



**DETAILED LIFE TABLE FOR THE POPULATION OF FEDERATION OF
BOSNIA AND HERZEGOVINA
2012 - 2014**

Sarajevo, 2017

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PREFACE

The life table for the population of Federation of Bosnia and Herzegovina for the period 2012 – 2014 are the first life table that are published by the Institute for Statistics of Federation of Bosnia and Herzegovina independently.

Realization of the Census Population, Households and Dwellings in Bosnia and Herzegovina in 2013 in accordance with the international methodology and harmonization of demographic statistics with EU standards, created the conditions for the Institute for Statistics of Federation of Bosnia and Herzegovina to be able to publish the life table for Federation of Bosnia and Herzegovina .

The life table for the population of Federation of Bosnia and Herzegovina for the period 2012 - 2014 are based on international methodology and practice. They were produced on the basis of the statistical data of the Census Population, Households and Dwellings in Bosnia and Herzegovina in 2013, as well as statistics on the natural changes of the population of Federation of Bosnia and Herzegovina.

The life table for the population of Federation of Bosnia and Herzegovina contributes to development of demographic analysis and population projections for Federation of Bosnia and Herzegovina. A special contribution of life table will be in the field of insurance, actuarial science and other fields.

DIRECTOR GENERAL

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METHODOLOGY FOR DETAILED LIFE TABLE, 2012 - 2014

INTRODUCTION

Life tables are designed for many of users providing a comprehensive picture of the population mortality, and considering their importance they are made in almost all countries of the world.

It is necessary to dispose of population data by sex and single age, data on the number of live births by sex, data on the deads by sex and single age for the production of detailed life table. Usually, such data are available for the census years, and detailed life tables are most often produced for census years.

Life tables represent the basis for setting the hypothesis about future mortality trends in demographic projections; they are used for demographic purposes (eg. calculating of the net reproduction rate); they also have a great importance in the field of life insurance for calculating and determining the amount of the premium.

Life table contains a set of demographic indicators. The basic indicator is the probability of death and all other biometric functions are calculated on its basis; the probability of survival, the number of living, the number of deaths, the average life duration and others.

DATA SOURCES

Detailed life table by single age and gender for the years 2012 - 2014 were made on the basis of:

1. data on the number of population according to the results of the Census Population, Households and Dwellings in BiH in 2013 (hereinafter: 2013 Census) and
2. results of data processing of vital statistics e.g. on the number of live births and deaths for the years 2012 - 2014.

The used data of 2013 Census are the number of population according to calendar years of birth and sex.

The used data of vital statistics are:

- a. number of livebirths by sex in 2012 and 2013
- b. number of deaths by calendar year of birth and sex and number of deaths:
 - after birthday in 2012
 - before and after the birthday in 2013
 - before and after 2013 Census
 - before birthday in 2014.

COMPUTING OF SET OF THE LIVING (L_x) AND SET OF THE DEATHS (T_x)

Before the creation of life table for single years of age, a set of the living and a set of the deaths should be formed.

A set of the living L_x is the number of persons born in the year n and in the year $n + 1$ who had reached x years in 2012 and 2013.

A set of the deaths T_x is the number of persons born in the year n and in the year $n + 1$ who died at x age.

Set of the living (L_x) and set of the deaths (T_x) are made on the base of basic set of data. The example of contents of the basic database is shown as an example in the Table 1 for the male population of Federation of BiH.

Table 1: Data on the population according to 2013 Census and data on the deaths in 2012, 2013 and 2014 which are used for the creation of a set of the living (L_x) and a set of the deaths (T_x) – Male population

Calendar year of birth	Ordinal number (n)	Population (2013 Census) L_n – census population who were born in given calendar year	Deaths (U)					
			2012	2013				2014
			after birthday	before birthday		after birthday		before birthday
				before Census	after Census	before Census	after Census	
1	2	3	4	5	6	7	8	9
2013	1	8279	0	49	27	0	0	8
2012	2	11622	78	12	0	0	0	1
2011	3	11645	1	2	1	0	0	0
2010	4	12107	0	0	0	1	2	2
2009	5	12360	0	1	1	1	0	0
2008	6	12382	2	1	0	1	0	0
2007	7	11890	3	2	0	0	0	1
2006	8	11736	2	0	0	0	0	0
2005	9	11854	1	2	0	0	0	1
2004	10	11817	1	0	0	1	0	1
2003	11	12363	1	2	0	1	0	1
2002	12	12302	4	0	0	0	1	1
2001	13	12652	3	2	0	2	1	0
2000	14	13124	2	1	0	2	0	2
1999	15	13490	0	2	0	0	0	2
1998	16	15268	3	2	0	1	0	2
1997	17	17171	4	3	1	2	0	3
1996	18	18716	2	1	0	1	0	5
1995	19	18030	2	2	1	2	2	4
1994	20	14467	3	2	1	1	5	3
1993	21	12546	2	3	1	1	2	3
1992	22	14720	9	5	0	1	3	5
1991	23	16381	3	7	0	3	2	8
1990	24	16495	7	3	0	4	2	6
1989	25	16074	7	8	3	2	2	8
1988	26	16834	3	3	0	4	3	10
1987	27	16928	1	3	0	2	2	5
1986	28	16712	8	5	0	4	3	3
1985	29	16705	6	9	1	5	1	3
1984	30	16969	7	7	0	3	4	1
1983	31	16538	7	5	0	5	2	3
1982	32	16761	7	5	0	7	6	11
1981	33	16570	10	8	1	5	2	12
1980	34	16324	6	7	1	6	3	4
1979	35	16013	10	5	0	6	2	6
1978	36	16000	7	5	0	5	1	10
1977	37	15775	15	4	0	5	4	12
1976	38	16246	3	9	1	5	4	14
1975	39	15808	3	9	0	2	7	10
1974	40	15404	10	11	1	2	12	12

