexpectedly high value to the possible presence of STDs in female prostitutes (which may have enhanced HIV transmission) and/or high levels of infectivity among the prostitutes who are likely to be at an early stage of HIV infection.

Mastro apparently overlooks these explanations and assumes that the probability of transmission of HIV between regular partners would be the same as that in prostitute-client contacts. He then used this probability of 0.031 to calculate that over 90% of initially uninfected regular partners of seropositive persons would acquire infection over 1 year.

This is inconsistent with data from prospective studies in developing countries suggesting seroconversion rates among HIV- discordant partners of about 10% per year. If it is assumed that couples on average have two sexual contacts per week, then on the basis of simple probability calculations, this gives an average transmission probability per sexual contact of about 0.001 (over 30 times smaller than the conservative estimate of Mastro)" *[Excerpt from a letter to Editor of The Lancet, May 21, 1994]*

(i) Carry out the calculation using the 0.031 to arrive at an estimate of "over 90%" [paragraph 2]; assume two sexual contacts per week

(ii) Assuming again two contacts per week, do the reverse calculation that produces an estimate of 'about 0.001' [paragraph 3].

(iii) The 'per-act' transmission probability for HPV is thought to be much higher [cf Pubmed for work of Ann Burchell]. Assuming a frequency of sexual intercourse of 2 /week with an infected partner, what would the 3-month cumulative incidence (seroconversion risk) be (a) if the per-act transmission probability was 10%? (b) if this per-act transmission probability could be halved by condom use?

5 Refer to the data on "Population size, number of deaths, by age-sex, Canada 2001" [c681/Lifetables]. Restrict attention to the age-rage 40-85.

(i) Calculate the (age-specific) mortality rate ratios contrasting mortality of males and females. Are they reasonably constant across this age-range? *[data in 'wide' format easier to work with for this Q]*

(ii) On a single graph, plot the age-specific mortality rates against age for males and for females. Repeat the exercise , but with the mortality rates on a log scale. Are the male-female differences more 'constant' (invariant, homogeneous) on the rate difference scale or on the rate ratio scale? *[data in 'long' format easier to work with for this and next Q]*

(iii) Fit a regression to the log rates, ie E[log-rate | Age Male] = $B_0 + B_{age} \times (\text{Age-40}) + B_{male} \times \text{Male}$ and interpret the coefficients (*relate the coefficients to contrasts of rates, rather than log-rates; don't worry for now about the fact that some log-rates are less 'stable' (noisier) than others: we will come back to this when we cover Poisson Regression*)

6 (i) "Eye-ball' the (age-specific) mortality rate ratios and rate differences contrasting mortality rates of Swedish males in 1918 and males in 1917. Comment on the patterns. Are they similar for females?

(ii) Estimate how may excess deaths there were in Sweden in 1918, over 1917. *[cf link from /hanley/c681/lifetables to Berkeley Mortality Database .. no modelling needed.. just look at the 'bottom line' in* `http://www.demog.berkeley.edu/~bmd/Sweden/Deaths/deaths.tri`*]*

7 A 12-year old female passenger from Sweden survived the Titanic sinking of 1912 and died in 1981.

(i) Based on the appropriate Swedish *cohort* lifetable,* what proportion of her birth cohort were alive in 1912?

(ii) What was the (a) mean (b) (approx) median post-1912 longevity of this 'alive in 1912' comparison group?

(iii) What percentage of her comparison group did she outlive?

[* the excerpt from the Swedish cohort lifetable, found on /hanley/c681/lifetables takes a lot less time to download than the full 1751-1910 version found in the Berkeley database]

8 The 'jazz musicians get a bad rap' letter to the editor by the retired business school professor contains several epidemiologic and statistical flaws. Write a short "letter to the editor" describing the two you think are the most serious. Be nicer to this well-meaning emeritus professor (in a discipline far from epidemiology, who tried to be scholarly) than Rothman was in his letter in Amer J Public Health. 82(5):761, 1992 May.

