HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES
DEMOGRAPHY PROGRAM

THE IMPACT OF COMPETING RISKS OF DEATH ON GAINS AND LOSSES IN LIFE EXPECTANCY IN TURKEY

Dilek TORUN

M.A. thesis submitted for the partial fulfilment
of the requirements for the M.A. degree
in Demography Program at Hacettepe University
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Ankara
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Supervisor
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This is to certify that we have read and examined this thesis and in our opinion it fulfills the requirements in scope and quality of a thesis for the degree of Master of Arts in Demography.

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SUMMARY

Mortality measures used for analyzing the mortality level of a population fail to quantify the effects of premature deaths. For this reason, alternative measures are developed to explain the mortality trends of a population. Years of potential life lost (YPLL) and potential gains in life expectancy (PGLE) are two measures for analyzing the effect of premature deaths. These measures enable to examine the premature mortality patterns of a population in terms of causes of death.

The main objective of this thesis is to calculate the YPLL and PGLE indicators for Turkey according to the major groups of causes of death. In Turkey, country wide and reliable causes of death statistics are not available. Therefore, cause specific mortality analyses are carried out under the assumption of available data on causes of death are representing the mortality pattern of actual population. Another assumption is related to the independence of causes of death; it is assumed that competing risks of death act independently. For applying cause specific mortality analyses, single and multiple decrement life tables and then further associated single decrement life tables are constructed. The life tables are constructed by using the infant mortality rates derived from the results of Turkish Demographic and Health Survey 1998, 2003 and 2008.

The results of the PGLE analyses are represented by complete and partial elimination of causes of death. YPLL results are estimated as lifetime YPLL and YPLL up to age 65 for each group of cause of death. The findings suggest that the overall effect of premature mortality shows a decreasing trend during the period 2000 – 2008 in Turkey. Cardiovascular diseases and cancers are the leading causes of death affecting premature mortality. It is observed that the impact of cancers and injuries on premature mortality are greater for the younger age groups in Turkey.

ÖZET

Nüfusun ölümlülük düzeyini analiz etmek üzere kullanılan ölüm oranı göstergeleri, prematüre ölümlerin etkilerini ölçememektedir. Bu sebeple, nüfusun ölümlülük eğilimlerini açıklamak için alternatif göstergeler geliştirilmiştir. Kaybedilen potansiyel yaşam yılı (YPLL) ve potansiyel yaşam yılı kazancı (PGLE) prematüre ölümlerin etkisini analiz etmek için kullanılan iki göstergedir. Bu göstergeler nüfusun erken mortalite örüntülerinin ölüm nedenleri açısından değerlendirilmesine imkan sağlamaktadır.

Bu tezin temel amacı Türkiye için YPLL ve PGLE göstergelerini ana ölüm nedeni gruplarına göre hesaplamaktır. Türkiye'de ülke çapında ve güvenilir ölüm nedeni istatistikleri mevcut değildir. Bu nedenle, etkene özel mortalite analizleri, mevcut ölüm nedeni istatistiklerinin nüfusun gerçek mortalite örüntüsünü yansıttığı varsayımıyla yapılmıştır. Bir diğer varsayım ölüm nedenlerin bağımsızlığı ile ilgilidir; yarışan ölüm risklerinin birbirinden bağımsız olduğu varsayılmıştır. Etkene özel mortalite analizlerini uygulamak için, tekli ve çoklu azalım yaşam tabloları ve sonrasında birleştirilmiş tekli azalım yaşam tabloları oluşturulmuştur. Yaşam tabloları Türkiye Nüfus ve Sağlık Araştırması 1998, 2003 ve 2008 sonuçlarından derlenen bebek ölüm oranları kullanılarak oluşturulmuştur.

PGLE analizlerinin sonuçları ölüm nedenleri tamamen ve kısmen elimine edilerek verilmiştir. YPLL sonuçları her ölüm nedeni grubu için yaşam boyu kaybedilen potansiyel yaşam yılı ve 65 yaşına kadar kaybedilen potansiyel yaşam yılı olarak hesaplanmıştır. Bulgulara göre, Türkiye'de 2000 – 2008 yılları arasında erken mortalitenin toplam etkisi azalan bir eğilim göstermiştir. Kardiyovasküler hastalıklar ve kanserler erken mortaliteyi etkileyen en önemli ölüm nedenleridir. Kanserler ve yaralanmaların erken mortalite üzerindeki etkisinin genç yaş grupları için daha fazla olduğu gözlemlenmiştir.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The change in mortality levels and patterns is a significant research topic for demographers. Mortality rates and life expectancy are frequently used for analyzing the change in mortality. General mortality rates are the measures of the number of deaths in a population and they are generally determined by crude and age-specific death rates. Life expectancy is the number of years of life remaining at a specific age and provides summary information about the mortality conditions of a population.

General mortality rates have no representation power of the mortality trends of young people as they are dominated by chronic diseases among the elderly, especially diseases of the cardiovascular system and malignant neoplasms. Measuring premature mortality in addition to overall death rates provides more information that can be used both to develop and to monitor health programmes that are aimed at reducing premature mortality (Weerasinghe, Yusuf and Parr, 2009). The particular causes of death playing substantial role in mortality are aimed to be reduced by policy makers by the help of these analyses. The importance of a cause of death is estimated by calculating the number of years gained or lost by elimination of specific causes of death.

Years of potential life lost (YPLL) and potential gains in life expectancy (PGLE) are the two indicators for measuring the impact of premature deaths from different causes of death in a population. General death rates fail to quantify the burden of loss resulting from premature mortality. YPLL, in contrast, is presented as an index that focuses on the social and economic consequences of mortality (Gardner and Sanborn, 1990). YPLLs represent the total number of years that a person would have lived if he/she is not died from a particular cause of death. It is the weighted sum of number of deaths from a specific cause in the concerned period. This method fails to take into account competing risks and is heavily influenced by population age structures. PGLEs represent the added years of life expectancy the population would receive if the deaths from a particular cause were reduced or eliminated (Lai and Hardy, 1999). They are based on the multiple decrement life table technique and competing risks of death are taken into consideration. Multiple decrement tables represent the change in life expectancies for two or more forms of exit. The life table concerning various causes of death is a method for estimating the role of causes of death in life expectancies. By eliminating one or more causes of death, the effect of corresponding causes on life expectancy can be analyzed. Since death is usually attributed to a single cause, the effect of competing causes of death is considered in the PGLE analysis.

Many studies were developed for measuring the effect of premature deaths all over the world, especially in the areas of demography, epidemiology and public health. In Turkey, a couple of studies were implemented in this area. The national burden of disease and cost effectiveness project for Turkey was applied as a part of global burden of disease (GBD) framework implemented by World Health Organization (WHO). GBD analysis measures mortality and loss of health due to diseases, injuries and risk factors for all regions of the world. The total burden of disease is measured by using disability-adjusted life year (DALY). DALY combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health. The national project was applied by Refik Saydam Hygiene Center Presidency and Başkent University for the year 2000. The analysis of years life lost and disability-adjusted life year are implemented for national and regional level (Refik Saydam Hygiene Center Presidency, 2004). Burden of disease methods were applied to cause of death data by Akgün, Rao, et al. (2007) in order to derive national cause-specific mortality estimates. Their study examines the application of different methods to develop national mortality estimates in Turkey, and their implications for national health development policies. Another study about premature mortality was performed by Naci and Baker (2008). The total years of potential life lost and potentially productive years of life lost from mortality were calculated in order to estimate the cost of productivity losses from road traffic deaths in Turkey.

The thesis contributes to the literature on premature mortality in Turkey since there is limited number of studies on the topic.

The main objective of this thesis is to examine gain and loss in life expectancy in Turkey according to the major groups of causes of death. The objectives of the thesis can be summarized as follows:

1. To construct the single and multiple decrement life tables and then further associated single decrement life tables by eliminating the major groups of causes of death for the years 2000 and 2008,
2. To calculate PGLE and YPLL by using associated single decrement life table techniques for the years 2000 and 2008,
3. To analyze the changes in PGLE and YPLL in the period of 2000-2008,
4. To compare the results with some selected countries,
5. To develop policy implications considering the results of the analysis.

The thesis consists of five chapters. In Chapter 2, the methodology of the YPLL and PGLE analysis will be introduced. The data sources, methods and computational procedure are included in this chapter. The literature review is represented in Chapter 3, where the examples of YPLL and PGLE applications will be reviewed. In Chapter 4, beside the application of the methods and results, the comparison of results will be presented. Finally, findings will be discussed in Chapter 5.

2. DATA SOURCES AND METHODOLOGY

The data sources and methodology used in the thesis are reviewed in this chapter. The data sources are interpreted in the first section. Life table methodology and computational procedure are explained in the second and third sections. Then, the multiple decrement processes are represented in the fourth section. After the two sections representing the concepts of potential gains in life expectancy and years of potential life lost, the assumptions and limitations of the method are interpreted.

2.1. DATA SOURCES

The province and district death statistics derived by Turkish Statistical Institute (TURKSTAT) for the years 2000 and 2008, the results of 2000 population census and 2008 address based population registration system and the last three Turkish Demographic and Health Surveys (TDHS) conducted by Hacettepe University Institute of Population Studies in 1998, 2003 and 2008 are the data sources of this thesis.

2.1.1. Death Statistics of TURKSTAT

Mortality data can be mainly provided from vital registration systems, censuses or demographic surveys. Since the vital registration system in Turkey is not effectively working, there is no reliable information about mortality levels and patterns. Although TURKSTAT is providing the mortality data using The Central Civil Registration System (MERNIS) together with the data derived by TURKSTAT since 2009, comprehensive death statistics are not published yet.

TURKSTAT has collected mortality data from 1931 to 1949 for the most populous 25 provincial centers, from 1950 to 1956 for all provincial centers, and for all provincial and district centers since 1957. The death events occurring in province and district centers are registered by municipal officers by using the “Death Statistics Form”. Data derived on death events are sent to Regional Office of TURKSTAT by the health directorates in the provinces and by health centers in the districts (TURKSTAT, 2009).

Although it is a legal obligation to fill “Death Statistics Form” together with a “Burial permission form” for the death events, there is serious underreporting of deaths at province and district levels (Refik Saydam Hygiene Center Presidency, 2004). Besides underreporting of deaths, misreporting is another consequence of data collection procedure. Death forms may contain missing or incorrect information or they may not be filled in compliance with the classification systems.

Death statistics of TURKSTAT are classified in compliance with the International Disease Categories (ICD-8) containing 50 and 150 diseases as required by the World Health Organization since 2009. After 2009 death statistics are classified in accordance with the classification system ICD-10 which is used by Ministry of Health since 2005.

Since information on deaths are collected in the province and district level, geographic units smaller than districts are excluded in the mortality statistics of TURKSTAT until 2009. Country wide death statistics provided from MERNIS are published since 2009 but they are not published in detail yet. Data on deaths by selected causes, sex and age group are not accessible for the years just after 2009.

Deaths by 150 selected causes, sex and age group for province and district centers for the years 2000 and 2008 is used in this study. Causes of death are grouped according to the major causes of death concerning public health issues. Major groups are cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases. Groups of causes of death and corresponding diseases are shown in Appendix A.

The major groups of death and number of cases related to these groups together with their percentage distribution are given in Table 2.1.1. As seen in the table, approximately half of the death events occur due to cardiovascular diseases

(CVD) in Turkey. The secondary cause of death is cancer for both years, covering nearly 15 percent of death events. Respiratory diseases and infectious diseases are other important diseases that affect mortality; they cover about 10 percent of causes of death. Nearly 5 percent of people die from injuries in Turkey.

Table 2.1.1. Number of cases and percentages of major causes of death in Turkey

Major groups of death	**2000**		**2008**	
	Number of cases	Percentage	Number of cases	Percentage
Cardiovascular diseases	83834	48%	106956	50%
Cancers	23681	14%	33188	15%
Respiratory diseases	12167	7%	21821	10%
Infectious diseases	5516	3%	4226	2%
Injuries	8305	5%	5950	3%
Other diseases	40812	23%	43421	20%
Total	174315	100%	215562	100%

Source: TURKSTAT, 2003 and 2009

2.1.2. 2000 Population Census / 2008 Address Based Population Registration System

In Turkey, the first population census was carried out in 1927. Subsequent population censuses were carried out between 1935 and 1990 regularly, in years ending with 0 and 5. In the year 1990, population censuses have been decided to be carried out in years ending with 0 by a law and the last population census was conducted in the year 2000.

Address Based Population Registration System (ABPRS) was established in 2007 by registering all addresses within the boundaries of the country in the National Address Database and registering all Turkish Citizens living in these addresses linked to the Identification Number. Since the beginning of 2008, changes in the addresses are updated by municipalities and special administration of provinces and changes in the places of residences are updated by the population registration offices based on declaration of persons. Instead of population censuses conducted in every ten years, information on population size according to the place of usual residence is published annually by TURKSTAT.

In this study, 2000 population census and 2008 ABPRS results according to sex and age groups are used. 2000 population census was carried out in October and the results of 2008 ABPRS refer to the end of the year. The population is adjusted to the mid-year for both of the years. The unknown age group is distributed by age for 2000 population census.

2.1.3. Turkish Demographic and Health Surveys (TDHS) 1998, 2003 and 2008

TDHS 1998, TDHS 2003 and TDHS 2008 are the part of the series of quinquennial demographic surveys conducted by Hacettepe University Institute of Population Studies. The aim of these surveys is to provide information on trends and levels in fertility, infant and child mortality and contraceptive prevalence, as well as for the health indicators for Turkey. (HUIPS, 2004)

A weighted, multistage, stratified cluster sampling approach was used for the three surveys. For TDHS 1998, the estimates of population and health indicators for Turkey as whole, urban and rural areas and major five regions of the country (West, South, Central, North and East) were provided by the sample design. In TDHS 2003, survey results were also presented for 12 geographical regions (NUTS 1) which were adopted as part of Turkey's process of adaptation to the European Union. In TDHS-2008, beside the four domains in TDHS-2003, the seven metropolitan cities which are larger than one million population (İstanbul, Ankara, İzmir, Bursa, Adana, Konya, Gaziantep) was added in the sample design.

Fieldwork was implemented between August 1998 and November 1998 for TDHS 1998 and 8576 women in 8059 households were successfully interviewed. Fieldwork for the TDHS 2003 was conducted between December 2003 and May 2004. Fieldwork teams visited 80 of the 81 provinces in Turkey. Interviews were carried out with 8075 ever-married women in 10836 households. TDHS 2008 data collection was carried out between October 2008 and December 2008. In 10525 households, 7405 women were interviewed.

Two main types of questionnaires were used to in three of the surveys: the Household Questionnaire and the Individual Questionnaire for ever-married women of reproductive ages. The contents of these questionnaires were based on the DHS Model "A" Questionnaire, which was designed for the Demographic and Health Surveys program for use in countries with high contraceptive prevalence. The Household Questionnaire was used to enumerate all usual members of and visitors to the selected households and to collect information relating to the socioeconomic position of the households. The Individual Questionnaire for ever-married women obtained information about fertility characteristics, infant and child mortality, contraceptive prevalence, health and women’s status.

In the thesis, probability of dying between ages 0-1 $({}_1q_0)$ - infant mortality rate (IMR) - is derived by using TDHS 1998, TDHS 2003 and TDHS 2008 results. TDHS results provide information on IMR for both sexes combined. Separate estimates for IMR on annual basis are made by using Toros’s (2000) segregation of IMR method. During the application of the method, the reference period for the surveys is determined and IMR for males and females referring to the mid year for 2000 and 2008 are calculated.

2.2. LIFE TABLES

Life table is a method for describing the mortality behavior of a population. By using life table, various information like the probability of surviving/dying at any particular age or remaining life expectancy are estimated. Life tables are also used for the purpose of comparing mortality of different populations. One of the main advantages is that they do not reflect the effects of the differences in the age structure of different populations and do not require the adoption of a standard population for acceptable comparisons of mortality levels (Siegel and Swanson, 2004).

Complete, or unabridged, life tables provide information on each year of age, whereas age groups are used for abridged life tables. An abridged life table contains data at intervals of 5 or 10 years of age for most of the age range. Abridged life tables are used commonly in the demographic analysis because they are less burdensome to prepare and give more concise picture of mortality.