Calendar year of birth	Ordinal number (n)	Population (2013 Census) Ln – census population who were born in given calendar year	Deaths (U)					
			2012	2013				2014
			after birthday	before birthday		after birthday		before birthday
				before Census	after Census	before Census	after Census	
1	2	3	4	5	6	7	8	9
1973	41	15185	9	9	0	5	4	13
1972	42	15617	11	14	1	12	7	11
1971	43	15776	23	15	0	5	5	15
1970	44	14624	14	7	0	9	5	16
1969	45	15986	14	13	0	15	11	22
1968	46	15817	21	17	1	18	7	22
1967	47	16191	24	20	0	17	11	17
1966	48	16671	37	21	0	20	10	29
1965	49	16923	20	22	3	20	16	30
1964	50	16848	34	31	0	29	15	28
1963	51	17117	49	28	1	24	16	51
1962	52	17181	46	46	4	19	26	43
1961	53	17267	52	42	4	33	24	59
1960	54	17029	71	41	4	37	23	49
1959	55	16510	70	57	5	43	30	44
1958	56	16290	69	60	5	39	30	66
1957	57	15037	86	61	2	51	31	61
1956	58	15423	75	60	3	74	29	86
1955	59	14877	86	80	5	53	40	75
1954	60	14955	91	88	4	63	38	81
1953	61	13939	117	74	7	46	42	91
1952	62	13229	90	81	6	65	42	104
1951	63	10868	106	83	3	61	45	79
1950	64	11566	120	90	5	80	45	98
1949	65	10982	107	97	5	64	55	99
1948	66	9453	101	104	7	73	48	95
1947	67	9418	137	97	3	71	49	94
1946	68	8226	118	108	4	52	36	93
1945	69	6948	131	82	3	68	46	84
1944	70	6320	101	82	1	60	49	81
1943	71	6233	123	120	6	75	69	101
1942	72	6715	147	124	4	82	75	116
1941	73	7091	199	120	4	104	83	145
1940	74	7365	190	163	3	105	60	155
1939	75	6838	189	125	9	117	83	162
1938	76	6362	215	152	10	125	91	192
1937	77	6006	221	175	6	110	104	186
1936	78	5486	237	191	9	116	91	164
1935	79	4952	235	176	13	119	77	163
1934	80	4307	218	167	2	107	100	158

Calendar year of birth	Ordinal number (n)	Population (2013 Census) Ln – census population who were born in given calendar year	Deaths (U)					
			2012	2013				2014
			after birthday	before birthday		after birthday		before birthday
				before Census	after Census	before Census	after Census	
1	2	3	4	5	6	7	8	9
1933	81	3756	182	171	6	93	74	181
1932	82	3276	189	147	8	127	83	136
1931	83	2656	179	149	5	101	67	144
1930	84	2444	177	155	10	89	61	132
1929	85	1914	164	134	11	91	65	112
1928	86	1584	144	113	5	97	62	100
1927	87	1059	114	71	3	57	39	87
1926	88	805	81	65	2	42	36	61
1925	89	521	71	68	5	34	20	50
1924	90	392	53	48	1	18	15	48
1923	91	272	41	24	3	25	13	29
1922	92	198	36	31	2	15	10	25
1921	93	131	23	11	2	12	10	12
1920	94	90	14	12	0	6	1	9
1919	95	68	15	14	1	3	1	7
1918	96	19	6	4	0	2	5	3
1917	97	19	3	8	0	1	0	1
1916	98	13	2	2	1	0	2	2
1915	99	12	1	2	0	2	0	1
1914	100	10	5	6	0	1	1	3
	100+	48	2	7	0	0	1	0

Sets of the living and the deaths are counted using uniform formulas for all age groups, except for infants and children of ages 1 year.

- a) Sets of the living and the deaths of ages 0 years are calculated on the basis of data on infant mortality by sex in the period from 2012 to 2014, and the number of livebirths (N) by sex in 2012 and 2013, using the formulas:

Set of the living (L_0)

$$L_0 = {}_{2012}N + {}_{2013}N$$

Set of the deaths (T_0)

$$T_0 = U_{2,4} + U_{2,5} + U_{2,6} + U_{1,5} + U_{1,6} + U_{1,9}$$

- b) Sets of the living and the deaths for children of ages 1 year are calculated on the basis of data on child mortality of this age and number of children who have reached one year in 2012 and 2013, according to the formulas:

Set of the living (L_1)

$$L_1 = L_3 + U_{3,7} + U_{3,5} + U_{3,4} + {}_{2012}N - (U_{2,4} + U_{2,5} + U_{2,6})$$

Set of the deaths (T_1):

$$T_1 = U_{3,4} + U_{3,5} + U_{3,6} + U_{2,7} + U_{2,8} + U_{2,9}$$

- c) For the population aged $x = 2, 3, 4 \dots 99$ years, sets of the living and the deaths are calculated according to the following formulas:

Sets of the living (L_x):

$$L_x = L_n - U_{n,6} + U_{n,7} + L_{n+1} + U_{n+1,4} + U_{n+1,5} + U_{n+1,7}$$

Sets of the deaths (T_x):

$$T_x = U_{n,7} + U_{n,8} + U_{n,9} + U_{n+1,4} + U_{n+1,5} + U_{n+1,6}$$

where is:

L_n - Census population who were born during the n -th calendar year.

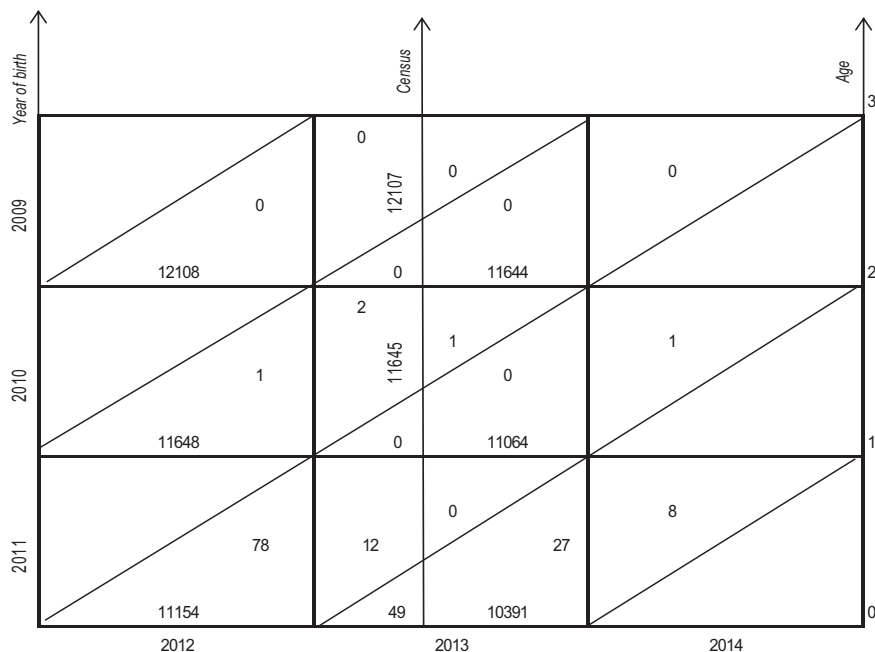
n - ordinal number of the calendar year of birth, in column 2, Table 1.

$U_{n,m}$ - the number of deaths in the period 2012 - 2014 according to reached years of age (column 2 „Ordinal number“), where m is the ordinal number of column in Table 1.

${}_{2012}N$ - number of live born children in 2012.