Premature Death in Jazz Musicians: Fact or Fiction?

A letter by a retired business school professor to American Journal of Public Health

"Jazz musicians tend to be more liable than other professions to die early deaths from drink, drugs, women, or overwork."[1]

"The career of the ODJB (Original Dixieland Jazz Band) was both as fantastic and as typical as any that jazz has had to offer. Its story features... the petty jealousies, alcoholism, premature deaths, and all the rest."[2]

"Catlett's career was a singularly queer one, even for jazz, whose history is filled with the wreckage of poverty, sudden obscurity, and premature death."[3]

Statistical study of 86 jazz musicians listed in a university syllabus refutes these tenets,[4] the second and third of which were made by two of America's most respected critics, and all of which foster the commonly held view that jazz players die prematurely.

Dates of birth, and of death when it had occurred, were tabulated, and longevity matched with that expected in the United States by year of birth, race, and sex.[5-7] One musician who had not reached the age of his life expectancy was excluded from the list; the musicians were born in the US.

Birth years ranged from 1862 to 1938; 16 births occurred before 1900, 23 between 1900 and 1909, 19 between 1910 and 1919, 22 between 1920 and 1929, and five between 1930 and 1939. Comparison with national values showed that 70 (82%) of the musicians exceeded their life expectancy; four-fifths of the Black men, three fourths of the White men, and all the women lived longer than expected as shown in this frequency distribution.

	Male			Female		
	Total	n	%	Total	n	%
White	19	14	74	-	-	-
Black	59	49	83	7	7	100

Jazz was born in the "sporting houses" of New Orleans and nurtured in the speakeasies and night clubs of Chicago, Kansas City, and New York. Its association with vice and crime in its early days has led to the assumption that to play jazz is to court depravity and death. Although the size and sex distribution of the sample limits the inferences to be drawn, the data suggest that jazz musicians do not die young. Most of the 85 musicians in this study have survived the potential hazards of irregular hours of work and meals, the ready temptation of drugs and alcohol, and the perils of racial prejudice, and to have overcome "the problem of the artist who is creative within a socially and racially discriminatory world."[8]