Life tables are also classified into two types according to the reference year of the table. Cohort - or generational - life tables observe the mortality experience of real cohorts. They describe the mortality behavior of an actual cohort born in the same year or group of years. Since construction of a cohort life table is not always possible because of practical reasons like unavailability or incompleteness of cohort data, period life tables are developed. A period life table presents the information of a synthetic or hypothetical cohort in a period. In other words, a cohort life table records the information about what actually happened to that cohort; a period life table is a model of what would happen to a hypothetical cohort if a certain set of mortality conditions pertained during its life (Preston, 2001).

The mortality experience of a population in a short period is summarized by period life tables. They are based on the age specific death rates of a relatively short period of time, usually one to three years. Age specific death rates for the observed period are transformed to the age specific probabilities of dying; and these probabilities are applied to a hypothetical cohort of usually 100.000 newborns. The cohort of 100.000 people are assumed to be subject to the age specific death rates observed in the particular period of time in a region or country. Period life tables, sometimes called as current life tables, are very powerful tools for interpreting the current mortality situation of a population and they are useful for representing the changes in the mortality through time.

2.2.1. Life Table Functions

The functions commonly used in life tables and relationship between them are presented in Table 2.2.1. The following steps are applied for constructing a life table by using these functions:

1. It is assumed that age specific death rate from observed data is equal to the age specific death rate in the cohort. (Assume ${}_nm_x$ = ${}_nM_x$)

2. Probability of dying $({}_nq_x)$ values are derived from age specific death rates $({}_nm_x)$:

   ${}_nq_x = n * {}_nm_x \,/\, (1 - (n - {}_na_x) * {}_nm_x)$

3. Probability of surviving: ${}_np_x = 1 - {}_nq_x$

4. The number of persons surviving: $l_{x+n} = l_x * {}_np_x$

5. The number of persons dying between ages *x* and *x*+*n*: ${}_nd_x = l_x - l_{x+n}$

6. The total number of person-years lived in the age group: ${}_nL_x = n * l_{x+n} + {}_nd_x * {}_na_x$

7. The total number of person years lived after age *x*: $T_x = \sum_{a=x}^{\infty} {}_nL_a$

8. Life expectancy: $e_x = T_x / l_x$

Table 2.2.1. Life table functions

Life table function	Explanation	Formula
$\boldsymbol{l_x}$	The number of persons surviving at age *x*. l_0 is an arbitrary number called radix, it would be usually numbered as 1, 1.000 or 100.000	$l_{x+n} = l_x * {}_np_x$
$\boldsymbol{{}_nd_x}$	The number of persons dying between ages *x* and *x+n*	${}_nd_x = l_x - l_{x+n}$
$\boldsymbol{{}_np_x}$	The probability of surviving between exact ages *x* and *x+n*	${}_np_x = l_{x+n} / l_x$
$\boldsymbol{{}_nq_x}$	The probability of dying between exact ages *x* and *x+n*	${}_nq_x = 1 - {}_np_x$
$\boldsymbol{{}_nL_x}$	The total number of person-years lived between ages *x* and *x+n*	${}_nL_x = n * l_{x+n} + {}_nd_x * {}_na_x$
$\boldsymbol{T_x}$	The total number of person years lived after age *x*	$T_x = \sum_{a=x}^{\infty} {}_nL_a$
$\boldsymbol{e_x}$	The expectation of life for a person who survives at age *x*	$e_x = T_x / l_x$
$\boldsymbol{{}_nm_x}$	The age specific death rate between ages *x* and *x+n*	${}_nm_x = {}_nd_x / {}_nL_x$
$\boldsymbol{{}_na_x}$	The average person years lived in the interval between ages *x* and *x+n* for persons dying in the interval. It is not calculated from other life table functions, it is either calculated from raw data or more frequently, assumed.	

2.2.2. Model Life Tables

Life tables are constructed by using the data on deaths by age and sex and population by age and sex. However, in many countries reliable information on death events does not exist due to lack of vital registration data or coverage and reporting errors. Therefore, demographers developed indirect techniques for obtaining mortality rates. These techniques are applied considering the similarities in the age patterns of mortality for different populations. (Murray et al., 2000)

A series of empirical mortality models - model life tables - were developed in order to construct models with specific characteristics based on the similarities between life tables for different populations and the generalization of their empirical relationships. These models have contributed to the demographic analysis in areas of the world with limited demographic data. The best known model life tables are:

(i) UN Model Life Tables,
(ii) Coale and Demeny Model Life Tables,
(iii) UN Model Life Tables for Developing Countries,
(iv) Ledermann System of Model Life Tables,
(v) Brass Logit System.

In this thesis, Coale and Demeny West model life table is used to construct the life tables for Turkey. The Coale and Demeny regional model life tables were first published in 1966. They were derived from a set of 192 life tables including several time periods. Life tables were mostly achieved from Western countries including Europe, North America, Australia, New Zealand, Israel, Japan, Taiwan and South Africa. Based on these 192 life tables four models were produced. The four patterns of life tables are: North, South, East, and West. The East model is mainly based on the Eastern European countries and characterized by high child mortality in relation to infant mortality. The North model is based on the Nordic countries and characterized by relatively low infant and old age mortality but high adult mortality. The South model is based on life tables from the countries of Southern Europe and has a mortality pattern characterized by high child mortality in relation to infant mortality, low adult mortality and high mortality over age 65. The West model is derived from the largest number of life tables from countries of Western Europe and most of the non-European populations. The West model represents a pattern intermediate between North and the East patterns and it can be considered as the most general mortality pattern (UN, 1983).

According to the mortality and age pattern of Turkey, Coale and Demeny's West model life table family is chosen as a demographic model in this study. Model selection is made by considering the demographic and geographical characteristics of the country. The mortality pattern varies by different geographic regions and among urban and rural areas in Turkey. Also the effect of the mortality transitions makes it difficult to choose the exact model of life tables. Since the West model is intermediate between other models of Coale and Demeny regional model life tables and reflects a general pattern of mortality, it is selected as the most appropriate model. The West model is usually recommended as a first choice when the mortality characteristics of a country prevent a more suitable choice of model (UN, 1983).

2.3. COMPUTATIONAL PROCEDURE

In this thesis, the following steps are applied through the process of construction of life tables.

Step 1: Segregation of IMR

In Turkish Demographic and Health Surveys, the estimates of infant mortality rate (IMR) are provided for both sexes combined for five years preceding the survey. In order to calculate $({}_1q_0)$ separately for males and females on annual basis, segregation of IMR procedure developed by Toros (2000) is used. The procedure requires sex ratio at birth, which is taken to be 1.064 and also sex specific IMR for ten year period preceding the survey is used in the calculations.

The variables used in the segregation procedure are:

- $({}_1q_0)$ for both sexes combined (for five years preceding the survey)
- $({}_1q_0)$ for males and females (for ten years preceding the survey)
- Sex ratio at birth

The segregation procedure of IMR is explained below. As mentioned, sex ratio at birth is taken to be 1.064. Regarding this value, female and male births are taken to be 100000 and 106400, respectively.

- IMR = (male deaths + female deaths) / (male births + female births)
  = (total infant deaths) / (total births)

- The product of IMR and the total births gives the estimate of total infant deaths:

Total infant deaths = (IMR * total births)

- Female and male deaths are determined by using IMR for males and females for ten years preceding the survey:

Sex ratio of deaths = ((IMR males)*(cohort size males)) / ((IMR females)*(cohort size females)), where
Cohort size males = 106.4
Cohort size females = 100

Female deaths = (total infant deaths*share of female deaths)
Male deaths = (total infant deaths - female deaths)

- Finally, IMR for males and females are calculated:

$({}_1q_0)$ females = (female deaths/size of birth cohort)
$({}_1q_0)$ males = (male deaths/size of birth cohort)

The detailed calculations for the years 1998, 2003 and 2008 are applied in Chapter 4.1.

Step 2: MORTPAK Match Procedure

MORTPAK is the software package developed by United Nations for demographic measurement in developing countries. MORTPAK includes 17 applications in the areas of population projection, life-table and stable-population construction, graduation of mortality data, indirect mortality estimation, indirect fertility estimation, and other indirect procedures for evaluating age distributions and the completeness of censuses. The 17 applications are selected for the use of analyzing demographic data from censuses and surveys and making reliable estimates of demographic parameters (UN, 2003).

In this thesis, MATCH application of MORTPAK is employed to construct life tables for Turkey. Life tables are created by using MORTPAK based on the infant mortality rates. The procedure is interpreted in Chapter 4.1.

The MATCH procedure constructs model life tables and compares empirical data with respect to a model life table. As well as United Nations or Coale and Demeny model life tables, a user-designated mortality pattern can be used in the MATCH application. As the user-designated model can be a mortality pattern specific to a certain population, MATCH can generate a country-specific model life table system. By using MATCH, a demographer can construct a series of life tables at different levels of life expectancy all consistent with the country's average pattern (UN, 2003).

The model pattern (any of the five United Nations, four Coale and Demeny patterns or an external model supplied by the user) and the sex desired should be identified by the user. Model life tables are calculated only when life expectancy at birth is between 20 and 80 years. When a user-defined pattern is used, it is permitted to go up to 90 years. The mortality level is specified by the user by designating a mortality value for one of four life table functions (${}_nm_x$, ${}_nq_x$, l_x or e_x) for any one of the age groups.

Step 3: Estimation of Number of Deaths

The age, sex and cause specific death structure of the population for the years 2000 and 2008 is estimated by using the data on deaths by selected causes, sex and age group and population by sex and age group. Firstly, some adjustment is applied on the population and death statistics.

As mentioned before, 2000 population census and 2008 ABPRS results are used as data sources. The results are provided by single age and sex and grouped into 5 year age groups in accordance with the life table methodology. The unknown age group for 2000 census results is distributed through age groups and results are adjusted to mid-year for the years 2000 and 2008. Detailed calculations are presented in Chapter 4.2.1.

Deaths by 150 selected causes, sex and age group for province and district centers for the years 2000 and 2008 is used as the data source for death statistics. Data is provided for single ages, and grouped according to the specified causes of death. Deaths of unknown age for the year 2008 are distributed proportionately among the age groups; but it should be considered that the distribution methodology does not take into account the effect of early and elderly ages on mortality. There are alternative methods to distribute the deaths of unknown age into specific age categories by using the Lexis diagrams (Wilmoth et al, 2005). Also in the context of burden of disease methodology, causes of death are distributed according to the disease groups. However, these specific adjustments require a more detailed level of information on death events. Therefore, deaths of unknown age for the year 2008 are distributed by using a correction factor as represented in Chapter 4.2.2.

Secondly, the proportion of deaths are calculated and used for estimating the number of deaths for whole Turkey since the number of deaths are provided for province and district centers. Here it should be noted that the level and pattern of mortality is probably different in the rural areas that are excluded from the death statistics. As a solution to this problem, causes of death are estimated by using different information sources as a part of burden of disease project. The verbal autopsy surveys and cause of death models developed for GBD framework are used as the main methods for estimating the incomplete information on death events (Refik Saydam Hygiene Center Presidency, 2004). However in this study, the scope of the information on causes of death does not permit to apply the same methods for the incomplete data. Instead, the mortality pattern of province and district centers is assumed to reflect the mortality pattern of whole Turkey as mentioned in Chapter 2.7.

The following steps are applied for adjustment:

- Age specific death rates provided from life tables are multiplied by the population of the corresponding age group and the number of deaths for each age group according to sex is estimated.

- Proportion of deaths due to each cause is calculated from death statistics by dividing the number of deaths due to each cause in an age group to all deaths in the corresponding age group.

- Proportion of deaths are multiplied by the adjusted total number of deaths and adjusted number of deaths according to cause of death, age group and sex is achieved.

The detailed interpretation of the above mentioned adjustments is referred in Chapter 4.2.3.

2.4. MULTIPLE DECREMENT PROCESS

In cause specific mortality analysis “competing risks” is a critical issue. In the competing risks framework, death is attributed to a single cause since it is not a repetitive event. Here, the underlying assumption is that the different causes of death act independently. Chiang (1991) gives the example of a study about cancer as a risk of death. In the case some persons may die from other causes during the study period so they will no longer die from cancer but also they would not survive to the end of the study period. So the question is what would be the contribution of their survival to the study or what adjustment would have to be made for the competing effect of other causes in the study? If cancer was eliminated as a cause of death, what would be a person’s chance of surviving or how many years in life expectancy was lost because of cancer? By applying multiple decrement process in cause specific mortality analysis, these questions are trying to be answered.

Commonly used methodology regarding causes of death as competing risks are given by Chiang (1968). According to Chiang’s methodology, the net probability of dying from cause R_δ if cause R_δ is eliminated as a competing risk is:

$\hat{q}_{i,\delta} = 1 - \hat{p}_i^{(D_i - D_{i\delta})/D_i}$, where

$\hat{p}_i$: probability of surviving in age interval $(x_i + x_{i+1})$
D_i : total number of deaths in age interval $(x_i + x_{i+1})$
$D_{i\delta}$: number of deaths from cause R_δ in age interval $(x_i + x_{i+1})$

2.4.1. Multiple Decrement Life Tables

Cause of death life tables, a type of the multiple decrement life tables, are constructed by subdividing a conventional life table into component tables for the causes of death. The total number of deaths is subdivided into different causes or groups of causes of death.

The multiple decrement life tables may be constructed by using the age specific probabilities of the occurrence of death. For constructing cause of death life table, first a conventional life table is constructed for age specific probabilities of dying for all causes combined. Then, the proportion of deaths from each cause is computed and the number of deaths for each age group is separated into subcategories. The component tables related to a particular cause or groups of causes of death and other table relating all other causes of death are mutually exclusive and additive. The sum of life table deaths through all age groups and component tables indicates the life table deaths for all causes combined. The life table deaths for each cause and age group are used to calculate the probabilities of death from specified causes and represent the probability that an individual will die of that cause in the corresponding age group (Siegel and Swanson, 2004).

The basic life table functions - l_x , ${}_nd_x$, ${}_nq_x$, ${}_nL_x$, T_x , e_x - are used in constructing cause of death life tables. New columns which refer to particular causes of death are added to the multiple decrement tables. The functions in these columns are represented in Table 2.4.1.

Table 2.4.1. Multiple decrement life table functions

Life table function	Explanation	Formula
$_{n}\boldsymbol{d}_{x}^{i}$	The number of persons dying from cause *i* between ages *x* and *x+n*	$_{n}d_{x}^{i} = {}_{n}q_{x}^{i} * l_{x}$
$_{n}\boldsymbol{q}_{x}^{i}$	The probability of dying from cause *i* between exact ages *x* and *x+n*	$_{n}q_{x}^{i} = {}_{n}q_{x} * \frac{_{n}D_{x}^{i}}{_{n}D_{x}}$
$\boldsymbol{l}_{x}^{i}$	The number of persons surviving at age *x* who will eventually succumb to cause *i*	$l_{x}^{i} = \sum_{a=x}^{\infty} {}_{n}d_{a}^{i}$
$_{n}\boldsymbol{m}_{x}^{i}$	The rate of decrement from cause *i* between ages *x* and *x+n*	$_{n}m_{x}^{i} = {}_{n}d_{x}^{i} / {}_{n}L_{x}$

2.4.2. Associated Single Decrement Life Tables

Associated single decrement - or cause deleted - life tables are constructed for computing the potential gains after the elimination of a cause. Cause elimination life tables are usually constructed in association with cause of death tables. For each of the causes of decrement in a multiple decrement life table, a single decrement table can be constructed. The gain in life expectancy from eliminating a specific cause of death is the difference in life expectancy calculated from the cause elimination life table and the life table for all causes combined (Siegel and Swanson, 2004).

The formulas of basic life table functions are adapted for some of the functions of the cause elimination life tables. Three types of functions used in associated single decrement life tables are explained in Table 2.4.2.