The influence of time component on the creation of a sets of the living and the deaths is shown in the demographic scheme (Lexis diagram).

Demographic scheme, Federation of Bosnia and Herzegovina, males



CALCULATION OF CRUDE DEATH PROBABILITY (q'_x)

Crude probabilities of deaths (q'_x) are calculated in a uniform way for the total males and females aged $x = 0, 1, 2, \dots 99$ years using the following form:

$$q'_x = \frac{T_x}{L_x}$$

SMOOTHING OF THE CRUDE DEATH PROBABILITY

Smoothing of the crude probability of death is a process of its transformation in order to eliminate the consequences of random errors. These errors usually occur due to an insufficiently high number of the living or the deaths in a certain age.

For smoothing of crude probability is used Karup's formulas which have different intensity. Smoothed probabilities are marked with $q_{x,n}$, where n is the index of the formula intensity (larger n means a more intensive formula).

The general form of Karup's formula is:

$$q_{x,n} = \frac{1}{2n^4} \sum_{v=0}^{n-1} (k_v z_v + k_{n+v} z_{n+v})$$

where is:

$$k_v = 2n^3 - 5nv^2 + 3v^3 \quad n=1,2,3,4,5,\dots$$

$$k_{n+v} = v(n-v)^2 \quad n=1,2,3,4,5,\dots$$

$$z_0 = q'_x$$

$$z_v = q'_{x-v} + q'_{x+v} \quad v \neq 0$$

Special formulas derived from the above general formulas are:

$$q_{x,1} = q'_x$$

$$q_{x,2} = \frac{1}{32} (16q'_x + 9z_1 - z_3)$$

$$q_{x,3} = \frac{1}{162} (54q'_x + 42z_1 + 18z_2 - 4z_4 - 2z_5)$$

$$q_{x,4} = \frac{1}{512} (128q'_x + 111z_1 + 72z_2 + 29z_3 - 9z_5 - 8z_6 - 3z_7)$$

$$q_{x,5} = \frac{1}{1250} (250q'_x + 228z_1 + 174z_2 + 106z_3 + 42z_4 - 16z_6 - 18z_7 - 12z_8 - 4z_9)$$

$$q_{x,6} = \frac{1}{2592} (432q'_x + 405z_1 + 336z_2 + 243z_3 + 144z_4 - 57z_5 - 25z_7 - 32z_8 - 27z_9 - 16z_{10} - 5z_{11})$$

$$q_{x,7} = \frac{1}{4802} (686q'_x + 654z_1 + 570z_2 + 452z_3 + 318z_4 + 186z_5 + 74z_6 - 36z_8 - 50z_9 - 48z_{10} - 36z_{11} - 20z_{12} - z_{13})$$

The formulas with the highest intensity of seven were used here, in this document. For each ages x values $q_{x,1}$ to $q_{x,7}$ are calculated and then the value of $q_{x,k}$ was selected for which:

$$L_x q_{x,k} - T_x = \min_n (L_x q_{x,n} - T_x)$$

The Karup's formula with the intensity 1 and those with the negative number as a result, were not used in the determining of the minimum.

The smoothed death probabilities for ages $x = 0, 1, 2, 3$ are equal to the crude probabilities.

There were no cases of death in male population aged 2 years. Due to this fact, within this population, smoothed rate is not equal to crude death rate, but available Karup's formulas were used for calculating smoothed death rates.

For age $x = 4, 5 \dots 11, 12$ all seven Karup's formulas cannot be applied. In these cases, the above mentioned procedure of seeking the minimum of the available formulas is applied.

In interval $x=81$ to $x=98$, the probabilities q_x are computed on the basis of exponential curve model.

$$q_x = bc^{x-80}$$

where is

$$b = q_{80}$$

$$c = (q_{99}/q_{80})^{1/19}$$

where the value of q_{80} is equal to the smoothed probability of death by Karup's formulas.

The probabilities of deaths for the age of 99 are fixed values obtained by reducing these probabilities from the years 2002 - 2004, for the average value of decrease of these probabilities in the periods 1970-1972 to 1980-1982, from 1980-1982 to 1990-1992, and from 1990-1992 to 2002-2004.*

*Detailed life table for Federation of Bosnia and Herzegovina were not produced so far, the value for this year is taken from the life table of the neighbouring countries, Serbia and Montenegro.

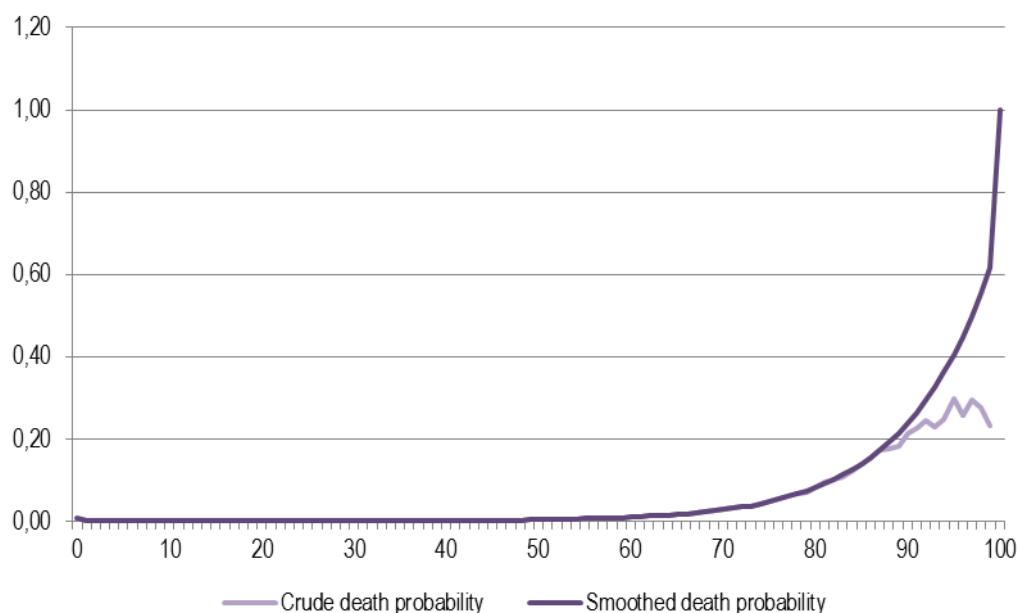
Table 2: Calculation of the value of q_{99}