Table 6b Complete life table, Quebec, 2000 to 2002: females

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
0 years	100000	415	0.99585	0.00415	4.8	99626	8200226	82.00	0.08
1 year	99585	34	0.99966	0.00034	15.9	99564	8100600	81.34	0.08
2 years	99551	18	0.99981	0.00019	20.5	99543	8001036	80.37	0.08
3 years	99533	14	0.99987	0.00013	25.9	99527	7901493	79.39	0.08
4 years	99519	10	0.99989	0.00011	33.4	99516	7801966	78.40	0.08
5 years	99509	14	0.99987	0.00013	31.4	99502	7702450	77.40	0.08
6 years	99495	9	0.99990	0.00010	45.0	99490	7602948	76.42	0.08
7 years	99486	7	0.99994	0.00006	58.3	99483	7503458	75.42	0.08
8 years	99479	6	0.99994	0.00006	56.7	99476	7403975	74.43	0.08
9 years	99473	6	0.99994	0.00006	53.3	99470	7304499	73.43	0.08
10 years	99467	7	0.99993	0.00007	49.7	99464	7205029	72.44	0.08
11 years	99460	7	0.99993	0.00007	47.4	99456	7105565	71.44	0.09
12 years	99453	10	0.99990	0.00010	46.8	99448	7006109	70.45	0.09
13 years	99443	13	0.99987	0.00013	34.3	99436	6906661	69.45	0.09
14 years	99430	18	0.99983	0.00017	27.4	99421	6807225	68.46	0.09
15 years	99412	21	0.99978	0.00022	27.2	99402	6707804	67.47	0.09
16 years	99391	27	0.99974	0.00026	28.2	99377	6608402	66.49	0.09
17 years	99364	29	0.99970	0.00030	27.3	99350	6509025	65.51	0.09
18 years	99335	31	0.99968	0.00032	23.7	99319	6409675	64.53	0.09
19 years	99304	33	0.99967	0.00033	20.1	99287	6310356	63.55	0.09
20 years	99271	34	0.99966	0.00034	19.9	99255	6211069	62.57	0.10
21 years	99237	34	0.99966	0.00034	22.4	99220	6111814	61.59	0.10
22 years	99203	34	0.99965	0.00035	23.9	99186	6012594	60.61	0.10
23 years	99169	34	0.99966	0.00034	22.5	99152	5913408	59.63	0.10
24 years	99135	33	0.99967	0.00033	20.5	99119	5814256	58.65	0.10
25 years	99102	31	0.99968	0.00032	21.2	99087	5715137	57.67	0.10
26 years	99071	30	0.99969	0.00031	24.7	99056	5616050	56.69	0.10
27 years	99041	31	0.99969	0.00031	26.6	99025	5516994	55.70	0.11
28 years	99010	31	0.99968	0.00032	24.2	98994	5417969	54.72	0.11
29 years	98979	33	0.99967	0.00033	21.2	98962	5318975	53.74	0.11
30 years	98946	34	0.99965	0.00035	21.2	98930	5220013	52.76	0.11
31 years	98912	37	0.99963	0.00037	22.9	98893	5121083	51.77	0.11
32 years	98875	41	0.99959	0.00041	22.3	98855	5022190	50.79	0.11
33 years	98834	46	0.99953	0.00047	18.3	98811	4923335	49.81	0.12
34 years	98788	54	0.99946	0.00054	14.8	98760	4824524	48.84	0.12
35 years	98734	62	0.99937	0.00063	14.1	98703	4725764	47.86	0.12
36 years	98672	70	0.99929	0.00071	14.7	98638	4627061	46.89	0.12
37 years	98602	76	0.99922	0.00078	14.4	98564	4528423	45.93	0.13
38 years	98526	83	0.99916	0.00084	12.6	98484	4429859	44.96	0.13
39 years	98443	87	0.99912	0.00088	10.9	98400	4331375	44.00	0.13