Table 2.4.2. Associated single decrement life table functions

Life table function	Explanation	Formula
$_{n}\boldsymbol{p}_{\boldsymbol{x}}^{-\boldsymbol{i}}$	The probability of surviving between exact ages x and $x+n$ assuming that cause *i* is eliminated	$_{n}p_{x}^{-i} = [_{n}p_{x}]^{R^{-i}}$, where $R^{-i} = ((_{n}D_{x} - {_{n}D_{x}^{i}}) / {_{n}D_{x}})$
$\boldsymbol{l}_{\boldsymbol{x}}^{-\boldsymbol{i}}$	The number of persons surviving at age x assuming that cause *i* is eliminated	$l_{x+n}^{-i} = l_{x}^{-i} * {_{n}p_{x}^{-i}}$
$_{n}\boldsymbol{a}_{\boldsymbol{x}}^{-\boldsymbol{i}}$	The average person years lived in the interval between ages x and $x+n$ for persons dying in the interval assuming that cause *i* is eliminated	$_{n}a_{x}^{-i} = n + R^{-i} \frac{_{n}q_{x}}{_{n}q_{x}^{-i}} (_{n}a_{x} - \text{n})$ for x = 0, 1, 5, 75 $_{5}a_{x}^{-i} = \frac{\frac{-5}{24}\,{_{5}d_{x-5}^{-i}} + 2.5\,{_{5}d_{x}^{-i}} + \frac{5}{24}\,{_{5}d_{x+5}^{-i}}}{_{5}d_{x}^{-i}}$ for x = 10 to 70 $_{\infty}a_{80}^{-i} = e_{80}^{-i} = \frac{e_{80}^{0}}{R^{-i}}$

2.5. POTENTIAL GAINS IN LIFE EXPECTANCY

Potential gains in life expectancy (PGLE) is the added years of life expectancy when particular causes of death are eliminated. PGLE is based on the multiple decrement life table technique and competing risks of death are taken into consideration. Multiple decrement life table analysis allows partial or total elimination of deaths due to a particular cause. Conventional life tables show the pattern of mortality for single form of exit from initial cohort. Multiple decrement tables represent the change in life expectancies for two or more forms of exit. By eliminating one or more causes of death, the effect of corresponding causes on life expectancy is analyzed. Since death is usually attributed to a single cause, the effect of competing causes of death is considered in the PGLE analysis.

The gain in life expectancy from eliminating a specific cause of death is the difference of life expectancy of cause elimination life table and the table for all causes combined:

$g_x^{-i} = e_x^{-i} - e_x$, where

e_x^{-i} : The expectation of life for a person who survives at age *x* assuming that cause *i* is eliminated as a cause of death

e_x : The expectation of life for a person who survives at age *x*

2.6. YEARS OF POTENTIAL LIFE LOST

Years of potential life lost (YPLL) is a summary measure of premature mortality which estimates the average time a person would have lived if the individual would not have died from a particular cause of death. Since general death rates fail to quantify the burden of loss resulting from this mortality, YPLL is presented as an index that focuses on the social and economic consequences of mortality (Gardner and Sanborn, 1990). The burden of loss resulting from this mortality, especially for younger ages, is quantified by using YPLL. The advantage of this measure is that; it is used to help quantify social and economic loss owing to premature death for specific causes of death affecting younger age groups. However, this method fails to take into account competing risks and is heavily influenced by population age structures (Lai and Hardy, 1999).

The number of deaths at each age is multiplied by an indicator of years of potential life remaining for that age, and the terms are summed to get the total YPLL. This calculation is a weighted total of the number of deaths by age, with the weights for each age determined by the particular method of valuing potential remaining years of life. There are many methods for weighting the number of deaths due to a particular cause (Gardner and Sanborn, 1990).

YPLL is calculated by multiplying the number of deaths at each age group by the remaining life expectancy for that age group:

YPLL = $\sum_{X=0}^{80} ({}_nD_x \;*\; e_x)$, where

${}_nD_x$: Number of deaths between ages x and $x+n$
e_x : The expectation of life for a person who survives at age x

In the analysis of years life lost, the effect of disability is frequently taken into consideration. There are different methods for analyzing the years lost with disability. However, in this thesis only the impact of mortality will be examined, the morbidity impact will not be considered in the measurement of years lost due to particular diseases.

2.7. ASSUMPTIONS AND LIMITATIONS OF THE METHOD

The major assumption related to multiple decrement methodology is the assumption of independence of causes of death. The various causes of death are assumed to act independently in the "competing risks" approach. The force of mortality – or failure rate – is assumed to be zero for an eliminated cause of death and also force of mortality is assumed to remain unchanged for all other causes. In other words, eliminating one cause of death has no effect on the risk of dying from the remaining causes (Siegel and Swanson, 2004). The independence of risks assumption is criticized for being unrealistic because some diseases may be closely related to some other diseases. However, the independence assumption is valid unless more is known about the exact nature of the dependency among various causes of death (Tsai et. al, 1978).

The concept of underlying cause of death is used during the collection procedure of statistical information on causes of death. Since most death events are attributed to multiple causes of death, underlying causes of death are determined for categorizing deaths; so more reliable cause of death data can be achieved. However, in this study the data source does not permit to determine the underlying causes of death and it is a limitation for this thesis.

The quality of death statistics is an important limitation for this thesis. Because of the lack of vital registration system data, the death statistics for province and district centers by 150 selected causes, sex and age group for the years 2000 and 2008 published by TURKSTAT is used. Since country wide and reliable data on death events for the corresponding years are not available, the age specific death rates are calculated and used in the analysis instead of actual number of deaths. The total number of deaths is estimated by multiplying the age specific death rates by the population of each age group.

TDHS results should also be taken into consideration. Since the results of TDHS refer to the 5 years preceding the survey, the reference dates for the corresponding surveys are determined and used in the estimation of infant mortality rates. IMR is segregated according to sex on the annual basis and is adjusted according to the reference periods for the surveys.

In this thesis, the first assumption is the independence of causes of death assumption as explained above. The mortality pattern of province and district centers is assumed to reflect the mortality pattern of whole Turkey including rural areas as a second assumption. The third assumption is related to the age distribution of data; the age pattern of the population and death statistics are assumed to be distributed in the way that reflects the actual situation of the population. The last assumption is related to the model life tables; the age pattern of mortality of the selected model life table is assumed to be consistent with the age pattern of the actual population under concern.

3. LITERATURE REVIEW

The literature on years of potential life lost and potential gains in life expectancy is reviewed in three sections. The historical background of the analyses on gains and losses in life expectancy and applications on the topic are examined in the first two sections. In the third section, life table applications in Turkey are reviewed.

3.1. LITERATURE ON YEARS OF POTENTIAL LIFE LOST

The concept of potential years of life lost was first introduced by Dempsey in 1947 with a method of measuring premature mortality due to tuberculosis and comparing with heart diseases and cancer. For each death, she calculated the remaining years of life by subtracting the age at death from the life expectancy at birth. In 1948, Dickinson and Welker introduced the concepts “life years lost” and “working years lost” which is calculated by using life expectancy at different ages instead of life expectancy at birth. (Romeder and McWhinnie, 1977)

Haenszel (1950) constructed a standardized rate of mortality defined in units of lost years of life. He examined the previous studies on concepts of "life years lost" and "working years lost" developed by Dickinson and Welker (1948). They described "life years lost" as “the total number of years lost through the failure of individuals to live some allotted life span”, while "working years lost" refers to the years lost falling between the productive ages between 20 and 65. Also, a number of articles appeared just before Haenszel’s study, which introduces different approaches of the potential years of life lost by causes of death. Haenszel examined the methods for calculating a standardized rate of mortality taking into account age at death and potential years of life lost. He calculated different standardized rates of years life lost by applying weighting factors to age specific death rates.

In 1951, Doughty used the same method with an upper age limit of 70. A similar approach was used by Logan and Benjamin in 1953 to analyze the changes in mortality patterns from 1848-72 to 1952. They proposed two further variations on the years of life lost concept. (Romeder and McWhinnie, 1977)

Stickle (1965) used the concepts of life years lost and future income sacrificed for measuring the social and economic impact of mortality. Life years lost was estimated by multiplying the number of deaths for each age and sex by the average number of years of life remaining at the midpoint of the interval. The future income sacrificed was estimated by the joint product of the average number of years of life remaining, the proportion of persons with money income at successive future ages, the number of years of personal income receipt and the average annual money income of persons. As a result of the analysis of life years lost and future income sacrificed for the year 1962 in United States, deaths from heart diseases result in the loss of nearly 8.1 million life years and $16.7 billion in future personal income. Deaths from malignant neoplasms cause the loss of an estimated 4.6 million life years and $8.9 billion of future income.

Romeder and McWhinnie (1977) introduced the indicator years of potential life lost between ages 1 and 70 with the primary objective of comparing the importance of major causes of premature mortality. They reviewed the historical background of the concept of years of potential life lost and existing mortality indicators and indices. The method of calculation of YPLL was presented as the sum of the number of deaths at each age (between 1 and 70) multiplied by the remaining years of life up to age 70. Rate of YPLL was introduced for comparing YPLL for two different sized populations. Standardized rate of YPLL is used for comparing the mortality for specific causes for different populations by eliminating the effect of different age structures of the populations. Three life table methods are also reviewed and compared with the YPLL method. After these discussions on alternative methodological approaches, they presented some Canadian data and interpretation.

Perloff et al. (1984) presented the potentially productive years of life lost (PPYLL) concept and examined the leading causes of premature death in United States. According to them, different mortality indexes such as crude and age-adjusted death rates are used to measure the impact of illness on population and allocating health care resources. However, the use of conventional measures of mortality substantially emphasizes deaths in older age groups. By recognition of this problem in early 1950's, a years of life lost index was proposed by Haenszel (1950). Yet, the years of life lost concept had a little use until 1970's as a planning tool. After 1980's the use of the index had become more widespread.

Data on the number of deaths in 1979 by five year age categories for two groupings of causes of death was used in the analysis. A years of life lost index was calculated by the sum of the number of deaths in each age category weighted by the number of years between the midpoint of the age category and a cutoff age. In the analysis, infant mortality was not excluded and seventy rather than sixty-five was used as the cutoff age. Their analysis differs from previous studies in regard to concept of potentially productive years of life (PPYLL). The deaths of children under the age fifteen are not weighted with the total number of years life lost between the age of death and seventy. Instead, they are weighted with the loss of the productive years, which was defined as the ages fifteen to seventy.

According to their analysis, heart disease, cancer, and cerebrovascular diseases were the three leading causes of death in the United States for people over one year old when measured with standard death rates. However, accidents are the largest cause of life lost among people at ages of seventy and younger with the PPYLL measure. Accidents account for almost one fifth of all potentially productive years of life lost. Cancer is the second cause on both measures and heart disease, which is the leading cause of death using death rates, is the third leading cause of years of life lost. Cerebrovascular diseases, that are the third leading cause of death using the death rate, drops to eighth among causes of years of life lost.

The analysis of PPYLL is significant because they show the preventable nature of premature death and the importance of improving preventive intervention. Also this analysis draws attention to the importance of lifestyle or environment rather than disease alone as a key factor in premature death and enables the analysts to highlight vulnerable populations.

Arcà et al. (1988) examined the death rates and YPLL for all causes and for 12 selected groups of causes for 1979 and 1983 in Italy. Number of years of life lost by persons who die before reaching age 65 is calculated by the sum of the number of deaths occurring in each five year age group multiplied by the difference between age 65 and the midpoint of the given age range. Here, infant mortality rate and child mortality rate were excluded since they are treated separately.

As a result, malignant neoplasms were the major cause of premature mortality in Italy for 1983, followed by unintentional injuries heart diseases. YPLL from all causes combined decreased considerably (-6.2 YPLL) in Italy from 1979 to 1983. The results are compared with the US data and premature mortality is seen to be lower in Italy because of the striking difference in mortality from injuries and heart diseases.

Gardner and Sanborn (1990) represented the measure of years of potential life lost (YPLL) and different calculation methods for YPLL. They emphasize that YPLL is an index that focuses on social and economic consequences of mortality. The burden of lost productivity subject to premature deaths is identified by considering the age pattern of deaths from each cause. They state that the major strengths of YPLL are that it considers deaths of young persons and it is simple to compute. There are different computational methods for YPLL and each method is a function of age at death and the number of deaths at that age. The number of deaths at each age is multiplied by an indicator that states the weight for the corresponding age and the results are summed to get the total YPLL. The difference in weighting methods results from the disagreement about the age interval that social and economic losses occur and the value of productivity at each age. According to them, the YPLL method assigns priority to causes of death considering the future contribution lost by emphasizing causes of death occurring in younger age groups. Briefly, YPLL is a method of assigning social value to each age at death.

They introduced the investment-producer-consumer (IPC) model for the analysis of lost economic productivity. The lifetime of an individual is divided into three parts as investment years (0-19 ages), producer years (20-64 ages) and consumer years (65+ ages). Here, the net investment made by the society is the amount received by the individual during the investment and consumer years minus the amount produced during the producer years. The summation of the net investment and the amount that would have been produced until life expectancy minus the additional amount that would have been consumed gives the potential loss to the society. The valued years of potential life lost (VYPLL) weights are calculated by using the investment-producer-consumer model.

Linn and Sheps (1993) analyzed the impact of disability by using the years of potential life lost (YPLL) index and investment-producer-consumer model suggested by Gardner and Sanborn (1990). They modified the YPLL by the overall percentage of permanent disability for considering the productivity lost. Similarly, the methodology of valued years of potential life lost (VYPLL) is modified by percentage of disability. The methodology is applied to the data on disabled veterans.

Fox et al. (1996) examined the economic costs associated to the cardiovascular disease (CVD) mortality in California for the year 1991. The number of CVD related mortality data was analyzed according to the deaths from heart diseases and cerebrovascular diseases. The data were examined among the persons dying in the period 1989-1991 who were residents of California. In this study, YPLL and the value of productivity losses were analyzed. Productivity loss is defined as the current monetary value of future output lost due to premature death from CVD. The number of deaths owing to CVD is multiplied by the individual’s real and imputed earnings to estimate loss of productivity. As a result, 81852 Californians died because of CVD in 1991 and it resulted in a productivity loss of $6.4 billion.

Bonneux (2002) analyzed the burden of mortality by using different methods with a special emphasis on disability adjusted life years (DALY) measure which is introduced by Global Burden of Disease Project. “Years life lost” is estimated by multiplying the number of deaths by a weighting factor. The weighting factor is calculated using the life expectancy from a standard life table. The historical mortality ratios are scaled in two different ways as a low standard (life expectancy of exact 50 years) and a high standard (exact 80 years) and burden of mortality is calculated for both of these scales. In the analysis of years life lost, the DALY valuing system is used and the life expectancy is discounted by 3% per expected year yet to live."Potential years of life lost" is calculated by multiplying the number of deaths at age x by the years missing to reach a desirable age everybody should reach.

As a result, the burden of death increases in low mortality conditions when a standard life table with idealized long life expectancy is used. The discounted life table decreases the burden of death dramatically in high mortality conditions since deaths at young ages are discounted. This effect of discounting is balanced by age weighting. However, it is concluded that, PYLL are extremely weighting deaths at younger ages and ignore the deaths at older ages.

Zhou et al. (2003) analyzed the productivity losses and costs of injury and disease in China using potentially productive years of life lost (PPYLL). PPYLL was calculated for injury and four major disease groups. The productive ages were assumed to be ages 15-64 and 3% discount rate was applied for the future years of life lost. The future years of life lost was calculated in 10 year age groups from the midpoint of that period. Then, lost years of productive work for age groups were discounted by a compounded annual 3%. The sum of all age groups gives the total loss of productive years. The morbidity losses from injury or disease were also calculated based on days of work lost. As a result, injuries caused 12.6 million years of lost productivity annually. Respiratory diseases with 10.2 million years, cardiovascular diseases with 9.0 million years and cancer with 8.3 million years were the following causes of lost productivity in China. Authors emphasized that high priority should be given to injury control and prevention in China’s health agenda since injury causes more loss of productivity than any disease group.

Lessa (2002) estimated the productive years of life lost due to coronary heart disease in Brazil and observed their trends over a 20 year period. The cut off ages for productive years were taken as 20 and 59 instead of 1 and 70 of the original formula introduced by Romeder and McWhinnie (1977). As a result, the number of deaths due to coronary heart disease increased 35.8% for males 51.3% for females in the period 1979-1988 in Brazil.