	Year	Value q_{99}	Change by periods	Average value of changes by periods	q_{99}
Total	1970 - 1972	0,69094			
	1980 - 1982	0,68840	-0,00254		
	1990 - 1992	0,66279	-0,02561		
	2002 - 2004	0,63534	-0,02745	-0,01853	0,61681
Male	1970 - 1972	0,68681			
	1980 - 1982	0,6842	-0,00261		
	1990 - 1992	0,6564	-0,0278		
	2002 - 2004	0,62704	-0,02936	-0,01992	0,60712
Female	1970 - 1972	0,69507			
	1980 - 1982	0,6926	-0,00247		
	1990 - 1992	0,66918	-0,02342		
	2002 - 2004	0,64364	-0,02554	-0,01714	0,62650

Table 3: The frequency of use of special formulas to smooth the crude probabilities of death

Total population	Federaton of Bosnia and Herzegovina
Crude death probability	
Karup's formulas of different intensity	4
2	31
3	9
4	6
5	5
6	16
7	11
Exponential curve	19
Male population	
Crude death probability	
Karup's formulas of different intensity	4
2	33
3	8
4	4
5	6
6	18
7	9
Exponential curve	19
Female population	
Crude death probability	
Karup's formulas of different intensity	4
2	28
3	13
4	4
5	4
6	15
7	14
Exponential curve	19

Diagram 1: Crude and smoothed death probabilities, Federation of Bosnia and Herzegovina, Total population



PRODUCTION OF OTHER INDICATORS (BIOMETRIC FUNCTIONS) IN THE LIFE TABLE

All other values are calculated from the smoothed probabilities of death (q_x) in the life table. This probability of death was applied to a fictitious mass of 100 000 born at the same time in order to obtain the value of the number of the living, as well as the values of other biometric functions.

Therefore, all the other indicators in the life table are based on the probabilities of death, and in their designing were used the following formulas:

Number of the living (l_x), (za $l_0=100000$):

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

Probability of survival (p_x):

$$p_x = 1 - q_x$$

Number of the deaths (d_x):

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

The sum of the number of the living (N_x):

$$N_x = \sum_{x=0}^{100} l_x$$

The average life duration:

$$e_x^0 = 0,5 + (1 - q_x)(e_{x+1}^0 + 0,5)$$

The numerical values of the biometric functions are provided in the appropriate columns in the tabular part of the publication.

APPLIED SYMBOLS WITH EXPLANATIONS

x - number of reached years of age.

L_x - number of persons born in the n -th and in the $(n+1)$ year, who in 2012 or 2013 reached the age of x .

T_x - number of persons aged x years on the day of the death.

L_n - census population who were born during the n -th calendar year.

$U_{n,m}$ - the number of deaths in the period 2012 - 2014 according to reached years of age (column 2 „Ordinal number“), where m is the ordinal number of the column in Table 1.

n - ordinal number of the calendar year of birth, in column 2, Table 1.

${}_{2012}N$ - number of live born children in 2012. godine.

q'_x - crude probability of death

q_x - probability of death. It is probability that a person aged x years will die before he/she reaches the age of $(x+1)$ year. This probability of death (q_x) is obtained by smoothing the crude probability of death (q'_x).

p_x - probability of survival. It is probability that a person aged x years will reach the age of $x+1$ year.

l_x - the number of living aged x years exactly. It starts with the initial value $l_0=100\ 000$, with $l_x=l_{x-1} \cdot p_{x-1}$ and decreases due to the age-related mortality.

d_x - number of deaths. This number shows how many persons, among of the number of living persons (l_x) at a given age x , according to the smoothed death probability (q_x), die before they reach the age of $x+1$ year.

N_x - the sum of the living. This number is used to calculate the average life expectancy (e_x), and implies fictitious totals of persons from the group of 100 000 in the same time born persons who survived zero year, then those who are of these survived the first, second, etc., up to a hundred years. Technically, this number is obtained by cumulating the value l_x , starting from the hundred years.

e^0_x - average life duration expressed in years. This number shows the life expectancy of a person aged x years under the terms of mortality by age from a period to which the life table refers.

DETAILED LIFE TABLE 2012 - 2014

LIFE TABLE 2012 - 2014, FEDERATION OF BOSNIA AND HERZEGOVINA, TOTAL POPULATION

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L_x	T_x	q'_x	q_x	P_x	l_x	d_x	N_x	e_x^0
0	41617	288	0,0069202	0,0069202	0,9930798	100000	692	7673161	76,23
1	43949	16	0,0003641	0,0003641	0,9996359	99308	36	7573161	75,76
2	46098	6	0,0001302	0,0001302	0,9998698	99272	13	7473853	74,79
3	47565	8	0,0001682	0,0001682	0,9998318	99259	17	7374581	73,80
4	48265	7	0,0001450	0,0001468	0,9998532	99242	15	7275322	72,81
5	47197	7	0,0001483	0,0000400	0,9999600	99228	4	7176080	71,82
6	45852	4	0,0000872	0,0001028	0,9998972	99224	10	7076852	70,82
7	46018	5	0,0001087	0,0000618	0,9999382	99213	6	6977629	69,83
8	46245	2	0,0000432	0,0000892	0,9999108	99207	9	6878415	68,83
9	46794	8	0,0001710	0,0001050	0,9998950	99198	10	6779208	67,84
10	47744	7	0,0001466	0,0001415	0,9998585	99188	14	6680009	66,85
11	48780	10	0,0002050	0,0001346	0,9998654	99174	13	6580821	65,86
12	50358	7	0,0001390	0,0001605	0,9998395	99161	16	6481647	64,87
13	52267	11	0,0002105	0,0001719	0,9998281	99145	17	6382487	63,88
14	56559	8	0,0001414	0,0001805	0,9998195	99128	18	6283342	62,89
15	63253	14	0,0002213	0,0001939	0,9998061	99110	19	6184214	61,90
16	69441	17	0,0002448	0,0002112	0,9997888	99091	21	6085104	60,91
17	71498	12	0,0001678	0,0002246	0,9997754	99070	22	5986014	59,92
18	63373	21	0,0003314	0,0002917	0,9997083	99047	29	5886944	58,94
19	52246	18	0,0003445	0,0003396	0,9996604	99019	34	5787896	57,95
20	53406	29	0,0005430	0,0003629	0,9996371	98985	36	5688878	56,97
21	61326	22	0,0003587	0,0003816	0,9996184	98949	38	5589893	55,99
22	64257	27	0,0004202	0,0003976	0,9996024	98911	39	5490944	55,01
23	63625	31	0,0004872	0,0004073	0,9995927	98872	40	5392033	54,04
24	64531	21	0,0003254	0,0003830	0,9996170	98832	38	5293161	53,06
25	65712	26	0,0003957	0,0003680	0,9996320	98794	36	5194329	52,08
26	65181	25	0,0003835	0,0004212	0,9995788	98757	42	5095535	51,10
27	65178	35	0,0005370	0,0004585	0,9995415	98716	45	4996778	50,12
28	66077	34	0,0005146	0,0004997	0,9995003	98671	49	4898062	49,14
29	65813	31	0,0004710	0,0005121	0,9994879	98621	50	4799391	48,16
30	65312	39	0,0005971	0,0006114	0,9993886	98571	60	4700770	47,19
31	65361	60	0,0009180	0,0006521	0,9993479	98511	64	4602199	46,22
32	64749	50	0,0007722	0,0006916	0,9993084	98446	68	4503689	45,25
33	63832	46	0,0007206	0,0007078	0,9992922	98378	70	4405243	44,28
34	63245	39	0,0006166	0,0006899	0,9993101	98309	68	4306864	43,31
35	62935	53	0,0008421	0,0007545	0,9992455	98241	74	4208556	42,34
36	63788	50	0,0007838	0,0008372	0,9991628	98167	82	4110315	41,37
37	64074	60	0,0009364	0,0009296	0,9990704	98084	91	4012149	40,41
38	62764	73	0,0011631	0,0010168	0,9989832	97993	100	3914064	39,44
39	61754	64	0,0010364	0,0011172	0,9988828	97894	109	3816071	38,48
40	62049	77	0,0012410	0,0012360	0,9987640	97784	121	3718177	37,52
41	63098	96	0,0015214	0,0013540	0,9986460	97663	132	3620393	36,57
42	61014	81	0,0013276	0,0014620	0,9985380	97531	143	3522730	35,62
43	61358	104	0,0016950	0,0016525	0,9983475	97389	161	3425198	34,67
44	63989	125	0,0019535	0,0019287	0,9980713	97228	188	3327810	33,73
45	64565	153	0,0023697	0,0021692	0,9978308	97040	210	3230582	32,79
46	66430	168	0,0025290	0,0024361	0,9975639	96830	236	3133542	31,86
47	68380	165	0,0024130	0,0025905	0,9974095	96594	250	3036713	30,94
48	68709	210	0,0030564	0,0030265	0,9969735	96343	292	2940119	30,02
49	68768	251	0,0036500	0,0034941	0,9965059	96052	336	2843775	29,11