Table 6b Complete life table, Quebec, 2000 to 2002: females

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
40 years	98356	91	0.99907	0.00093	11.1	98311	4232975	43.04	0.13
41 years	98265	97	0.99901	0.00099	12.1	98217	4134664	42.08	0.14
42 years	98168	107	0.99891	0.00109	11.8	98114	4036447	41.12	0.14
43 years	98061	120	0.99878	0.00122	9.9	98001	3938333	40.16	0.14
44 years	97941	136	0.99861	0.00139	8.5	97873	3840332	39.21	0.14
45 years	97805	155	0.99842	0.00158	8.8	97728	3742459	38.26	0.15
46 years	97650	173	0.99823	0.00177	9.4	97563	3644731	37.32	0.15
47 years	97477	191	0.99804	0.00196	9.3	97381	3547168	36.39	0.15
48 years	97286	207	0.99788	0.00212	8.0	97183	3449787	35.46	0.16
49 years	97079	220	0.99773	0.00227	7.1	96969	3352604	34.53	0.16
50 years	96859	236	0.99757	0.00243	7.4	96741	3255635	33.61	0.17
51 years	96623	252	0.99739	0.00261	8.1	96497	3158894	32.69	0.17
52 years	96371	274	0.99716	0.00284	8.1	96234	3062397	31.78	0.17
53 years	96097	299	0.99689	0.00311	6.9	95948	2966163	30.87	0.18
54 years	95798	327	0.99658	0.00342	6.2	95634	2870215	29.96	0.18
55 years	95471	359	0.99624	0.00376	6.5	95291	2774581	29.06	0.19
56 years	95112	392	0.99588	0.00412	7.1	94916	2679290	28.17	0.19
57 years	94720	428	0.99548	0.00452	7.0	94506	2584374	27.28	0.20
58 years	94292	466	0.99507	0.00493	6.1	94059	2489868	26.41	0.20
59 years	93826	502	0.99464	0.00536	5.5	93575	2395809	25.53	0.21
60 years	93324	544	0.99418	0.00582	5.9	93052	2302234	24.67	0.21
61 years	92780	589	0.99365	0.00635	6.5	92486	2209182	23.81	0.22
62 years	92191	643	0.99302	0.00698	6.4	91869	2116696	22.96	0.23
63 years	91548	703	0.99233	0.00767	5.5	91196	2024827	22.12	0.23
64 years	90845	766	0.99157	0.00843	4.8	90462	1933631	21.28	0.24
65 years	90079	836	0.99073	0.00927	5.0	89661	1843169	20.46	0.25
66 years	89243	911	0.98979	0.01021	5.4	88788	1753508	19.65	0.25
67 years	88332	996	0.98872	0.01128	5.3	87834	1664720	18.85	0.26
68 years	87336	1084	0.98759	0.01241	4.5	86794	1576886	18.06	0.27
69 years	86252	1173	0.98640	0.01360	3.9	85665	1490092	17.28	0.28
70 years	85079	1270	0.98508	0.01492	4.1	84444	1404427	16.51	0.29
71 years	83809	1378	0.98355	0.01645	4.4	83121	1319983	15.75	0.30
72 years	82431	1505	0.98175	0.01825	4.3	81678	1236862	15.00	0.31
73 years	80926	1639	0.97975	0.02025	3.7	80107	1155184	14.27	0.33
74 years	79287	1775	0.97761	0.02239	3.2	78399	1075077	13.56	0.34
75 years	77512	1923	0.97520	0.02480	3.4	76551	996678	12.86	0.36
76 years	75589	2087	0.97239	0.02761	3.7	74545	920127	12.17	0.38
77 years	73502	2275	0.96904	0.03096	3.6	72365	845582	11.50	0.40
78 years	71227	2471	0.96531	0.03469	3.1	69991	773217	10.86	0.42
79 years	68756	2664	0.96126	0.03874	2.8	67423	703226	10.23	0.44

Table 6b Complete life table, Quebec, 2000 to 2002: females

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
80 years	66092	2862	0.95670	0.04330	3.1	64661	635803	9.62	0.48
81 years	63230	3071	0.95144	0.04856	3.4	61695	571142	9.03	0.51
82 years	60159	3292	0.94527	0.05473	3.3	58513	509447	8.47	0.54
83 years	56867	3507	0.93833	0.06167	2.8	55114	450934	7.93	0.58
84 years	53360	3695	0.93075	0.06925	2.8	51512	395820	7.42	0.63
85 years	49665	3857	0.92234	0.07766	3.3	47736	344308	6.93	0.68
86 years	45808	3990	0.91289	0.08711	3.4	43813	296572	6.47	0.73
87 years	41818	4090	0.90221	0.09779	3.1	39773	252759	6.04	0.79
88 years	37728	4050	0.89265	0.10735	3.1	35703	212986	5.65	0.86
89 years	33678	3995	0.88137	0.11863	3.2	31681	177283	5.26	0.94
90 years	29683	3883	0.86918	0.13082	3.3	27741	145602	4.91	1.04
91 years	25800	3714	0.85605	0.14395	3.5	23943	117861	4.57	1.17
92 years	22086	3491	0.84195	0.15805	3.6	20340	93918	4.25	1.31
93 years	18595	3219	0.82687	0.17313	3.8	16986	73578	3.96	1.49
94 years	15376	2910	0.81076	0.18924	4.2	13921	56592	3.68	1.72
95 years	12466	2572	0.79364	0.20636	4.4	11180	42671	3.42	1.99
96 years	9894	2222	0.77548	0.22452	4.8	8783	31491	3.18	2.35
97 years	7672	1870	0.75629	0.24371	5.7	6737	22708	2.96	2.81
98 years	5802	1531	0.73608	0.26392	6.3	5037	15971	2.75	3.36
99 years	4271	1218	0.71487	0.28513	7.2	3662	10934	2.56	4.10
100 years	3053	938	0.69268	0.30732	8.7	2584	7272	2.38	5.10
101 years	2115	699	0.66954	0.33046	10.1	1766	4688	2.22	6.33
102 years	1416	502	0.64551	0.35449	12.2	1165	2922	2.06	8.05
103 years	914	347	0.62063	0.37937	14.8	741	1757	1.92	10.41
104 years	567	229	0.59496	0.40504	17.1	452	1016	1.79	13.78
105 years	338	146	0.56857	0.43143	23.1	265	564	1.67	19.69
106 years	192	88	0.54153	0.45847	32.9	148	299	1.56	29.00
107 years	104	51	0.51392	0.48608	43.9	78	151	1.46	43.42
108 years	53	27	0.48584	0.51416	85.4	40	73	1.36	70.31