Šemerl and Šešok (2002) determined the leading causes of death in Slovenia and classified them according to cause of death, age and sex. The years of potential life lost (YPLL) and valued years of potential life lost (VYPLL) were calculated to estimate the potential economic losses of premature mortality. Sex, age and cause specific YPLL and VYPLL were calculated with a cut off age 65 using age-specific weights of investment- producer-consumer model. As a result, 4558 YPLL per 100,000 population were lost to Slovenia in 1998. External causes of death, including suicides and traffic accidents, were the leading causes of productivity loss.

Weerasinghe, et al. (2009) examined the years of potential life lost due to selected group of causes in New South Wales from 1990 to 2002. The differentials in the years life lost due to premature deaths by age, sex, urban/rural residence and socio economic determinants were considered. Premature years of potential life lost (PYPLL) and valued years of potential life lost (VYPLL) methods were applied to mortality data. The calculation of VYPLL was based on the investment-producer-consumer model. The analysis showed that PYPLL rates for all leading causes of death have declined from 1990 to 2002.

Savidan et al. (2010) examined the causes and trends in premature death in Switzerland to from 1995–2006. The potential years of life lost were reviewed between age 1 and 70, as the upper age limit, considering 4 main categories: circulatory diseases, cancer, external causes of mortality and other causes, and 19 specific causes of death. PYLL rates decreased for all categories but circulatory diseases and external causes had the most dramatic decrease.

Ibayashi et al. (2011) examined the premature death from oral cancer for the years 1995 and 2005 in Japan. They estimated years of life lost (YLL) and average years of life lost (AYLL) for oral cancer deaths. YLL is defined as the difference between age at death and remaining years of life expectancy; AYLL is calculated by taking the average of the YLL. Age standardized rates were calculated and YLL and AYLL was estimated according to the life tables. As a result, an overall AYLL of 17.2 years for 1995 and 16.5 years for 2005 was observed for oral cancer deaths in Japan.

As summarized, many studies were developed for measuring the effect of premature deaths all over the world. However, in Turkey, limited number of studies was implemented in this area. One of them is the national burden of disease and cost effectiveness project for Turkey which was applied as a part of global burden of disease (GBD) framework implemented by World Health Organization (WHO). Global burden of disease (GBD) analysis measures mortality and loss of health due to diseases, injuries and risk factors for all regions of the world. The total burden of disease is measured by using disability-adjusted life year (DALY). DALY combines years of life lost due to premature mortality and years of life lost due to time lived in states of disability and loss of function caused by diseases, accidents or injuries that do not result in death. DALYs are calculated by the sum of the years of life lost (YLL) from the premature mortality and the years of life lost due to disability (YLD). The calculation procedure includes estimating total number of deaths according to age and sex by using life tables, estimating cause specific death structure according to age and sex and developing estimates concerning incidence, prevalence, duration, remission and case fatality of diseases. The national burden of disease and cost effectiveness project for Turkey was applied by Refik Saydam Hygiene Center Presidency and Başkent University for the year 2000. The analysis of years life lost and disability-adjusted life year are implemented for national and regional level. (Refik Saydam Hygiene Center Presidency, 2004)

Burden of disease methods were applied to cause of death data by Akgün et al. (2007) in order to derive national cause-specific mortality estimates. They applied the methods of GBD study to different data sets of mortality in order to develop national mortality estimates in Turkey. Age specific death rates were estimated by applying child mortality ratios from Turkish Demographic and Health Survey (TDHS) to model life tables. Causes of death structures were estimated using re-distribution algorithms of the GBD study for urban areas and from epidemiological models for rural areas. After all, life expectancy at birth in 2000 was estimated to be 67.7 years for males and 71.9 years for females. The primary causes of death were vascular diseases covering 35-38 % of deaths. The authors emphasized the importance of developing a reliable health information system within the context of health development strategies for Turkey.

An analysis of premature mortality for Turkey was performed by Naci and Baker (2008). The total years of potential life lost and potentially productive years of life lost from mortality were calculated in order to estimate the cost of productivity losses from road traffic deaths in Turkey. Three different methods employed in the study are YPLL, YPLL (life table approach) end PPYLL. Age and sex specific death estimates used in the analyses were provided from the national burden of disease study. As a result, road traffic deaths cost Turkey an estimated US $2.6 billion productivity loss in 2000.

3.2. LITERATURE ON POTENTIAL GAINS IN LIFE EXPECTANCY

The analysis of the level of mortality when a cause of death is eliminated originated when vaccination was discovered in the eighteenth century. Different methods were derived by Bernoulli, D’Alembert and Laplace for determining the change in the level of mortality when smallpox is eliminated as a cause of death. The theory of decremental forces or multiple decrement forces are first formulated by Makeham and practical applications were explored. (Chiang, 1968)

The theory of multiple decrements was developed by the actuarial mathematicians in nineteenth century. They have applied Makeham's theory to develop multiple decrement life tables in the area of life contingencies. In the area of vital statistics, Greville analyzed mortality tables by cause of death. In the area of public health Fix &Neyman introduced a stochastic model to describe recovery, relapse, death, and loss of patients in medical follow-up studies and Cornfield described problems in the estimation of the probability of the development of a disease when there were competing risks (Chiang, 1991). The concept of competing risks also has applications in survival analysis, reliability theory and life testing. Multiple decrement theory or the theory of competing risks has recently been recognized as a special branch of stochastic process.

The concept of potential lifetimes is another approach for competing risk analysis. Moeschberger (1971) used the potential lifetimes approach for applying life tests under competing causes of failure. The term “force of mortality” is used in the analysis of potential lifetimes and the connection between potential lifetimes and competing risks is built. “Force of mortality” represents the failure rate or in other words the constant intensity of risk of death. Chiang (1968) used the concept “force of mortality” for the solution of the multiple decrement problem.

In cause specific mortality analysis, basic references regarding the development of competing risk theory are given by Chiang (1968) who considers causes of death as competing risks and formulated relations between three types of probability of death: crude, net, and partial crude probabilities. In the analysis of cause specific mortality, competing risks are assumed to be independent of each other when one or more risks are eliminated. Keyfitz (1977) makes an analogy between parts of a watch and parts of a person for explaining the independence assumption for competing causes of death. The hypothetical watch operates only as long as all parts are functioning and each part has its own life table. The product of the independent probabilities for each part gives the probability that the watch (or the person) will survive to a given age. According to Chiang (1991), independence of risks is assumed because there is no simple statistical method available for cause specific mortality analysis when risks are dependent. Chiang represents the statistical methods including the estimation of three types of probability of dying with respect to a particular cause of death and applies these methods to the major cardiovascular diseases and malignant neoplasms mortality data of the United States white male and female population in 1986.

Feeney (1974) summarized the concepts related to the multiple decrement theory. Firstly, probability of death functions for different causes of death are introduced; they are expressed in the same way as the single decrement case where causes of death are not distinguished. Then, the concept of the “force of mortality” is introduced; it is defined for each cause of death separately and the force of mortality for all causes combined is the sum of the forces for all individual causes of death. The effect of elimination of a cause of death on overall mortality is expressed as the multiple decrement problem. For the solution of this problem, it is assumed that the force of mortality from an eliminated cause of death will become zero and also force of mortality from all other causes will remain unchanged. Multiple decrement life tables representing the incidence of several causes of death and associated single decrement life tables representing the situation when a cause of death is eliminated are also introduced.

Tsai, Lee and Hardy (1978) examined the potential gains in total expectation of life and in the working life ages among the United States population when the three leading causes of death are totally or partially eliminated. Major cardiovascular diseases, malignant neoplasms and motor vehicle accidents are taken into consideration as the leading causes of mortality. The main data sources were the U.S. Census of Population and the death statistics compiled by the National Center for Health Statistics for the three year period 1969-1971. The causes of death were classified according to the eighth revision of International Classification of Diseases (ICD-8). The analyses were employed by constructing life tables. The methodology of constructing the multiple decrement life tables and the cause deleted life tables with partial elimination used in this study was taken from Chiang (1968). The partial elimination of a risk of dying was enabled by the "improvement factor" used in the analysis. As a consequence, the potential gains in life expectancy at birth with a 30% reduction in major cardiovascular diseases would be1.98 years, for malignant neoplasms 0.71 years, and for motor vehicle accidents 0.21 years. When the working ages (15-70) are taken into consideration, a gain of 0.43, 0.26, and 0.14 years is estimated for cardiovascular diseases, malignant neoplasms and motor vehicle accidents respectively.

Robert Tseng (1980) analyzed the effects of causes of death in Taiwan area by using the multiple decrement and associated single decrement life table techniques for the year 1980. The causes of death are classified into ten groups according to the leading causes of death. The multiple decrement life tables were constructed by using ten leading causes of death. For calculating the potential gains in life expectancy, three of the ten causes were completely eliminated for males and females. The eliminated causes of death were; cerebrovascular diseases (CVD), malignant neoplasms (MN) and accidents. The largest potential gain in life expectancy was estimated to be 2.07 years for males and 1.76 years for females after elimination of MN. Also partial eliminations of three causes were explored and elimination of MN had the largest gain in life expectancy.

Carey (1989) introduced the multiple decrement methodology to the ecological literature. Multiple decrement life table techniques were applied to the cause of death data in insect populations. Insect cause of death data specified by stage and number of deaths due to four causes of death was calculated for each stage. Using the hypothetical data set, cause specific probability of death from specified causes in the presence of all causes was computed. Then, fraction of all deaths and fraction of deaths due to each cause in each stage were computed. The probability of dying from a cause in the absence of other causes of death was estimated by using the independent risk probabilities approach. The effect of different cause specific combinations of death on overall mortality was explained. Interrelations between multiple decrement approach and other tools used in ecology were discussed by the author. It is concluded that; the independent variables are similar for each approach, all of the techniques are based on the competing risks assumption and most techniques are based on the assumption of independence.

Conti et al. (1999) examined the effect of the reduction in mortality caused by major cardiovascular diseases, malignant neoplasms, accidents and AIDS to the gains in life expectancy during the period 1985-1994 in Italy. Mortality data was derived from the Italian Mortality Data Base and ICD-9 was used to classify the causes of death. Initially, life expectancy in working ages was calculated on the basis of annual mortality. Contributions made by age groups and causes of death on changes in life expectancy were estimated. After all, potential gains in life expectancy were estimated with partial and total elimination of the main causes of death. As a result, in the period 1985-1994, the gain in life expectancy at birth was 2.27 years for men and 2.16 years for women. The main contribution to this increase was the reduction in mortality related to cardiovascular diseases, accidents and malignant neoplasms.

Lai and Hardy (1999) examined the impact of competing risks of death by applying the methods years of potential life lost (YPLL) and potential gains in life expectancy (PGLE) on the US population data at working ages (15-64 years). The effect of premature mortality due to HIV/AIDS, heart diseases and malignant neoplasms was analyzed and compared by using PGLE and YPLL. PGLE was estimated by using the multiple decrement life table technique for the people in working ages. YPLL for working ages was computed by the sum of the weighted number of deaths from that cause. In order to compare the two methods numerically, gains in life expectancy was multiplied by the number of people in the cohort since PGLE gives the average gains for individuals in the population. The relative ratios of the results obtained from two calculation methods were computed and compared. According to the results, YPLL overestimated the importance of premature deaths from HIV/AIDS for the total population. However, for the US black population YPLL was about 20-30% lower than the PGLE. YPLL generally underestimated the impact of heart diseases and malignant neoplasms when compared to the total PGLE.

As a consequence, it is stated that PGLE and YPLL measure different things; PGLE measure the impact of causes of death for the survival experience of individuals by taking into account the competing risks of death, however YPLL is the weighted number of deaths without considering the competing risks. Since the comparisons of YPLL between different populations can be influenced by the age structure of the populations, standardization techniques were developed to improve the comparability. However, these kinds of improvements do not prevent the inconsistencies between the results of PGLE and YPLL. When two methods were compared, it is argued that PGLE is preferable to the YPLL for measuring the effect of premature mortality in a population.

Bawah and Binka (2007) examined the impact of mortality from malaria on overall mortality in a rural African setting. Main source of data was the Demographic Surveillance System (NDSS) carried out by Navrongo Health Research Center (NHRC) in Ghana. The effect of malaria on overall mortality was analyzed by estimating the number of the person years lived if malaria was eliminated as a main cause of death by using multiple decrement and associated single decrement life table techniques. As a result, one third of the deaths in this population were related to malaria and life expectancy at birth would increase by more than six years if malaria were eliminated as a cause of death.

Ferguson et al. (2008) assessed the demographic cost of mortality due to intentional violence in over 90 countries using population and mortality data collected from international organizations and country statistical offices for the year 2004. To estimate the potential gains in life expectancy that could be achieved by reducing the risk of intentional injury deaths, multiple decrement life table analysis are employed. Results suggest that, regional PGLEs range from 0.44 years per 100,000 persons for men in the Americas to 0.02 years for women in the Western Pacific. The authors emphasize that violence prevention programs should have the highest impact in countries such as Jamaica, Colombia, and Brazil with relatively high life expectancies and high levels of homicide.

3.3. LIFE TABLE APPLICATIONS IN TURKEY

There are number of studies on life tables for Turkey in the regional and national level or for the provinces. Life tables were generally produced by using indirect techniques. The main data sources were censuses, birth and death statistics, population surveys and demographic and health surveys.

Gürtan (1966) constructed life tables for Turkey by using 1955 and 1960 population censuses within the context of his study about population growth and economic development in Turkey. Alpay (1969) produced life tables for 4 regions and 3 cities by using the data derived from the Turkish Demographic Survey in 1966-67. The life tables are constructed by using the vital statistics and the rates are derived from Reed and Merrell table. In 1969, Oral calculated mortality estimates by using the Brass logit system. The African Standard and Coale and Demeny South Model Life Tables are applied to the mortality data for Ankara province. Özsoy (1970) constructed life tables for Army Mutual Assistance Association (OYAK) for the years 1950-1957. In 1974, Öcal used population census results of 9 province centers for producing life tables.

Demirci (1987) reflected the age structure of mortality and selected the most appropriate model life table pattern for Turkey. In this study, Shorter and Macura model life table that was developed according to the Turkish Demographic Survey (1966-67) was taken as a basis. According to the mortality levels of 1966-67 period, appropriate patterns are estimated in the Coale and Demeny and United Nations model life tables.

In 1991, Hancıoğlu discussed the patterns of infant and under-5 mortality by using abridged life tables for Turkey in the period 1970-1985. Hoşgör (1992) constructed post-childhood life tables for Turkey by using age and sex distributions and intercensal growth rates between official census dates. In 1997, Hoşgör estimated mortality level for all provinces and regions of Turkey by using 1985 and 1990 population censuses.

Duransoy (1993) produced life tables for 1971-1981 and 1980-1990 periods by using death statistics. In 2000, Toros constructed life tables for each year of the last decade of the 20th century. Corrections for age misreporting and international migration and determination of infant mortality rate and child mortality rate by sex were employed during the process. Appropriate life table patterns for males and females are selected according to the least variations of the age ogives observed between actual and projected populations.

Demirbüken (2001) calculated life table for Ankara City by using burial records of Ankara city cemeteries in 1997. In 2002, Coşkun constructed life tables by using synthetic orphanhood method from the 1993 and 1998 Turkish Demographic and Health Surveys.

Koç (2002) used the life table technique for estimating the effect of deaths related to traffic accidents for the province and district centers. The main data sources were the death statistics, population statistics and road traffic accident statistics derived by TURKSTAT. Deaths by selected causes, age and sex for the year 1999 were taken into consideration. Since death statistics are derived in the province and district level by TURKSTAT, rural population was omitted from the total population in the analyses. The population data for the year 1999 was estimated by applying projection methods to the 1990 population census and 1997 population count data. Then, life tables were constructed based on the Coale and Demeny East Model Life Table. Two groups of life tables, one involving all causes of death and other excluding traffic accidents as a cause of death, were produced. As a result, life expectancy at birth was 74.43 years when all deaths are included and 74.61 years when traffic accidents are excluded. In other words, 0.21 years were lost because of the traffic accidents. The years life lost due to traffic accidents were 0.24 years for men and 0.11 years for women for the year 1999.

As part of the national burden of disease and cost effectiveness project (Refik Saydam Hygiene Center Presidency, 2004) life tables are constructed in the national level, for rural and urban areas and for the five regions of Turkey for the year 2000.