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L_x	T_x	q'_x	q_x	P_x	l_x	d_x	N_x	e_x^0
50	69763	281	0,0040279	0,0039368	0,9960632	95716	377	2747723	28,21
51	70589	300	0,0042500	0,0043920	0,9956080	95339	419	2652007	27,32
52	70499	355	0,0050355	0,0048835	0,9951165	94921	464	2556668	26,43
53	68779	374	0,0054377	0,0054025	0,9945975	94457	510	2461747	25,56
54	67677	404	0,0059695	0,0059591	0,9940409	93947	560	2367290	24,70
55	65079	446	0,0068532	0,0065468	0,9934532	93387	611	2273343	23,84
56	62919	419	0,0066594	0,0071586	0,9928414	92776	664	2179956	23,00
57	62989	528	0,0083824	0,0078874	0,9921126	92112	727	2087180	22,16
58	62304	547	0,0087795	0,0086340	0,9913660	91385	789	1995069	21,33
59	60508	554	0,0091558	0,0092860	0,9907140	90596	841	1903684	20,51
60	58093	588	0,0101217	0,0103540	0,9896460	89755	929	1813088	19,70
61	52146	634	0,0121582	0,0115494	0,9884506	88825	1026	1723333	18,90
62	48623	622	0,0127923	0,0126897	0,9873103	87799	1114	1634508	18,12
63	49636	698	0,0140624	0,0139420	0,9860580	86685	1209	1546708	17,34
64	45884	711	0,0154956	0,0153481	0,9846519	85477	1312	1460023	16,58
65	42546	757	0,0177925	0,0168170	0,9831830	84165	1415	1374546	15,83
66	39709	722	0,0181823	0,0182454	0,9817546	82749	1510	1290381	15,09
67	34593	670	0,0193681	0,0196280	0,9803720	81240	1595	1207632	14,37
68	30585	676	0,0221023	0,0226227	0,9773773	79645	1802	1126392	13,64
69	29474	809	0,0274479	0,0256652	0,9743348	77843	1998	1046747	12,95
70	30734	887	0,0288605	0,0285034	0,9714966	75845	2162	968904	12,27
71	33099	1101	0,0332638	0,0316434	0,9683566	73684	2332	893058	11,62
72	35065	1260	0,0359333	0,0349588	0,9650412	71352	2494	819374	10,98
73	34743	1253	0,0360648	0,0373766	0,9626234	68858	2574	748022	10,36
74	32908	1386	0,0421174	0,0422548	0,9577452	66284	2801	679165	9,75
75	31156	1549	0,0497176	0,0482553	0,9517447	63483	3063	612881	9,15
76	29168	1592	0,0545804	0,0537452	0,9462548	60420	3247	549398	8,59
77	27057	1637	0,0605019	0,0598493	0,9401507	57172	3422	488978	8,05
78	24603	1665	0,0676747	0,0663486	0,9336514	53751	3566	431805	7,53
79	21795	1551	0,0711631	0,0726447	0,9273553	50184	3646	378055	7,03
80	19313	1576	0,0816031	0,0822160	0,9177840	46539	3826	327870	6,55
81	16574	1573	0,0949077	0,0914153	0,9085847	42713	3905	281331	6,09
82	14529	1495	0,1028977	0,1016440	0,8983560	38808	3945	238619	5,65
83	12611	1373	0,1088732	0,1130172	0,8869828	34863	3940	199811	5,23
84	10420	1293	0,1240883	0,1256630	0,8743370	30923	3886	164947	4,83
85	8278	1159	0,1400097	0,1397237	0,8602763	27037	3778	134024	4,46
86	6317	967	0,1530790	0,1553577	0,8446423	23260	3614	106987	4,10
87	5022	873	0,1738351	0,1727411	0,8272589	19646	3394	83727	3,76
88	3689	649	0,1759284	0,1920695	0,8079305	16252	3122	64081	3,44
89	2812	510	0,1813656	0,2135607	0,7864393	13131	2804	47829	3,14
90	2161	462	0,2137899	0,2374565	0,7625435	10327	2452	34698	2,86
91	1518	345	0,2272727	0,2640261	0,7359739	7874	2079	24372	2,60
92	1138	278	0,2442882	0,2935686	0,7064314	5795	1701	16497	2,35
93	807	185	0,2292441	0,3264167	0,6735833	4094	1336	10702	2,11
94	425	106	0,2494118	0,3629403	0,6370597	2758	1001	6608	1,90
95	231	69	0,2987013	0,4035506	0,5964494	1757	709	3850	1,69
96	151	39	0,2582781	0,4487048	0,5512952	1048	470	2093	1,50
97	119	35	0,2941176	0,4989115	0,5010885	578	288	1045	1,31
98	119	33	0,2773109	0,5547359	0,4452641	289	161	468	1,12
99	215	50	0,2325581	0,6168067	0,3831933	129	79	178	0,88
100				1,0000000		49	49	49	0,50