Note: Estimates with a coefficient of variation (cv) greater than 33.3% are to be used with caution
F too unreliable to be published (indicates a cv of at least 100.0%).

Table 6a Complete life table, Quebec, 2000 to 2002: males

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
0 years	100000	528	0.99472	0.00528	4.1	99520	7638585	76.39	0.09
1 year	99472	29	0.99971	0.00029	17.4	99462	7539065	75.79	0.08
2 years	99443	24	0.99975	0.00025	18.6	99430	7439603	74.81	0.09
3 years	99419	22	0.99978	0.00022	19.2	99407	7340173	73.83	0.09
4 years	99397	16	0.99984	0.00016	22.4	99389	7240766	72.85	0.09
5 years	99381	11	0.99988	0.00012	37.2	99375	7141377	71.86	0.09
6 years	99370	10	0.99991	0.00009	50.4	99365	7042002	70.87	0.09
7 years	99360	7	0.99992	0.00008	52.4	99357	6942637	69.87	0.09
8 years	99353	7	0.99994	0.00006	57.5	99349	6843280	68.88	0.09
9 years	99346	6	0.99994	0.00006	57.4	99343	6743931	67.88	0.09
10 years	99340	8	0.99992	0.00008	50.1	99336	6644588	66.89	0.10
11 years	99332	9	0.99991	0.00009	44.3	99328	6545252	65.89	0.10
12 years	99323	14	0.99985	0.00015	38.0	99316	6445924	64.90	0.10
13 years	99309	23	0.99977	0.00023	24.0	99297	6346608	63.91	0.10
14 years	99286	34	0.99966	0.00034	18.9	99269	6247311	62.92	0.10
15 years	99252	45	0.99954	0.00046	18.8	99230	6148042	61.94	0.10
16 years	99207	58	0.99942	0.00058	18.8	99177	6048812	60.97	0.10
17 years	99149	67	0.99932	0.00068	17.5	99116	5949635	60.01	0.10
18 years	99082	76	0.99924	0.00076	14.6	99043	5850519	59.05	0.11
19 years	99006	82	0.99917	0.00083	12.1	98966	5751476	58.09	0.11
20 years	98924	88	0.99911	0.00089	12.0	98879	5652510	57.14	0.11
21 years	98836	93	0.99906	0.00094	13.3	98790	5553631	56.19	0.11
22 years	98743	95	0.99903	0.00097	13.9	98695	5454841	55.24	0.11
23 years	98648	95	0.99904	0.00096	13.0	98601	5356146	54.30	0.11
24 years	98553	93	0.99906	0.00094	11.7	98506	5257545	53.35	0.11
25 years	98460	88	0.99910	0.00090	12.2	98417	5159039	52.40	0.12
26 years	98372	85	0.99914	0.00086	14.3	98329	5060622	51.44	0.12
27 years	98287	83	0.99915	0.00085	15.6	98246	4962293	50.49	0.12
28 years	98204	85	0.99914	0.00086	14.4	98161	4864047	49.53	0.12
29 years	98119	86	0.99912	0.00088	12.5	98076	4765886	48.57	0.12
30 years	98033	90	0.99909	0.00091	12.4	97988	4667810	47.61	0.12
31 years	97943	93	0.99905	0.00095	13.6	97897	4569822	46.66	0.13
32 years	97850	97	0.99901	0.00099	14.0	97802	4471925	45.70	0.13
33 years	97753	101	0.99896	0.00104	12.5	97703	4374123	44.75	0.13
34 years	97652	106	0.99891	0.00109	10.6	97599	4276420	43.79	0.13
35 years	97546	111	0.99886	0.00114	10.1	97491	4178821	42.84	0.14
36 years	97435	118	0.99879	0.00121	10.9	97375	4081330	41.89	0.14
37 years	97317	125	0.99872	0.00128	11.1	97255	3983955	40.94	0.14
38 years	97192	132	0.99864	0.00136	9.7	97127	3886700	39.99	0.14
39 years	97060	140	0.99856	0.00144	8.4	96990	3789573	39.04	0.15