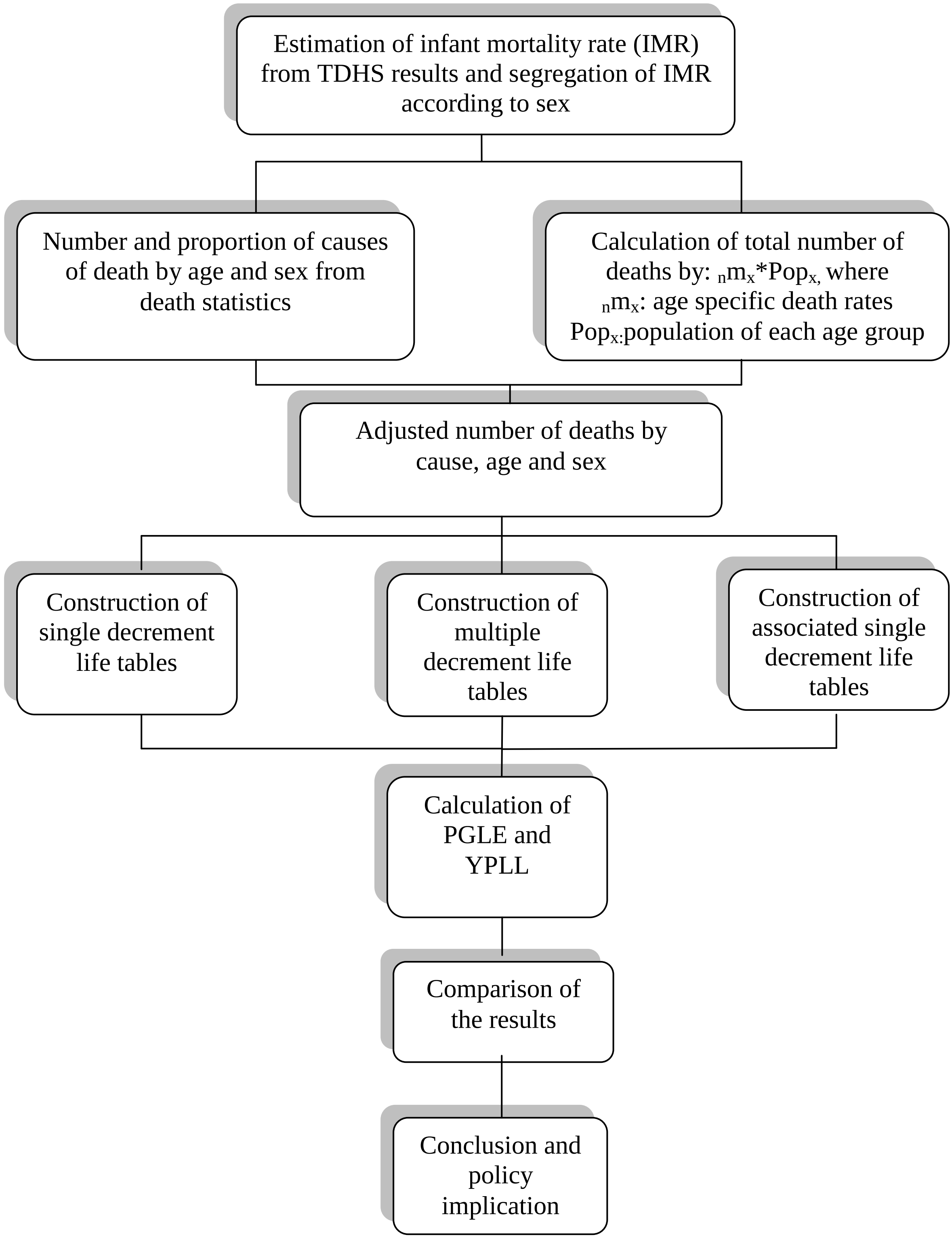
Life tables are based on the 1990 and 2000 population census results and death statistics of TURKSTAT.

Kırkbeşoğlu (2006) emphasized the lack of life tables in the insurance sector prepared in compliance with the Turkish mortality conditions. The aim of his study was to construct the life tables needed for insurance sector in Turkey. The life tables were prepared by using the death rates derived from 2003 Turkey Demographic and Health Survey. Life tables were constructed with two different methods; by using Coale and Demeny West Model Life Tables with the linear interpolation formula and by using synthetic orphanhood method which gives results regarding the adult mortality indirectly. The reference year was 2001 for both methods. The calculation of life insurance premiums require commutation tables that are constructed by adding a technical interest on the life tables. The commutation tables were generated and by using these tables life insurance premiums were calculated according to types of life insurances. Finally, the results were compared with other four foreign commutation tables which are used in Turkey.

Eryurt and Koç (2010) constructed life tables with the purpose of determining the level and pattern of adult mortality in Turkey. Male and female life tables are produced for the period 1998-2003 by applying the synthetic orphanhood method to the TDHS data.

4. ANALYSIS OF GAINS AND LOSSES IN LIFE EXPECTANCY

The following steps are applied in the analysis of gains and losses in life expectancy:



4.1. CONSTRUCTION OF LIFE TABLES FOR TURKEY

To construct the life tables for Turkey, firstly, the segregation procedure of infant mortality rates described in Chapter 2.3 is applied for the years 1998, 2003 and 2008.

<u>1998 TDHS Data (Reference period February 1996):</u>

Sex ratio at birth: 1.064
Female births: 100000
Male births: 106400
IMR = (total infant deaths / total births) = 0.0427
Total infant deaths = (IMR * total births) = (0.0427 * 206400) = 8813.28

Sex ratio of deaths = ((IMR males)*(cohort size males)) / ((IMR females)*(cohort size females))
$({}_1q_0)$ males for ten years preceding 1998: 0.0515
$({}_1q_0)$ females for ten years preceding 1998: 0.0455
Cohort size males: 106.4
Cohort size females: 100
Sex ratio of deaths = (0.0515*106.4) / (0.0455*100) = 1.204307

Female deaths = (total deaths*share of female deaths)
= 8813.28 * (100/ (100+120.43))
= 3998.2077
Male deaths = (total deaths - female deaths)
= 8813.28 - 3998.2077
= 4815.0723

$({}_1q_0)$ females = (female deaths/size of birth cohort)
= 3998.2077/100000
= 0.039982

$({}_1q_0)$ males = (male deaths/size of birth cohort)

= 4815.0723/106400

= 0.045254

2003 TDHS Data (Reference period June 2001):

Sex ratio at birth: 1.064

Female births: 100000

Male births: 106400

IMR = (total infant deaths / total births) = 0.029

Total infant deaths = (IMR * total births) = (0.029 * 206400) = 5985.6

Sex ratio of deaths = ((IMR males)*(cohort size males)) / ((IMR females)*(cohort size females))

$({}_1q_0)$ males for ten years preceding 1998: 0.039

$({}_1q_0)$ females for ten years preceding 1998: 0.036

Cohort size males: 106.4

Cohort size females: 100

Sex ratio of deaths = (0.039*106.4) / (0.036*100) = 1.152667

Female deaths = (total deaths*share of female deaths)

= 5985.6* (100/ (100+115.2667))

= 2780.551

Male deaths = (total deaths - female deaths)

= 5985.6 - 2780.551

= 3205.049

$({}_1q_0)$ females = (female deaths/size of birth cohort)

= 2780.551/100000 = 0.0278055

$({}_1q_0)$ males = (male deaths/size of birth cohort)

= 3205.049/106400 = 0.0301226

<u>2008 TDHS Data (Reference period April 2006):</u>

Sex ratio at birth: 1.064

Female births: 100000

Male births: 106400

IMR = (total infant deaths / total births) = 0.017

Total infant deaths = (IMR * total births) = (0.017 * 206400) = 3508.8

Sex ratio of deaths = ((IMR males)*(cohort size males)) / ((IMR females)*(cohort size females))

($_1q_0$) males for ten years preceding 1998: 0.028

($_1q_0$) females for ten years preceding 1998: 0.023

Cohort size males: 106.4

Cohort size females: 100

Sex ratio of deaths = (0.028*106.4) / (0.023*100) = 1.295304

Female deaths = (total deaths*share of female deaths)

= 3508.8 * (100/ (100+129.5304))

= 1528.686

Male deaths = (total deaths - female deaths)

= 3508.8 - 1528.686

= 1980.114

($_1q_0$) females = (female deaths/size of birth cohort)

= 1528.686/100000

= 0.0152869

($_1q_0$) males = (male deaths/size of birth cohort)

= 1980.114/106400

= 0.0186101

The estimates of infant mortality rate (IMR) are provided from TDHS results for both sexes combined for five years preceding the survey. The estimated IMR is 43 per 1000 live births between the period of 1993 and 1998, 29 per 1000 live births between 1998 and 2003, 17 per 1000 live births between 2003 and 2008 according to the TDHS results. After the implementation of segregation procedure, infant mortality rates for males and females are achieved for the specified periods.

The infant mortality rates by sex for mid-year of 2000 and 2008 are required for construction of life tables. Infant mortality rates for June 2000 and June 2008 are calculated by applying linear interpolation and extrapolation to the segregated IMR values.

Linear interpolation/extrapolation is a method for estimating the unknown values that lie between two known values with an assumption of the rate of change is constant. The unknown value, y, is estimated by the formula:

$y = x_1 + (x_2 - x_1) / t * t_y$, where

x_1 and x_2: two known points,
t: the number of days between x_1 and x_2,
t_y: the number of days between y and the known point.

The results of interpolation and extrapolation for infant mortality rates are shown in Tables 4.1.1 and 4.1.2. The estimated IMR for June 2000 is 30 per 1000 live births for females, 33 per 1000 live births for males. For June 2008, IMR is 9 per 1000 live births for females, 13 per 1000 live births for males.

Table 4.1.1. Interpolation for IMR for June 30, 2000

${}_1q_0$	1998*	2003**	Daily Difference for Interpolation	2000
Female	0,0399821	0,0278055	0,000006	0,030091
Male	0,0452544	0,0301226	0,000008	0,032962

*1998 figures are taken from TDHS 1998 and reference period is February 1996
**2003 figures are taken from TDHS 2003 and reference period is June 2001

Table 4.1.2. Extrapolation for IMR for June 30, 2008

${}_1q_0$	2003*	2008**	Daily Difference for Extrapolation	2008
Female	0,0278055	0,0152869	0,00000709	0,00968
Male	0,0301226	0,0186101	0,00000652	0,01346

*2003 figures are taken from TDHS 2003 and reference period is June 2001
**2008 figures are taken from TDHS 2008 and reference period is April 2006

The life tables are constructed by using the MATCH procedure of MORTPAK described in Chapter 2.3. The abridged life tables for the years 2000 and 2008 are composed for males and females separately. The mortality level required by the software is specified by using the infant mortality rate segregated according to sex. MATCH application also requires the selection of a model life table. The Coale and Demeny West model pattern is selected as the life table pattern since it is derived from a large number of life tables and represents the most general pattern of mortality.

2000 and 2008 life tables for each sex are presented in Table 4.1.3, 4.1.4, 4.1.5 and 4.1.6.

Table 4.1.3. Turkey male life table, 2000

x	${}_nm_x$	${}_nq_x$	l_x	${}_nd_x$	${}_nL_x$	${}_nS_x$	T_x	e_x	${}_na_x$
0	0,0339	0,0330	100000	3296	97156	0,9647	6815579	68,16	0,137
1	0,0017	0,0068	96704	660	385201	0,9937	6718423	69,47	1,554
5	0,0007	0,0037	96044	357	479328	0,9966	6333222	65,94	2,500
10	0,0006	0,0030	95687	290	477711	0,9959	5853894	61,18	2,500
15	0,0011	0,0056	95397	533	475756	0,9932	5376183	56,36	2,695
20	0,0016	0,0078	94864	739	472523	0,9921	4900427	51,66	2,568
25	0,0016	0,0079	94125	741	468790	0,9917	4427904	47,04	2,524
30	0,0018	0,0089	93384	831	464905	0,9900	3959114	42,40	2,574
35	0,0023	0,0114	92553	1058	460256	0,9862	3494209	37,75	2,628
40	0,0034	0,0168	91495	1535	453900	0,9787	3033952	33,16	2,671
45	0,0054	0,0267	89960	2401	444241	0,9661	2580052	28,68	2,684
50	0,0086	0,0423	87560	3707	429198	0,9460	2135811	24,39	2,680
55	0,0140	0,0677	83853	5676	406016	0,9152	1706613	20,35	2,666
60	0,0220	0,1048	78176	8191	371585	0,8696	1300597	16,64	2,644
65	0,0348	0,1609	69985	11259	323135	0,8007	929012	13,27	2,621
70	0,0557	0,2454	58726	14414	258745	0,7008	605877	10,32	2,580
75	0,0891	0,3648	44312	16163	181316	0,4777	347132	7,83	2,510
80+	0,1698	...	28149	28149	165816	...	165816	5,89	5,891

Table 4.1.4. Turkey female life table, 2000

x	${}_nm_x$	${}_nq_x$	l_x	${}_nd_x$	${}_nL_x$	${}_nS_x$	T_x	e_x	${}_na_x$
0	0,0309	0,0301	100000	3009	97413	0,9671	7041354	70,41	0,140
1	0,0019	0,0074	96991	715	386158	0,9938	6943941	71,59	1,475
5	0,0007	0,0033	96276	314	480594	0,9971	6557783	68,11	2,500
10	0,0005	0,0026	95962	252	479181	0,9967	6077189	63,33	2,500
15	0,0008	0,0042	95710	402	477615	0,9949	5598008	58,49	2,668
20	0,0012	0,0059	95309	564	475194	0,9934	5120393	53,72	2,611
25	0,0014	0,0072	94744	684	472064	0,9921	4645199	49,03	2,578
30	0,0018	0,0087	94060	820	468326	0,9901	4173135	44,37	2,590
35	0,0023	0,0113	93241	1052	463693	0,9868	3704809	39,73	2,615
40	0,0031	0,0154	92188	1423	457582	0,9813	3241116	35,16	2,639
45	0,0046	0,0226	90765	2047	449022	0,9724	2783534	30,67	2,653
50	0,0068	0,0334	88718	2962	436640	0,9591	2334512	26,31	2,653
55	0,0102	0,0498	85756	4268	418792	0,9375	1897872	22,13	2,660
60	0,0162	0,0779	81488	6350	392629	0,9003	1479081	18,15	2,668
65	0,0268	0,1262	75138	9481	353504	0,8379	1086451	14,46	2,660
70	0,0456	0,2058	65657	13510	296196	0,7409	732948	11,16	2,625
75	0,0771	0,3243	52147	16910	219463	0,4975	436752	8,38	2,559
80+	0,1622	...	35237	35237	217289	...	217289	6,17	6,166

Table 4.1.5. Turkey male life table, 2008

x	${}_nm_x$	${}_nq_x$	l_x	${}_nd_x$	${}_nL_x$	${}_nS_x$	T_x	e_x	${}_na_x$
0	0,0136	0,0135	100000	1346	98763	0,9860	7406084	74,06	0,081
1	0,0004	0,0016	98654	160	394234	0,9983	7307321	74,07	1,612
5	0,0003	0,0013	98494	127	492151	0,9988	6913087	70,19	2,500
10	0,0002	0,0011	98367	113	491552	0,9983	6420936	65,28	2,500
15	0,0005	0,0024	98254	234	490736	0,9971	5929384	60,35	2,719
20	0,0007	0,0033	98020	322	489313	0,9968	5438647	55,49	2,556
25	0,0006	0,0031	97698	307	487728	0,9967	4949334	50,66	2,514
30	0,0007	0,0035	97391	344	486126	0,9960	4461606	45,81	2,585
35	0,0010	0,0048	97048	462	484159	0,9939	3975481	40,96	2,663
40	0,0016	0,0078	96586	752	481222	0,9892	3491322	36,15	2,730
45	0,0029	0,0145	95834	1389	476036	0,9804	3010099	31,41	2,745
50	0,0052	0,0258	94445	2433	466711	0,9648	2534063	26,83	2,734
55	0,0095	0,0464	92012	4266	450296	0,9399	2067352	22,47	2,712
60	0,0158	0,0763	87746	6695	423213	0,9015	1617056	18,43	2,682
65	0,0266	0,1253	81051	10153	381508	0,8399	1193844	14,73	2,661
70	0,0447	0,2020	70898	14321	320411	0,7476	812335	11,46	2,620
75	0,0741	0,3139	56577	17759	239534	0,5131	491924	8,69	2,559
80+	0,1538	...	38818	38818	252390	...	252390	6,50	6,502