LIFE TABLE 2012 - 2014, FEDERATION OF BOSNIA AND HERZEGOVINA, MALES

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L _x	T _x	q' _x	q _x	P _x	l _x	d _x	N _x	e _x ⁰
0	21545	174	0,0080761	0,0080761	0,9919239	100000	808	7441425	73,91
1	22712	5	0,0002201	0,0002201	0,9997799	99192	22	7341425	73,51
2	23752	0	0,0000000	0,0001424	0,9998576	99171	14	7242233	72,53
3	24470	7	0,0002861	0,0002861	0,9997139	99156	28	7143062	71,54
4	24746	4	0,0001616	0,0002199	0,9997801	99128	22	7043906	70,56
5	24278	6	0,0002471	0,0000899	0,9999101	99106	9	6944778	69,57
6	23628	3	0,0001270	0,0001534	0,9998466	99097	15	6845672	68,58
7	23593	3	0,0001272	0,0001104	0,9998896	99082	11	6746574	67,59
8	23673	2	0,0000845	0,0001197	0,9998803	99071	12	6647492	66,60
9	24185	5	0,0002067	0,0001608	0,9998392	99059	16	6548421	65,61
10	24670	6	0,0002432	0,0002040	0,9997960	99043	20	6449362	64,62
11	24961	7	0,0002804	0,0001957	0,9998043	99023	19	6350318	63,63
12	25783	6	0,0002327	0,0002239	0,9997761	99004	22	6251295	62,64
13	26618	6	0,0002254	0,0002320	0,9997680	98982	23	6152291	61,66
14	28764	7	0,0002434	0,0002496	0,9997504	98959	25	6053309	60,67
15	32449	11	0,0003390	0,0002595	0,9997405	98934	26	5954351	59,69
16	35892	8	0,0002229	0,0002666	0,9997334	98908	26	5855417	58,70
17	36753	11	0,0002993	0,0003030	0,9996970	98882	30	5756508	57,72
18	32504	14	0,0004307	0,0004260	0,9995740	98852	42	5657626	56,73
19	27019	15	0,0005552	0,0005224	0,9994776	98810	52	5558774	55,76
20	27281	20	0,0007331	0,0005735	0,9994265	98758	57	5459964	54,79
21	31115	19	0,0006106	0,0006165	0,9993835	98702	61	5361206	53,82
22	32893	23	0,0006992	0,0006505	0,9993495	98641	64	5262504	52,85
23	32590	30	0,0009205	0,0006733	0,9993267	98577	66	5163864	51,88
24	32917	18	0,0005468	0,0006638	0,9993362	98510	65	5065287	50,92
25	33772	21	0,0006218	0,0006054	0,9993946	98445	60	4966777	49,95
26	33659	22	0,0006536	0,0006568	0,9993432	98385	65	4868332	48,98
27	33441	26	0,0007775	0,0006617	0,9993383	98321	65	4769946	48,01
28	33695	23	0,0006826	0,0006680	0,9993320	98256	66	4671626	47,05
29	33527	20	0,0005965	0,0006242	0,9993758	98190	61	4573370	46,08
30	33323	22	0,0006602	0,0008061	0,9991939	98129	79	4475180	45,11
31	33361	43	0,0012889	0,0008455	0,9991545	98050	83	4377051	44,14
32	32917	33	0,0010025	0,0008856	0,9991144	97967	87	4279002	43,18
33	32363	28	0,0008652	0,0008890	0,9991110	97880	87	4181035	42,22
34	32036	26	0,0008116	0,0008843	0,9991157	97793	86	4083155	41,25
35	31804	35	0,0011005	0,0009750	0,9990250	97706	95	3985362	40,29
36	32043	34	0,0010611	0,0010522	0,9989478	97611	103	3887656	39,33
37	32072	35	0,0010913	0,0011392	0,9988608	97508	111	3790045	38,37
38	31237	41	0,0013125	0,0012655	0,9987345	97397	123	3692536	37,41
39	30613	44	0,0014373	0,0014094	0,9985906	97274	137	3595139	36,46
40	30844	48	0,0015562	0,0015550	0,9984450	97137	151	3497865	35,51
41	31447	68	0,0021624	0,0017228	0,9982772	96986	167	3400728	34,56
42	30435	46	0,0015114	0,0017532	0,9982468	96819	170	3303742	33,62
43	30661	57	0,0018590	0,0019760	0,9980240	96649	191	3206923	32,68
44	31874	87	0,0027295	0,0023945	0,9976055	96458	231	3110274	31,74
45	32086	91	0,0028361	0,0026905	0,9973095	96227	259	3013815	30,82
46	32957	103	0,0031253	0,0030333	0,9969667	95968	291	2917588	29,90
47	33676	104	0,0030883	0,0032555	0,9967445	95677	311	2821620	28,99
48	33882	131	0,0038664	0,0037824	0,9962176	95366	361	2725943	28,08
49	34095	150	0,0043995	0,0044436	0,9955564	95005	422	2630577	27,19