Table 6a Complete life table, Quebec, 2000 to 2002: males

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
40 years	96920	149	0.99846	0.00154	8.5	96845	3692583	38.10	0.15
41 years	96771	160	0.99835	0.00165	9.2	96691	3595738	37.16	0.15
42 years	96611	172	0.99821	0.00179	9.2	96525	3499047	36.22	0.16
43 years	96439	188	0.99806	0.00194	8.0	96345	3402522	35.28	0.16
44 years	96251	202	0.99789	0.00211	7.0	96150	3306177	34.35	0.17
45 years	96049	221	0.99770	0.00230	7.3	95939	3210027	33.42	0.17
46 years	95828	241	0.99748	0.00252	8.0	95707	3114088	32.50	0.17
47 years	95587	265	0.99723	0.00277	7.8	95455	3018381	31.58	0.18
48 years	95322	291	0.99694	0.00306	6.7	95176	2922926	30.66	0.18
49 years	95031	321	0.99663	0.00337	5.9	94871	2827750	29.76	0.19
50 years	94710	352	0.99628	0.00372	6.1	94533	2732879	28.86	0.19
51 years	94358	389	0.99588	0.00412	6.6	94164	2638346	27.96	0.20
52 years	93969	430	0.99543	0.00457	6.4	93754	2544182	27.07	0.20
53 years	93539	475	0.99492	0.00508	5.5	93302	2450428	26.20	0.21
54 years	93064	523	0.99438	0.00562	4.9	92802	2357126	25.33	0.22
55 years	92541	575	0.99378	0.00622	5.2	92254	2264324	24.47	0.22
56 years	91966	634	0.99311	0.00689	5.6	91649	2172070	23.62	0.23
57 years	91332	699	0.99234	0.00766	5.5	90983	2080421	22.78	0.24
58 years	90633	770	0.99150	0.00850	4.7	90248	1989438	21.95	0.24
59 years	89863	845	0.99060	0.00940	4.2	89440	1899190	21.13	0.25
60 years	89018	925	0.98960	0.01040	4.6	88555	1809750	20.33	0.26
61 years	88093	1013	0.98850	0.01150	5.0	87586	1721195	19.54	0.27
62 years	87080	1110	0.98726	0.01274	4.9	86525	1633609	18.76	0.28
63 years	85970	1210	0.98593	0.01407	4.2	85366	1547084	18.00	0.29
64 years	84760	1313	0.98450	0.01550	3.7	84104	1461718	17.25	0.30
65 years	83447	1424	0.98294	0.01706	3.9	82734	1377614	16.51	0.31
66 years	82023	1542	0.98120	0.01880	4.2	81252	1294880	15.79	0.32
67 years	80481	1671	0.97923	0.02077	4.1	79646	1213628	15.08	0.33
68 years	78810	1807	0.97708	0.02292	3.5	77906	1133982	14.39	0.35
69 years	77003	1942	0.97478	0.02522	3.1	76032	1056076	13.71	0.36
70 years	75061	2082	0.97226	0.02774	3.3	74020	980044	13.06	0.38
71 years	72979	2230	0.96945	0.03055	3.6	71864	906024	12.41	0.40
72 years	70749	2386	0.96628	0.03372	3.5	69556	834160	11.79	0.42
73 years	68363	2540	0.96285	0.03715	3.0	67093	764604	11.18	0.44
74 years	65823	2684	0.95922	0.04078	2.8	64481	697511	10.60	0.46
75 years	63139	2827	0.95522	0.04478	3.0	61726	633030	10.03	0.50
76 years	60312	2973	0.95070	0.04930	3.3	58825	571304	9.47	0.53
77 years	57339	3125	0.94551	0.05449	3.3	55777	512479	8.94	0.56
78 years	54214	3270	0.93968	0.06032	2.8	52579	456702	8.42	0.60
79 years	50944	3396	0.93333	0.06667	2.7	49246	404123	7.93	0.65