Table 4.1.6. Turkey female life table, 2008

x	${}_nm_x$	${}_nq_x$	l_x	${}_nd_x$	${}_nL_x$	${}_nS_x$	T_x	e_x	${}_na_x$
0	0,0098	0,0097	100000	968	99109	0,9899	7725239	77,25	0,079
1	0,0003	0,0012	99032	114	395843	0,9989	7626130	77,01	1,508
5	0,0001	0,0007	98918	68	494418	0,9994	7230287	73,09	2,500
10	0,0001	0,0006	98849	57	494104	0,9992	6735870	68,14	2,500
15	0,0002	0,0010	98792	99	493731	0,9988	6241766	63,18	2,692
20	0,0003	0,0015	98693	145	493121	0,9983	5748035	58,24	2,633
25	0,0004	0,0019	98548	188	492290	0,9978	5254914	53,32	2,614
30	0,0005	0,0025	98360	250	491208	0,9969	4762624	48,42	2,640
35	0,0008	0,0038	98110	369	489692	0,9952	4271416	43,54	2,683
40	0,0012	0,0062	97740	602	487329	0,9916	3781724	38,69	2,721
45	0,0022	0,0110	97138	1066	483259	0,9859	3294395	33,91	2,717
50	0,0036	0,0178	96073	1708	476432	0,9771	2811135	29,26	2,698
55	0,0059	0,0291	94365	2749	465498	0,9624	2334703	24,74	2,698
60	0,0098	0,0481	91616	4411	447993	0,9346	1869206	20,40	2,713
65	0,0181	0,0870	87205	7586	418695	0,8829	1421212	16,30	2,715
70	0,0332	0,1541	79619	12267	369656	0,7968	1002517	12,59	2,682
75	0,0603	0,2639	67352	17774	294545	0,5346	632861,7	9,40	2,625
80+	0,1465	...	49578	49578	338316	...	338316,3	6,82	6,824

The life tables indicate that life expectancy at birth is approximately 68 years for males, 70 years for females for the year 2000 and 74 years for males, 77 years for females for 2008. For the year 2000, males reached to age 20 are estimated to live nearly 51 years more and females are estimated to live 54 years more. In 2008, the life expectancy for males and females reached to age 20 are 55 and 58 years, respectively. Males reached to age 65 in 2000 have 13 years more to live and females have 14 years. The life expectancy for age 65 is 15 years for males and 16 years for females in 2008.

Age specific probability of dying ($_nq_x$) derived from Turkey life tables are compared in Figure 4.1.1 and 4.1.2. For both years, the distribution of the $_nq_x$ values show "J" shaped pattern, which is consistent with the mortality pattern of developed countries. Both of the figures indicate that mortality pattern is similar for males and females until the ages 40-45, after age 45, males have higher probability of dying than females.

Figure 4.1.1. Age specific probability of dying by sex, 2000

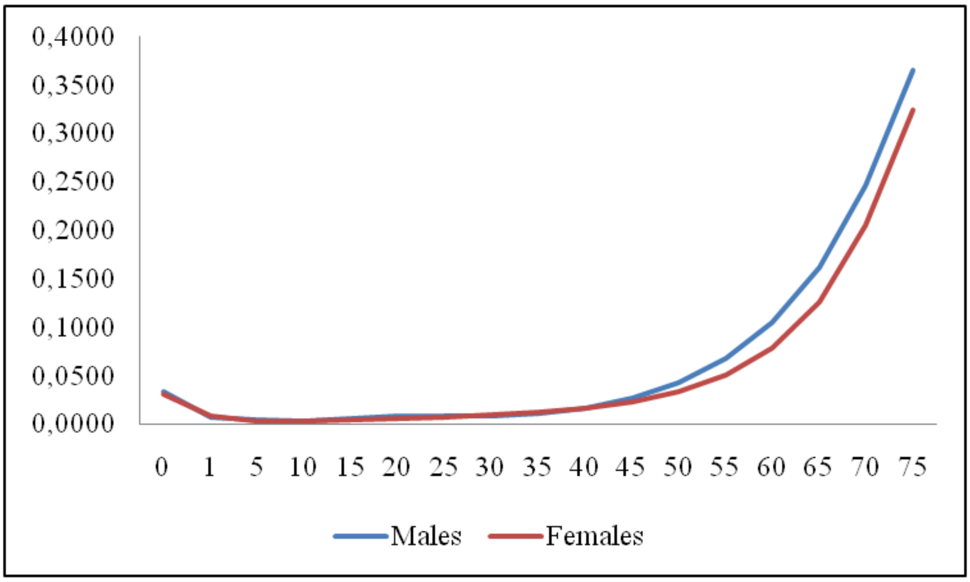
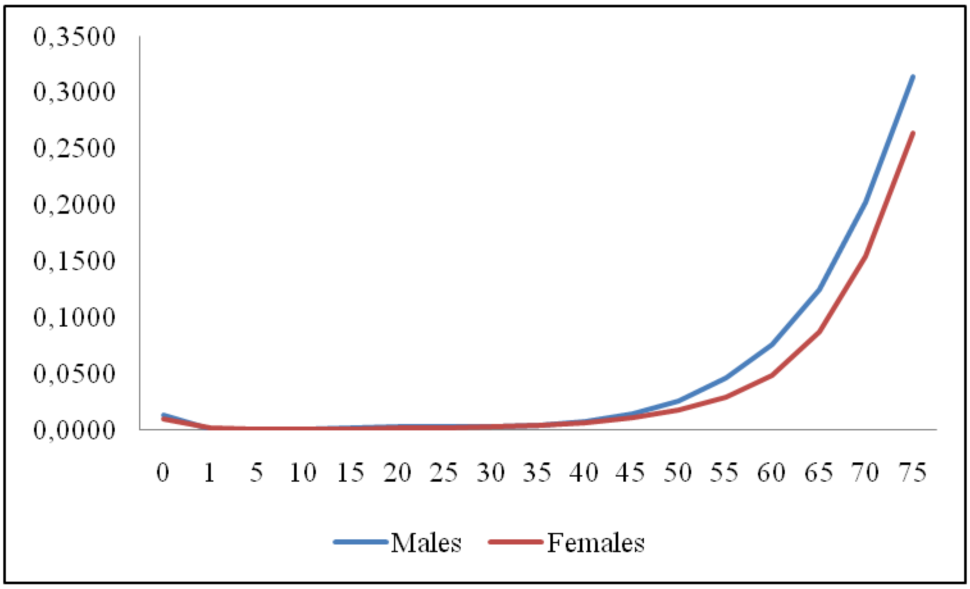


Figure 4.1.2. Age specific probability of dying by sex, 2008



4.2. CONSTRUCTION OF MULTIPLE DECREMENT AND ASSOCIATED SINGLE DECREMENT LIFE TABLES

The construction of multiple decrement and associated single decrement life tables require the estimation of number of deaths. The estimation procedure referred in Chapter 2.3 is applied to the data. Firstly, some adjustment is applied on the population distribution obtained from 2000 population census and 2008 ABPRS results. Secondly, death statistics are adjusted. The final step is the adjustment of number of deaths by using the age, sex and cause specific proportion of number of deaths achieved from the death statistics for province and district centers.

4.2.1. Population Distribution

2000 population census was carried out in October, 22 and the results of 2008 ABPRS refer to the end of the year. Since life table calculations require the mid-year population estimates, the results should be adjusted to the mid-year. But, first of all the unknown age group for 2000 population census results is distributed by using a correction factor:

c.f. (females) = total number of female deaths / known number of female deaths
c.f. (males) = total number of male deaths / known number of male deaths

Each column is multiplied by the corresponding correction factor and population distribution is achieved. Adjusted population estimate for the year 2000 is shown in Table 4.2.1.

After distribution of unknown age group for the year 2000, the population results for both years are adjusted to mid-year, June 30, by using linear interpolation as described in Chapter 4.1. The results are shown in Table 4.2.2.

Table 4.2.1. Distribution of unknown age group, 2000

Age	2000		2000*	
	Male	Female	Male	Female
0	640.760	603.915	640.994	604.111
1	2.755.930	2.584.217	2.756.936	2.585.055
5	3.485.746	3.270.871	3.487.019	3.271.932
10	3.570.657	3.307.999	3.571.961	3.309.072
15	3.691.218	3.518.257	3.692.566	3.519.398
20	3.426.714	3.263.432	3.427.965	3.264.490
25	2.976.430	2.918.825	2.977.517	2.919.771
30	2.552.370	2.457.285	2.553.302	2.458.082
35	2.453.579	2.400.808	2.454.475	2.401.586
40	2.083.531	1.985.225	2.084.292	1.985.869
45	1.710.757	1.658.012	1.711.382	1.658.550
50	1.356.391	1.360.958	1.356.886	1.361.399
55	1.016.254	1.042.168	1.016.625	1.042.506
60	864.299	964.989	864.615	965.302
65	794.881	850.636	795.171	850.912
70	517.870	654.773	518.059	654.985
75	254.443	323.154	254.536	323.259
80+	182.369	280.823	182.436	280.914
unknown	12.536	10.845		
total	34.346.735	33.457.192		
known	34.334.199	33.446.347		
c.f.	1,0003651	1,0003243		

***Adjusted population estimate for the year 2000**

Table 4.2.2. Interpolation for population distribution, 2000 and 2008

	2000*		2008**		Daily Difference for Interpolation		2000 (June,30)		2008 (June,30)	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	640.994	604.111	595.174	560.092	15	15	642.742	605.790	597.996	562.803
1	2.756.936	2.585.055	2.487.164	2.355.828	90	77	2.767.229	2.593.801	2.503.776	2.369.944
5	3.487.019	3.271.932	3.242.581	3.075.551	82	66	3.496.345	3.279.424	3.257.633	3.087.644
10	3.571.961	3.309.072	3.322.041	3.150.156	84	53	3.581.496	3.315.135	3.337.431	3.159.942
15	3.692.566	3.519.398	3.171.917	3.013.187	174	169	3.712.430	3.538.711	3.203.978	3.044.359
20	3.427.965	3.264.490	3.187.625	3.068.933	80	65	3.437.135	3.271.951	3.202.425	3.080.975
25	2.977.517	2.919.771	3.300.291	3.218.546	-108	-100	2.965.202	2.908.372	3.280.415	3.200.148
30	2.553.302	2.458.082	2.939.518	2.870.589	-129	-138	2.538.567	2.442.344	2.915.735	2.845.187
35	2.454.475	2.401.586	2.680.941	2.649.543	-76	-83	2.445.835	2.392.126	2.666.995	2.634.274
40	2.084.292	1.985.869	2.397.706	2.342.544	-105	-119	2.072.334	1.972.261	2.378.406	2.320.580
45	1.711.382	1.658.550	2.153.427	2.130.748	-148	-158	1.694.516	1.640.534	2.126.206	2.101.670
50	1.356.886	1.361.399	1.824.582	1.818.591	-157	-153	1.339.042	1.343.956	1.795.781	1.790.437
55	1.016.625	1.042.506	1.423.445	1.454.659	-136	-138	1.001.104	1.026.781	1.398.393	1.429.279
60	864.615	965.302	1.035.261	1.153.037	-57	-63	858.104	958.139	1.024.753	1.141.476
65	795.171	850.912	783.680	917.704	4	-22	795.610	848.364	784.388	913.591
70	518.059	654.985	575.433	699.248	-19	-15	515.870	653.297	571.900	696.522
75	254.536	323.259	492.226	618.556	-80	-99	245.467	311.992	477.589	600.372
80+	182.436	280.914	288.142	518.434	-35	-79	178.403	271.852	281.633	503.808
Total	34.346.735	33.457.192	35.901.154	35.615.946			34.287.430	33.374.830	35.805.433	35.483.011

*Reference date for 2000 figures is October, 22
** Reference date for 2008 figures is December, 31

4.2.2. Death Statistics

As mentioned before, deaths by 150 selected causes, sex and age group for province and district centers for the years 2000 and 2008 is used as the data source for death statistics. Causes of death are grouped according to the major causes of death concerning public health issues. Major groups are cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases.

The number of deaths according to age, sex and specified causes of death for the year 2000 are shown in Table 4.2.3.

The unknown age group for 2008 death statistics is distributed by using a correction factor as mentioned in Chapter 2.3.

c.f. (females) = total number of female deaths from cause i / known number of female deaths from cause i

c.f. (males) = total number of male deaths from cause i / known number of male deaths from cause i

Each column is multiplied by the corresponding correction factor and population distribution is achieved. Distribution of unknown age group and age, sex and cause specific number of deaths from death statistics are shown in Tables 4.2.4 and 4.2.5

Table 4.2.3. Age, sex and cause specific number of deaths from death statistics, 2000

	Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases		Total	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	201	202	38	37	561	485	1490	1123	131	84	6344	4847	8765	6778
1	354	299	63	74	267	225	307	244	170	119	461	324	1622	1285
5	168	135	71	49	55	47	70	64	158	80	170	121	692	496
10	126	105	69	46	33	27	36	28	175	57	120	98	559	361
15	220	180	125	68	56	35	40	22	508	260	259	151	1208	716
20	283	195	117	71	41	42	40	42	635	270	253	159	1369	779
25	284	236	138	110	39	47	39	30	588	183	290	159	1378	765
30	395	272	163	158	60	35	49	31	504	161	298	174	1469	831
35	766	410	346	294	77	52	74	34	530	133	428	180	2221	1103
40	1402	641	607	441	144	64	96	38	496	134	502	202	3247	1520
45	2223	1009	1042	515	257	106	101	55	401	91	667	266	4691	2042
50	3103	1454	1439	712	366	144	144	41	349	103	790	372	6191	2826
55	3990	1982	1818	766	497	195	142	67	310	102	903	462	7660	3574
60	5273	3332	2143	904	759	307	130	81	282	91	1085	779	9672	5494
65	7396	5078	2706	1156	1130	580	152	105	244	109	1460	1183	13088	8211
70	7528	6815	2367	1224	1205	745	154	112	197	133	1772	2084	13223	11113
75	5334	5820	1366	806	879	616	90	84	120	100	1656	2205	9445	9631
80+	6362	10261	925	707	873	1116	67	94	140	157	3501	6087	11868	18422
Total	45408	38426	15543	8138	7299	4868	3221	2295	5938	2367	20959	19853	98368	75947

Table 4.2.4. Distribution of unknown age group for death statistics, 2008

	Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	1170	885	61	70	854	642	705	530	102	86	3374	2551
1	380	334	49	35	141	121	112	92	94	71	327	261
5	175	127	52	33	55	45	36	37	58	32	162	108
10	135	108	52	32	47	33	20	22	58	52	145	94
15	231	141	65	45	49	42	21	12	255	154	249	135
20	255	157	94	63	54	45	25	14	439	136	275	153
25	299	192	100	104	63	52	23	13	457	131	383	184
30	418	267	167	181	60	44	28	18	389	110	417	195
35	673	435	287	307	109	64	39	34	393	96	437	204
40	1158	644	562	490	157	108	55	32	326	92	606	267
45	2135	1090	1174	747	295	158	69	45	326	86	780	331
50	3359	1551	2101	927	564	186	104	74	249	77	1103	484
55	4477	2078	2574	1017	759	333	113	79	218	71	1269	664
60	5091	3062	2953	1096	998	480	129	102	172	59	1413	941
65	6192	4462	2995	1293	1430	652	158	117	172	74	1714	1332
70	7349	6469	2970	1406	1770	1023	172	145	152	69	2149	1888
75	9337	9852	2924	1552	2370	1565	189	194	178	105	2867	2934
80+	11342	18654	2257	1777	2846	3082	204	306	153	173	4315	7347
unknown	1 193	1 079	401	175	306	219	87	71	57	28	735	628
total	55369	51587	21838	11350	12927	8894	2289	1937	4248	1702	22720	20701
known	54176	50508	21437	11175	12621	8675	2202	1866	4191	1674	21985	20073
c.f.	1,0220	1,0214	1,0187	1,0157	1,0242	1,0252	1,0395	1,0380	1,0136	1,0167	1,0334	1,0313

Table 4.2.5. Age, sex and cause specific number of deaths from death statistics, 2008

	Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases		Total	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	1196	904	62	71	875	658	733	550	103	87	3487	2631	6456	4902
1	388	341	50	36	144	124	116	96	95	72	338	269	1132	938
5	179	130	53	34	56	46	37	38	59	33	167	111	552	392
10	138	110	53	33	48	34	21	23	59	53	150	97	469	349
15	236	144	66	46	50	43	22	12	258	157	257	139	890	541
20	261	160	96	64	55	46	26	15	445	138	284	158	1167	581
25	306	196	102	106	65	53	24	13	463	133	396	190	1355	691
30	427	273	170	184	61	45	29	19	394	112	431	201	1513	833
35	688	444	292	312	112	66	41	35	398	98	452	210	1982	1165
40	1184	658	573	498	161	111	57	33	330	94	626	275	2931	1668
45	2182	1113	1196	759	302	162	72	47	330	87	806	341	4888	2509
50	3433	1584	2140	942	578	191	108	77	252	78	1140	499	7651	3371
55	4576	2122	2622	1033	777	341	117	82	221	72	1311	685	9625	4336
60	5203	3127	3008	1113	1022	492	134	106	174	60	1460	970	11002	5869
65	6328	4557	3051	1313	1465	668	164	121	174	75	1771	1374	12954	8109
70	7511	6607	3026	1428	1813	1049	179	151	154	70	2221	1947	14903	11252
75	9543	10062	2979	1576	2427	1605	196	201	180	107	2963	3026	18289	16577
80+	11592	19053	2299	1805	2915	3160	212	318	155	176	4459	7577	21632	32088
Total	55369	51587	21838	11350	12927	8894	2289	1937	4248	1702	22720	20701	119391	96171

4.2.3. Adjustment of Number of Deaths

The number of deaths for whole Turkey is estimated by using the proportion of deaths since death statistics are provided for province and district centers. The steps referred in Chapter 2.3 are applied for the adjustment.