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L _x	T _x	q' _x	q _x	P _x	l _x	d _x	N _x	e _x ⁰
50	34432	187	0,0054310	0,0050455	0,9949545	94583	477	2535572	26,31
51	34590	186	0,0053773	0,0056839	0,9943161	94106	535	2440989	25,44
52	34474	232	0,0067297	0,0063770	0,9936230	93571	597	2346883	24,58
53	33742	241	0,0071424	0,0071037	0,9928963	92974	660	2253313	23,74
54	33006	251	0,0076047	0,0078063	0,9921937	92314	721	2160339	22,90
55	31559	284	0,0089990	0,0086367	0,9913633	91593	791	2068025	22,08
56	30718	281	0,0091477	0,0097002	0,9902998	90802	881	1976432	21,27
57	30590	360	0,0117686	0,0107059	0,9892941	89921	963	1885630	20,47
58	30122	351	0,0116526	0,0117869	0,9882131	88958	1049	1795709	19,69
59	29190	380	0,0130182	0,0126003	0,9873997	87910	1108	1706751	18,91
60	27443	356	0,0129723	0,0138341	0,9861659	86802	1201	1618841	18,15
61	24406	403	0,0165123	0,0156732	0,9843268	85601	1342	1532039	17,40
62	22782	400	0,0175577	0,0171725	0,9828275	84260	1447	1446437	16,67
63	22891	432	0,0188720	0,0187914	0,9812086	82813	1556	1362178	15,95
64	20772	430	0,0207009	0,0205645	0,9794355	81257	1671	1279365	15,24
65	19242	453	0,0235423	0,0224645	0,9775355	79586	1788	1198108	14,55
66	17990	444	0,0246804	0,0242840	0,9757160	77798	1889	1118523	13,88
67	15503	397	0,0256079	0,0257968	0,9742032	75909	1958	1040725	13,21
68	13576	382	0,0281379	0,0287827	0,9712173	73950	2128	964816	12,55
69	12930	439	0,0339520	0,0331810	0,9668190	71822	2383	890866	11,90
70	13370	520	0,0388930	0,0366669	0,9633331	69439	2546	819044	11,30
71	14307	596	0,0416579	0,0405097	0,9594903	66893	2710	749606	10,71
72	15014	688	0,0458239	0,0438907	0,9561093	64183	2817	682713	10,14
73	14736	643	0,0436346	0,0463965	0,9536035	61366	2847	618530	9,58
74	13800	739	0,0535507	0,0530414	0,9469586	58519	3104	557164	9,02
75	12989	810	0,0623605	0,0594335	0,9405665	55415	3293	498646	8,50
76	12140	837	0,0689456	0,0651367	0,9348633	52121	3395	443231	8,00
77	11075	795	0,0717833	0,0713378	0,9286622	48726	3476	391110	7,53
78	9857	746	0,0756823	0,0764458	0,9235542	45250	3459	342384	7,07
79	8614	724	0,0840492	0,0831865	0,9168135	41791	3476	297133	6,61
80	7582	692	0,0912688	0,0926736	0,9073264	38315	3551	255342	6,16
81	6480	679	0,1047840	0,1023104	0,8976896	34764	3557	217028	5,74
82	5617	654	0,1164323	0,1129494	0,8870506	31207	3525	182264	5,34
83	4826	591	0,1224617	0,1246947	0,8753053	27682	3452	151057	4,96
84	3932	530	0,1347915	0,1376613	0,8623387	24230	3336	123375	4,59
85	2977	447	0,1501512	0,1519763	0,8480237	20895	3176	99144	4,24
86	2106	331	0,1571700	0,1677799	0,8322201	17719	2973	78249	3,92
87	1539	283	0,1838856	0,1852269	0,8147731	14746	2731	60530	3,60
88	1061	206	0,1941565	0,2044881	0,7955119	12015	2457	45784	3,31
89	771	149	0,1932555	0,2257522	0,7742478	9558	2158	33769	3,03
90	574	136	0,2369338	0,2492276	0,7507724	7400	1844	24211	2,77
91	388	86	0,2216495	0,2751440	0,7248560	5556	1529	16810	2,53
92	263	60	0,2281369	0,3037554	0,6962446	4027	1223	11254	2,29
93	196	46	0,2346939	0,3353421	0,6646579	2804	940	7227	2,08
94	101	21	0,2079208	0,3702134	0,6297866	1864	690	4423	1,87
95	52	21	0,4038462	0,4087108	0,5912892	1174	480	2560	1,68
96	37	7	0,1891892	0,4512115	0,5487885	694	313	1386	1,50
97	29	7	0,2413793	0,4981317	0,5018683	381	190	692	1,32
98	36	14	0,3888889	0,5499310	0,4500690	191	105	311	1,13
99	68	14	0,2058824	0,6071167	0,3928833	86	52	120	0,89
100				1,0000000		34	34	34	0,50

LIFE TABLE 2012 - 2014, FEDERATION OF BOSNIA AND HERZEGOVINA, FEMALES

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L _x	T _x	q' _x	q _x	P _x	l _x	d _x	N _x	e _x ⁰
0	20072	114	0,0056796	0,0056796	0,9943204	100000	568	7902266	78,52
1	21237	11	0,0005180	0,0005180	0,9994820	99432	52	7802266	77,97
2	22346	6	0,0002685	0,0002685	0,9997315	99381	27	7702834	77,01
3	23095	1	0,0000433	0,0000433	0,9999567	99354	4	7603453	76,03
4	23519	3	0,0001276	0,0000693	0,9999307	99350	7	7504099	75,03
5	22919	1	0,0000436	0,0000620	0,9999380	99343	6	7404750	74,04
6	22224	1	0,0000450	0,0000480	0,9999520	99337	5	7305407	73,04
7	22425	2	0,0000892	0,0000165	0,9999835	99332	2	7206071	72,05
8	22572	0	0,0000000	0,0000571	0,9999429	99330	6	7106739	71,05
9	22609	3	0,0001327	0,0000460	0,9999540	99324	5	7007409	70,05
10	23074	1	0,0000433	0,0000754	0,9999246	99320	7	6908084	69,05
11	23819	3	0,0001259	0,0000704	0,9999296	99312	7	6808764	68,06
12	24575	1	0,0000407	0,0000939	0,9999061	99305	9	6709452	67,06
13	25649	5	0,0001949	0,0001029	0,9998971	99296	10	6610147	66,07
14	27795	1	0,0000360	0,0000954	0,9999046	99286	9	6510850	65,08
15	30804	3	0,0000974	0,0001254	0,9998746	99276	12	6411565	64,08
16	33549	9	0,0002683	0,0001390	0,9998610	99264	14	6312288	63,09
17	34745	1	0,0000288	0,0001417	0,9998583	99250	14	6213024	62,10
18	30869	7	0,0002268	0,0001488	0,9998512	99236	15	6113774	61,11
19	25227	3	0,0001189	0,0001478	0,9998522	99221	15	6014538	60,12
20	26125	9	0,0003445	0,0001418	0,9998582	99207	14	5915317	59,13
21	30211	3	0,0000993	0,0001350	0,9998650	99193	13	5816110	58,13
22	31364	4	0,0001275	0,0000922	0,9999078	99179	9	5716918	57,14
23	31035	1	0,0000322	0,0000649	0,9999351	99170	6	5617738	56,15
24	31614	3	0,0000949	0,0000827	0,9999173	99164	8	5518568	55,15
25	31940	5	0,0001565	0,0001149	0,9998851	99155	11	5419405	54,16
26	31522	3	0,0000952	0,0001597	0,9998403	99144	16	5320249	53,16
27	31737	9	0,0002836	0,0002404	0,9997596	99128	24	5221105	52,17
28	32382	11	0,0003397	0,0003077	0,9996923	99104	30	5121977	51,18
29	32286	11	0,0003407	0,0003596	0,9996404	99074	36	5022873	50,20
30	31989	17	0,0005314	0,0004079	0,9995921	99038	40	4923799	49,22
31	32000	17	0,0005313	0,0004510	0,9995490	98998	45	4824761	48,24
32	31832	17	0,0005341	0,0004908	0,9995092	98953	49	4725763	47,26
33	31469	18	0,0005720	0,0005160	0,9994840	98905	51	4626810	46,28
34	31209	13	0,0004165	0,0004908	0,9995092	98854	49	4527905	45,30
35	31131	18	0,0005782	0,0004996	0,9995004	98805	49	4429052	44,33
36	31745	16	0,0005040	0,0005964	0,9994036	98756	59	4330247	43,35
37	32002	25	0,0007812	0,0006845	0,9993155	98697	68	4231491	42,37
38	31527	32	0,0010150	0,0007493	0,9992507	98629	74	4132794	41,40
39	31141	20	0,0006422	0,0008164	0,9991836	98555	80	4034165	40,43
40	31205	29	0,0009293	0,0008218	0,9991782	98475	81	3935610	39,47
41	31651	28	0,0008846	0,0009569	0,9990431	98394	94	3837135	38,50
42	30579	35	0,0011446	0,0011382	0,9988618	98300	112	3738741	37,53
43	30697	47	0,0015311	0,0013026	0,9986974	98188	128	3640441	36,58
44	32115	38	0,0011832	0,0014661	0,9985339	98060	144	3542253	35,62
45	32479	62	0,0019089	0,0016497	0,9983503	97916	162	3444193	34,67
46	33473	65	0,0019419	0,0018374	0,9981626	97755	180	3346277	33,73
47	34704	61	0,0017577	0,0019429	0,9980571	97575	190	3248522	32,79
48	34827	79	0,0022684	0,0022892	0,9977108	97385	223	3150947	31,86
49	34673	101	0,0029129	0,0025631	0,9974369	97163	249	3053562	30,93