Table 6a Complete life table, Quebec, 2000 to 2002: males

Age x	l_x	d_x	p_x	q_x	cv(q_x)	L_x	T_x	e_x	cv(e_x)
80 years	47548	3500	0.92639	0.07361	3.1	45797	354877	7.46	0.71
81 years	44048	3579	0.91876	0.08124	3.5	42259	309080	7.02	0.77
82 years	40469	3627	0.91037	0.08963	3.4	38655	266821	6.59	0.83
83 years	36842	3637	0.90128	0.09872	3.0	35024	228166	6.19	0.89
84 years	33205	3602	0.89153	0.10847	3.2	31404	193142	5.82	0.99
85 years	29603	3521	0.88106	0.11894	3.9	27843	161738	5.46	1.11
86 years	26082	3397	0.86977	0.13023	4.2	24383	133895	5.13	1.21
87 years	22685	3230	0.85759	0.14241	3.9	21070	109512	4.83	1.31
88 years	19455	2931	0.84934	0.15066	4.0	17990	88442	4.55	1.46
89 years	16524	2691	0.83715	0.16285	4.4	15178	70452	4.26	1.64
90 years	13833	2433	0.82411	0.17589	4.6	12616	55274	4.00	1.85
91 years	11400	2164	0.81016	0.18984	5.0	10317	42658	3.74	2.12
92 years	9236	1891	0.79526	0.20474	5.5	8291	32341	3.50	2.47
93 years	7345	1621	0.77936	0.22064	6.3	6534	24050	3.27	2.89
94 years	5724	1360	0.76244	0.23756	6.8	5044	17516	3.06	3.37
95 years	4364	1115	0.74445	0.25555	7.7	3807	12472	2.86	4.03
96 years	3249	892	0.72534	0.27466	8.7	2803	8665	2.67	4.87
97 years	2357	695	0.70510	0.29490	10.8	2009	5862	2.49	6.03
98 years	1662	526	0.68368	0.31632	12.4	1398	3853	2.32	7.37
99 years	1136	385	0.66107	0.33893	15.5	944	2455	2.16	9.18
100 years	751	272	0.63725	0.36275	17.1	615	1511	2.01	11.16
101 years	479	186	0.61219	0.38781	21.7	386	896	1.87	14.17
102 years	293	121	0.58591	0.41409	25.1	232	510	1.74	17.50
103 years	172	76	0.55839	0.44161	28.2	134	278	1.62	22.24
104 years	96	45	0.52965	0.47035	30.6	73	144	1.51	30.83
105 years	51	26	0.49971	0.50029	70.7	38	71	1.40	50.64
106 years	25	13	0.46860	0.53140	68.5	19	33	1.30	47.97

Note: Estimates with a coefficient of variation (cv) greater than 33.3% are to be used with caution
F too unreliable to be published (indicates a cv of at least 100.0%).