Firstly, age specific death rates provided from life tables are multiplied by the population of the corresponding age group and the number of deaths for each age group according to sex is estimated as shown in Table 4.2.6 and 4.2.7.

Table 4.2.6. Estimated number of deaths for age groups, 2000

	Male			Female			Total
Age	Population	${}_nm_x$	D_x	Population	${}_nm_x$	D_x	D_x
0	642742	0,0339	21806	605790	0,0309	18713	40519
1	2767229	0,0017	4741	2593801	0,0019	4804	9545
5	3496345	0,0007	2601	3279424	0,0007	2140	4741
10	3581496	0,0006	2178	3315135	0,0005	1741	3919
15	3712430	0,0011	4157	3538711	0,0008	2977	7134
20	3437135	0,0016	5378	3271951	0,0012	3886	9264
25	2965202	0,0016	4686	2908372	0,0014	4213	8899
30	2538567	0,0018	4536	2442344	0,0018	4275	8811
35	2445835	0,0023	5624	2392126	0,0023	5429	11053
40	2072334	0,0034	7007	1972261	0,0031	6132	13139
45	1694516	0,0054	9157	1640534	0,0046	7481	16638
50	1339042	0,0086	11565	1343956	0,0068	9116	20681
55	1001104	0,0140	13996	1026781	0,0102	10465	24461
60	858104	0,0220	18917	958139	0,0162	15496	34413
65	795610	0,0348	27720	848364	0,0268	22753	50473
70	515870	0,0557	28738	653297	0,0456	29797	58535
75	245467	0,0891	21882	311992	0,0771	24040	45922
80+	178403	0,1698	30286	271852	0,1622	44085	74371
Total	34.287.430		224974	33.374.830		217545	442518
CDR		6,56			6,52		6,54

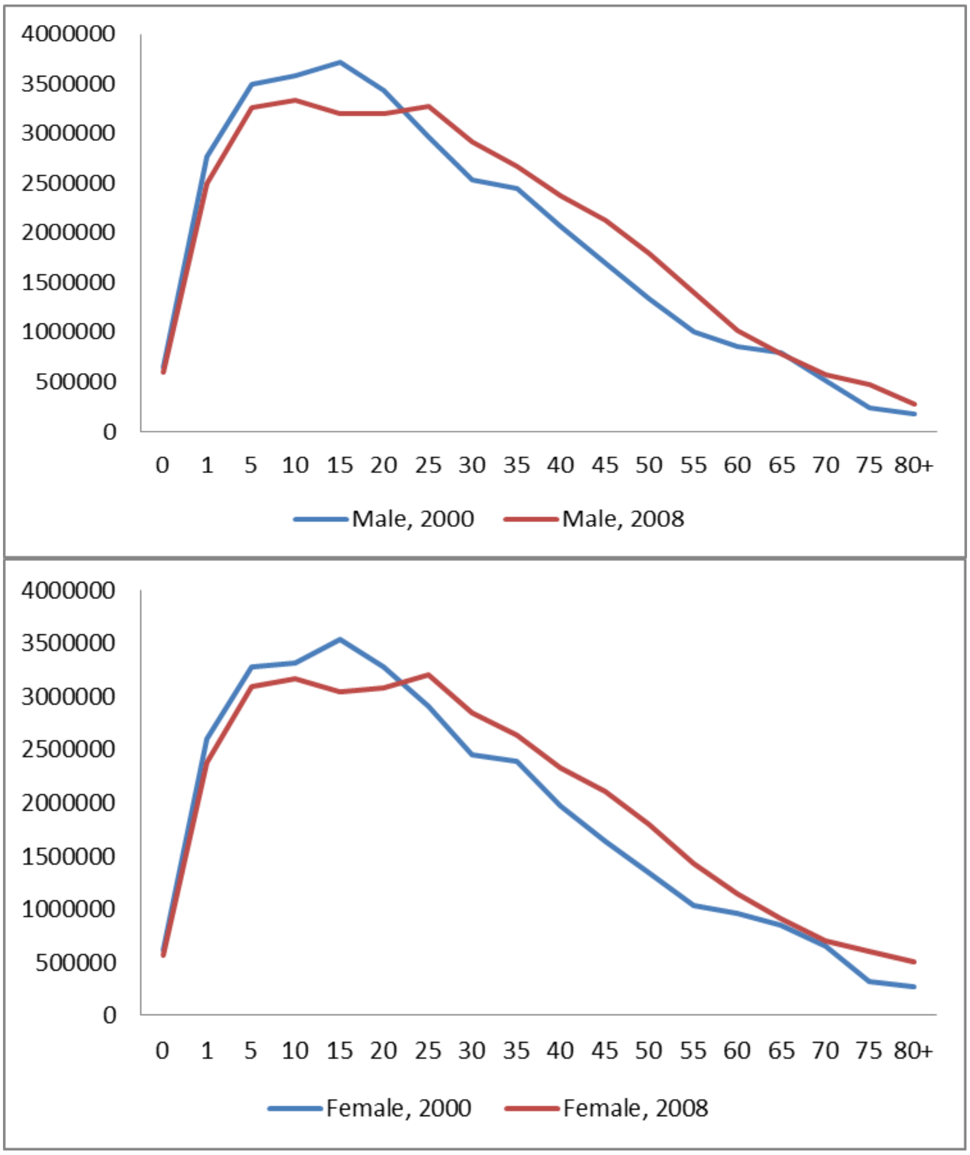
Table 4.2.7. Estimated number of deaths for age groups, 2008

	Male			Female			Total
Age	Population	${}_nm_x$	D_x	Population	${}_nm_x$	D_x	D_x
0	597996	0,0136	8150	562803	0,0098	5497	13647
1	2503776	0,0004	1017	2369944	0,0003	685	1702
5	3257633	0,0003	842	3087644	0,0001	425	1267
10	3337431	0,0002	764	3159942	0,0001	368	1132
15	3203978	0,0005	1530	3044359	0,0002	613	2143
20	3202425	0,0007	2105	3080975	0,0003	904	3009
25	3280415	0,0006	2065	3200148	0,0004	1225	3290
30	2915735	0,0007	2061	2845187	0,0005	1448	3509
35	2666995	0,0010	2542	2634274	0,0008	1987	4529
40	2378406	0,0016	3718	2320580	0,0012	2866	6584
45	2126206	0,0029	6205	2101670	0,0022	4635	10840
50	1795781	0,0052	9361	1790437	0,0036	6418	15779
55	1398393	0,0095	13248	1429279	0,0059	8439	21687
60	1024753	0,0158	16210	1141476	0,0098	11240	27450
65	784388	0,0266	20875	913591	0,0181	16552	37427
70	571900	0,0447	25562	696522	0,0332	23115	48677
75	477589	0,0741	35409	600372	0,0603	36229	71638
80+	281633	0,1538	43315	503808	0,1465	73829	117144
Total	35.805.433		194978	35.483.011		196474	391454
CDR		5,45			5,54		5,49

The crude death rate, average annual number of deaths per 1000 people, is calculated from the estimated number of deaths (# of deaths / total population *1000). In 2000, crude death rates are estimated as 6,56 deaths per 1000 for males and 6,52 deaths for females. The crude death rates for 2008 are 5,45 deaths per 1000 for males and 5,54 deaths for females.

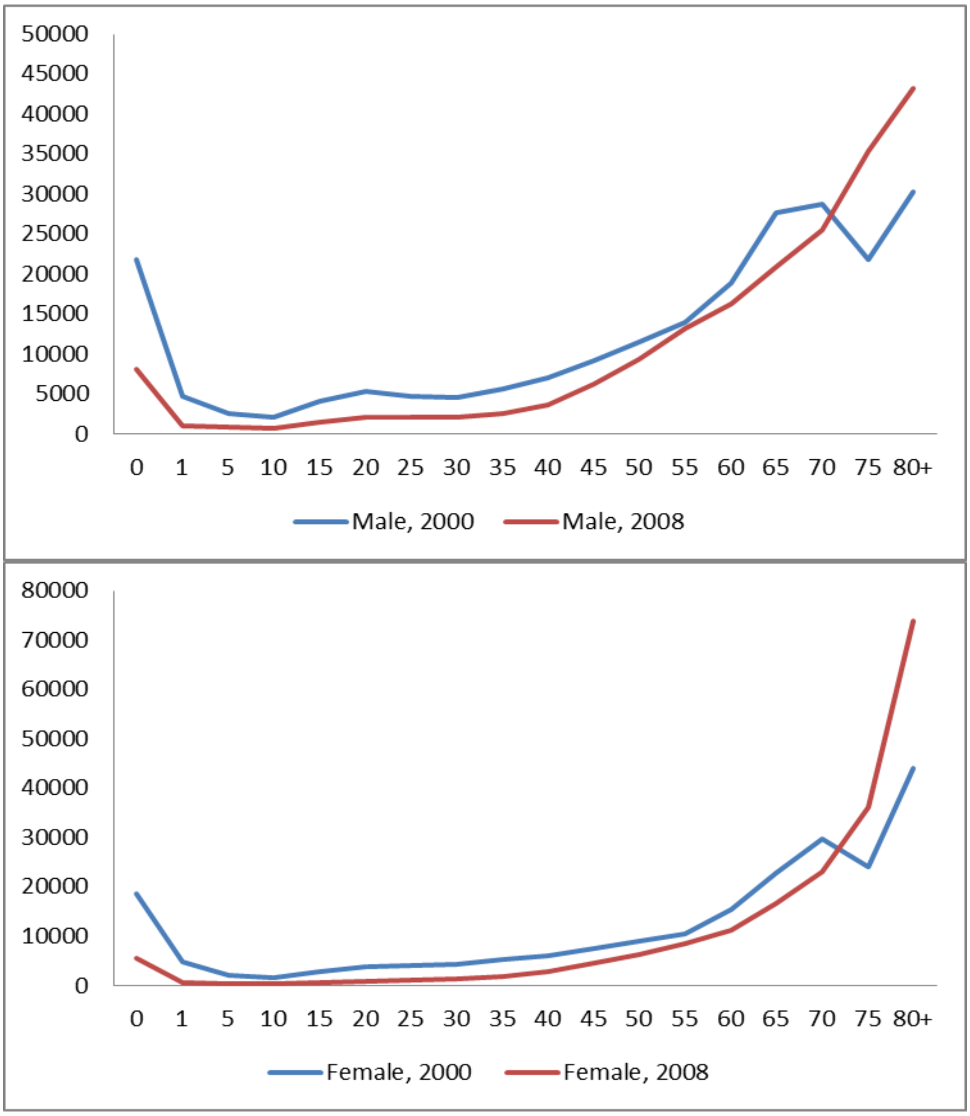
The age pattern of population and estimated number of deaths are examined in Figure 4.2.1 and 4.2.2. When age pattern of population is considered, population at younger ages has a descending trend for males and females. After age 25, an increasing trend is observed in male and female population between 2000 and 2008. There are slight differences in the age pattern of male and female population; however, in the oldest age groups female population has a considerably increasing pattern.

Figure 4.2.1. Age pattern of population, 2000 and 2008



Age pattern of mortality has a similar trend for women; the number of deaths among the elder women is substantially increasing between 2000 and 2008. As seen in Table 4.2.6 and 4.2.7, estimated total number of female deaths is greater than male deaths in 2008 while the exact opposite situation is expected. This can be explained by the increasing pattern of female deaths as well as the ageing population.

Figure 4.2.2. Age pattern of mortality, 2000 and 2008



Following the estimation of total number of deaths, proportion of deaths due to each cause is calculated from death statistics and multiplied by the adjusted total number of deaths and adjusted number of deaths according to cause of death, age group and sex is achieved as presented in Table 4.2.8, 4.2.9, 4.2.10 and 4.2.11.

Table 4.2.8. Adjusted number of deaths according to cause of death and age, 2000 males

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases	
age	D_x	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*
0	21806	0,0229	500	0,0043	95	0,0640	1396	0,1700	3707	0,0149	326	0,7238	15783
1	4741	0,2182	1035	0,0388	184	0,1646	780	0,1893	897	0,1048	497	0,2842	1347
5	2601	0,2428	631	0,1026	267	0,0795	207	0,1012	263	0,2283	594	0,2457	639
10	2178	0,2254	491	0,1234	269	0,0590	129	0,0644	140	0,3131	682	0,2147	468
15	4157	0,1821	757	0,1035	430	0,0464	193	0,0331	138	0,4205	1748	0,2144	891
20	5378	0,2067	1112	0,0855	460	0,0299	161	0,0292	157	0,4638	2494	0,1848	994
25	4686	0,2061	966	0,1001	469	0,0283	133	0,0283	133	0,4267	1999	0,2104	986
30	4536	0,2689	1220	0,1110	503	0,0408	185	0,0334	151	0,3431	1556	0,2029	920
35	5624	0,3449	1940	0,1558	876	0,0347	195	0,0333	187	0,2386	1342	0,1927	1084
40	7007	0,4318	3026	0,1869	1310	0,0443	311	0,0296	207	0,1528	1070	0,1546	1083
45	9157	0,4739	4340	0,2221	2034	0,0548	502	0,0215	197	0,0855	783	0,1422	1302
50	11565	0,5012	5796	0,2324	2688	0,0591	684	0,0233	269	0,0564	652	0,1276	1476
55	13996	0,5209	7290	0,2373	3322	0,0649	908	0,0185	259	0,0405	566	0,1179	1650
60	18917	0,5452	10313	0,2216	4191	0,0785	1484	0,0134	254	0,0292	552	0,1122	2122
65	27720	0,5651	15665	0,2068	5731	0,0863	2393	0,0116	322	0,0186	517	0,1116	3092
70	28738	0,5693	16361	0,1790	5144	0,0911	2619	0,0116	335	0,0149	428	0,1340	3851
75	21882	0,5647	12358	0,1446	3165	0,0931	2036	0,0095	209	0,0127	278	0,1753	3837
80+	30286	0,5361	16235	0,0779	2361	0,0736	2228	0,0056	171	0,0118	357	0,2950	8934
Total	224974		100034		33499		16543		7997		16442		50459

* Adjusted number of deaths according to causes of death

Table 4.2.9. Adjusted number of deaths according to cause of death and age, 2000 females