Age	Number of the living	Deaths	Crude death probability	Smoothed death probability	Probability of survival	Number of the living	Number of deaths	Sum of number of the living	Average life duration
x	L_x	T_x	q'_x	q_x	P_x	l_x	d_x	N_x	e_x^0
50	35331	94	0,0026606	0,0028536	0,9971464	96914	277	2956399	30,01
51	35999	114	0,0031668	0,0030831	0,9969169	96637	298	2859486	29,09
52	36025	123	0,0034143	0,0034234	0,9965766	96339	330	2762849	28,18
53	35037	133	0,0037960	0,0037379	0,9962621	96009	359	2666510	27,27
54	34671	153	0,0044129	0,0040683	0,9959317	95650	389	2570500	26,37
55	33520	162	0,0048329	0,0044242	0,9955758	95261	421	2474850	25,48
56	32201	138	0,0042856	0,0046682	0,9953318	94840	443	2379589	24,59
57	32399	168	0,0051853	0,0051253	0,9948747	94397	484	2284749	23,70
58	32182	196	0,0060904	0,0056414	0,9943586	93913	530	2190352	22,82
59	31318	174	0,0055559	0,0062174	0,9937826	93383	581	2096439	21,95
60	30650	232	0,0075693	0,0071045	0,9928955	92803	659	2003055	21,08
61	27740	231	0,0083273	0,0078886	0,9921114	92144	727	1910252	20,23
62	25841	222	0,0085910	0,0087813	0,9912187	91417	803	1818109	19,39
63	26745	266	0,0099458	0,0097824	0,9902176	90614	886	1726692	18,56
64	25112	281	0,0111899	0,0109249	0,9890751	89727	980	1636078	17,73
65	23304	304	0,0130450	0,0121233	0,9878767	88747	1076	1546351	16,92
66	21719	278	0,0127999	0,0130812	0,9869188	87671	1147	1457604	16,13
67	19090	273	0,0143007	0,0146015	0,9853985	86524	1263	1369932	15,33
68	17009	294	0,0172850	0,0175582	0,9824418	85261	1497	1283408	14,55
69	16544	370	0,0223646	0,0197236	0,9802764	83764	1652	1198147	13,80
70	17364	367	0,0211357	0,0221591	0,9778409	82112	1820	1114383	13,07
71	18792	505	0,0268731	0,0249203	0,9750797	80292	2001	1032271	12,36
72	20051	572	0,0285273	0,0279824	0,9720176	78291	2191	951979	11,66
73	20007	610	0,0304893	0,0307451	0,9692549	76101	2340	873687	10,98
74	19108	647	0,0338602	0,0344598	0,9655402	73761	2542	797586	10,31
75	18167	739	0,0406782	0,0394935	0,9605065	71219	2813	723826	9,66
76	17028	755	0,0443387	0,0455141	0,9544859	68406	3113	652606	9,04
77	15982	842	0,0526843	0,0518990	0,9481010	65293	3389	584200	8,45
78	14746	919	0,0623220	0,0588645	0,9411355	61904	3644	518907	7,88
79	13181	827	0,0627418	0,0657583	0,9342417	58260	3831	457002	7,34
80	11731	884	0,0753559	0,0751190	0,9248810	54429	4089	398742	6,83
81	10094	894	0,0885675	0,0839909	0,9160091	50341	4228	344313	6,34
82	8912	841	0,0943671	0,0939107	0,9060893	46112	4330	293972	5,88
83	7785	782	0,1004496	0,1050020	0,8949980	41782	4387	247860	5,43
84	6488	763	0,1176017	0,1174032	0,8825968	37395	4390	206078	5,01
85	5301	712	0,1343143	0,1312692	0,8687308	33005	4332	168683	4,61
86	4211	636	0,1510330	0,1467727	0,8532273	28672	4208	135678	4,23
87	3483	590	0,1693942	0,1641073	0,8358927	24464	4015	107006	3,87
88	2628	443	0,1685693	0,1834892	0,8165108	20449	3752	82542	3,54
89	2041	361	0,1768741	0,2051601	0,7948399	16697	3426	62093	3,22
90	1587	326	0,2054190	0,2293906	0,7706094	13271	3044	45396	2,92
91	1130	259	0,2292035	0,2564827	0,7435173	10227	2623	32125	2,64
92	875	218	0,2491429	0,2867746	0,7132254	7604	2181	21898	2,38
93	611	139	0,2274959	0,3206441	0,6793559	5423	1739	14294	2,14
94	324	85	0,2623457	0,3585138	0,6414862	3684	1321	8871	1,91
95	179	48	0,2681564	0,4008561	0,5991439	2363	947	5186	1,69
96	114	32	0,2807018	0,4481992	0,5518008	1416	635	2823	1,49
97	90	28	0,3111111	0,5011337	0,4988663	781	392	1407	1,30
98	83	19	0,2289157	0,5603201	0,4396799	390	218	625	1,10
99	147	36	0,2448980	0,6264967	0,3735033	171	107	235	0,87
100				1,0000000		64	64	64	0,50