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases	
age	D_x	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*
0	18713	0,0298	558	0,0055	102	0,0716	1339	0,1657	3100	0,0124	232	0,7151	13382
1	4804	0,2327	1118	0,0576	277	0,1751	841	0,1899	912	0,0926	445	0,2521	1211
5	2140	0,2722	583	0,0988	211	0,0948	203	0,1290	276	0,1613	345	0,2440	522
10	1741	0,2909	506	0,1274	222	0,0748	130	0,0776	135	0,1579	275	0,2715	473
15	2977	0,2514	748	0,0950	283	0,0489	146	0,0307	91	0,3631	1081	0,2109	628
20	3886	0,2503	973	0,0911	354	0,0539	210	0,0539	210	0,3466	1347	0,2041	793
25	4213	0,3085	1300	0,1438	606	0,0614	259	0,0392	165	0,2392	1008	0,2078	876
30	4275	0,3273	1399	0,1901	813	0,0421	180	0,0373	159	0,1937	828	0,2094	895
35	5429	0,3717	2018	0,2665	1447	0,0471	256	0,0308	167	0,1206	655	0,1632	886
40	6132	0,4217	2586	0,2901	1779	0,0421	258	0,0250	153	0,0882	541	0,1329	815
45	7481	0,4941	3696	0,2522	1887	0,0519	388	0,0269	201	0,0446	333	0,1303	974
50	9116	0,5145	4691	0,2519	2297	0,0510	465	0,0145	132	0,0364	332	0,1316	1200
55	10465	0,5546	5804	0,2143	2243	0,0546	571	0,0187	196	0,0285	299	0,1293	1353
60	15496	0,6065	9398	0,1645	2550	0,0559	866	0,0147	228	0,0166	257	0,1418	2197
65	22753	0,6184	14071	0,1408	3203	0,0706	1607	0,0128	291	0,0133	302	0,1441	3278
70	29797	0,6132	18273	0,1101	3282	0,0670	1998	0,0101	300	0,0120	357	0,1875	5588
75	24040	0,6043	14527	0,0837	2012	0,0640	1538	0,0087	210	0,0104	250	0,2289	5504
80+	44085	0,5570	24555	0,0384	1692	0,0606	2671	0,0051	225	0,0085	376	0,3304	14567
Total	217545		106804		25259		13924		7154		9261		55142

* Adjusted number of deaths according to causes of death

Table 4.2.10. Adjusted number of deaths according to cause of death and age, 2008 males

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases	
age	D_x	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*
0	8150	0,1852	1510	0,0096	78	0,1355	1104	0,1135	925	0,0160	131	0,5401	4402
1	1017	0,3430	349	0,0441	45	0,1275	130	0,1028	105	0,0841	86	0,2984	304
5	842	0,3241	273	0,0960	81	0,1021	86	0,0678	57	0,1065	90	0,3034	255
10	764	0,2945	225	0,1131	86	0,1027	78	0,0444	34	0,1255	96	0,3198	244
15	1530	0,2652	406	0,0744	114	0,0564	86	0,0245	38	0,2904	444	0,2891	442
20	2105	0,2234	470	0,0821	173	0,0474	100	0,0223	47	0,3813	803	0,2436	513
25	2065	0,2255	466	0,0752	155	0,0476	98	0,0176	36	0,3419	706	0,2921	603
30	2061	0,2823	582	0,1124	232	0,0406	84	0,0192	40	0,2606	537	0,2848	587
35	2542	0,3470	882	0,1475	375	0,0563	143	0,0205	52	0,2009	511	0,2278	579
40	3718	0,4038	1501	0,1954	726	0,0549	204	0,0195	73	0,1127	419	0,2137	794
45	6205	0,4464	2770	0,2447	1518	0,0618	384	0,0147	91	0,0676	419	0,1649	1023
50	9361	0,4487	4200	0,2797	2618	0,0755	707	0,0141	132	0,0330	309	0,1490	1395
55	13248	0,4754	6298	0,2724	3609	0,0808	1070	0,0122	162	0,0230	304	0,1363	1805
60	16210	0,4729	7666	0,2734	4432	0,0929	1506	0,0122	198	0,0158	257	0,1327	2151
65	20875	0,4885	10198	0,2355	4917	0,1131	2360	0,0127	265	0,0135	281	0,1367	2854
70	25562	0,5040	12883	0,2030	5190	0,1216	3110	0,0120	307	0,0103	264	0,1490	3809
75	35409	0,5218	18476	0,1629	5767	0,1327	4700	0,0107	380	0,0099	349	0,1620	5736
80+	43315	0,5359	23211	0,1063	4604	0,1348	5837	0,0098	425	0,0072	311	0,2061	8929
Total	194978		92364		34720		21786		3365		6316		36427

* Adjusted number of deaths according to causes of death

Table 4.2.11. Adjusted number of deaths according to cause of death and age, 2008 females

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases	
age	D_x	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*	Prop.	D_x*
0	5497	0,1844	1014	0,0145	80	0,1343	738	0,1122	617	0,0178	98	0,5367	2950
1	685	0,3638	249	0,0379	26	0,1323	91	0,1019	70	0,0770	53	0,2871	197
5	425	0,3312	141	0,0856	36	0,1178	50	0,0981	42	0,0831	35	0,2844	121
10	368	0,3158	116	0,0930	34	0,0969	36	0,0654	24	0,1514	56	0,2775	102
15	613	0,2662	163	0,0845	52	0,0796	49	0,0230	14	0,2894	177	0,2573	158
20	904	0,2760	249	0,1101	100	0,0794	72	0,0250	23	0,2380	215	0,2715	245
25	1225	0,2836	347	0,1528	187	0,0771	94	0,0195	24	0,1926	236	0,2744	336
30	1448	0,3273	474	0,2206	319	0,0541	78	0,0224	32	0,1342	194	0,2413	349
35	1987	0,3814	758	0,2676	532	0,0563	112	0,0303	60	0,0838	167	0,1806	359
40	2866	0,3943	1130	0,2983	855	0,0664	190	0,0199	57	0,0561	161	0,1651	473
45	4635	0,4436	2056	0,3023	1401	0,0646	299	0,0186	86	0,0348	161	0,1360	630
50	6418	0,4700	3016	0,2793	1793	0,0566	363	0,0228	146	0,0232	149	0,1481	950
55	8439	0,4895	4131	0,2382	2011	0,0787	665	0,0189	160	0,0166	141	0,1579	1333
60	11240	0,5329	5989	0,1897	2132	0,0839	942	0,0180	203	0,0102	115	0,1654	1858
65	16552	0,5620	9302	0,1619	2680	0,0824	1364	0,0150	248	0,0093	154	0,1694	2804
70	23115	0,5872	13573	0,1269	2934	0,0932	2155	0,0134	309	0,0062	144	0,1730	4000
75	36229	0,6070	21991	0,0951	3445	0,0968	3507	0,0121	440	0,0064	233	0,1825	6613
80+	73829	0,5938	43837	0,0562	4153	0,0985	7270	0,0099	731	0,0055	405	0,2361	17433
Total	196474		108538		22769		18075		3286		2893		40913

* Adjusted number of deaths according to causes of death

Age specific death rates and number of deaths from original and adjusted death statistics are compared in Figure 4.2.3, 4.2.4, 4.2.5 and 4.2.6.

Figure 4.2.3 indicates that adjusted age specific death rates are higher than the original death rates for all age groups in 2000. Between the ages of 1-45, a slight difference is observed between the original and adjusted death rates for both sexes and total population. Age specific death rates have a gradually increasing pattern after age 45 and for the oldest age groups, adjusted death rates are remarkably higher than the original death rates as well as the ages of 0-1. It can be suggested that the death rates of the infants and older age groups are underestimated in the original death statistics. As mentioned in Chapter 2, death statistics have underreporting and misreporting problems due to the data collection procedure.

Number of deaths before and after adjustment is compared in Figure 4.2.4. Adjusted number of deaths are also higher than original number of deaths for all age groups. The gap between the original and adjusted number of deaths increases in the older ages as well as the ages of 0-1.

The pattern of age specific death rates and number of deaths in 2008 are shown in Figure 4.2.5 and 4.2.6. Until the age of 55 years, the pattern of death rates indicate a slight difference; in the oldest age groups adjusted death rates are substantially higher than the original death rates for both sexes and total population. In 2008, number of deaths show a similar trend for original and adjusted number of deaths until age of 40 years, then an increasing pattern is observed in the adjusted number of deaths. The trend of the original and adjusted number of deaths is not as dispersed as the trend of the year 2000.

Figure 4.2.3. Age specific death rates from original and adjusted death statistics, 2000

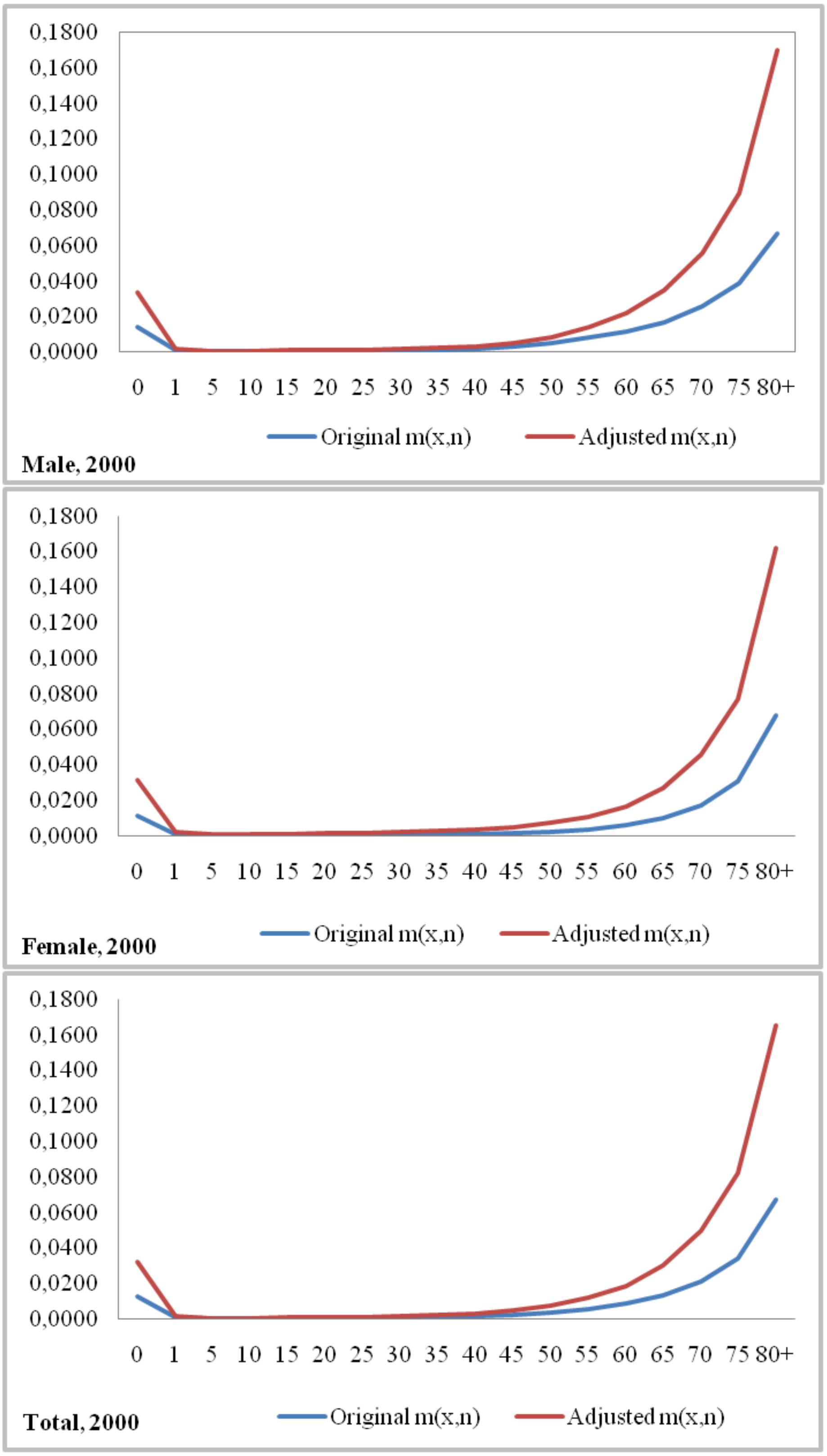


Figure 4.2.4. Number of deaths from original and adjusted death statistics, 2000

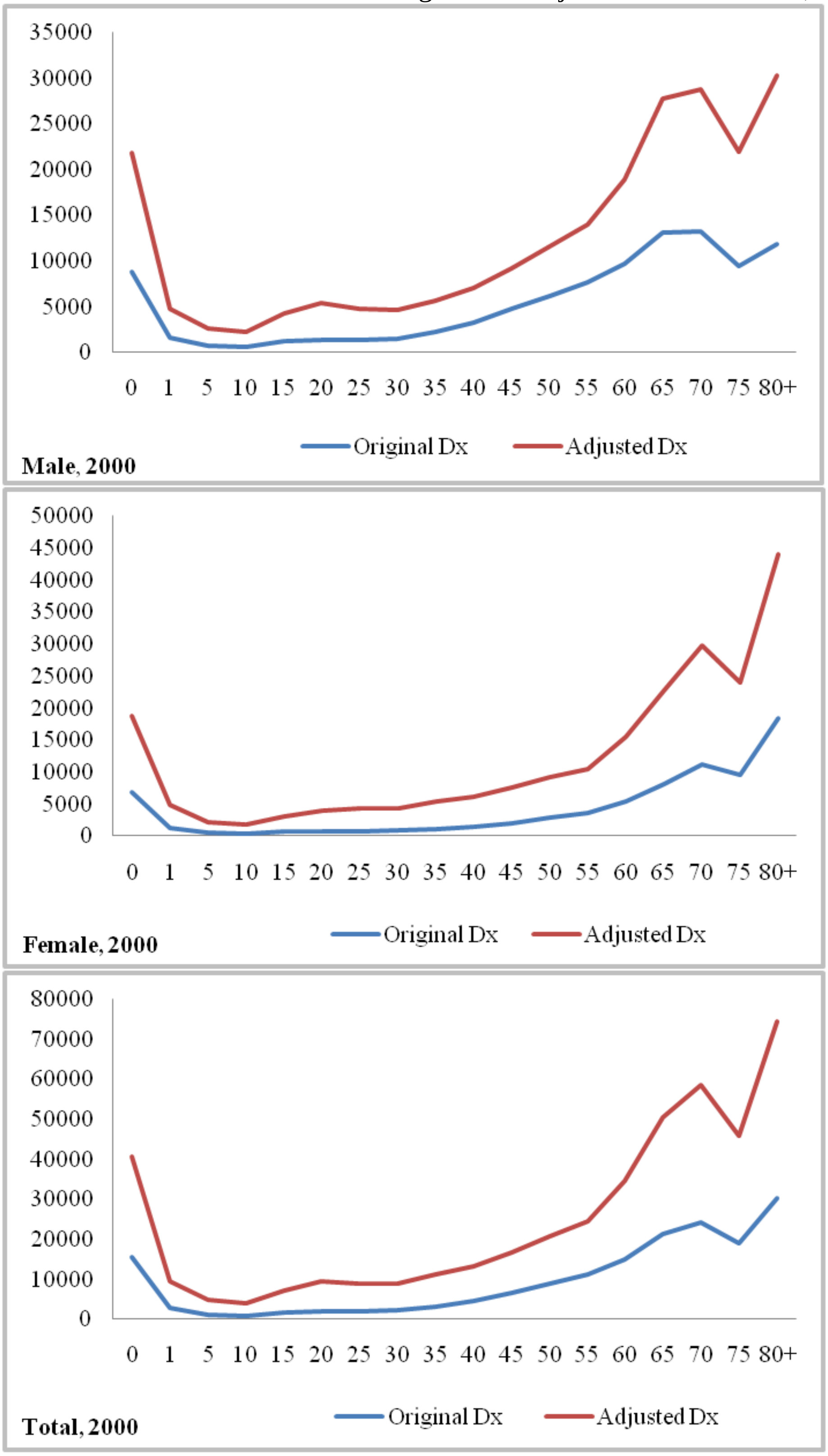


Figure 4.2.5. Age specific death rates from original and adjusted death statistics, 2008

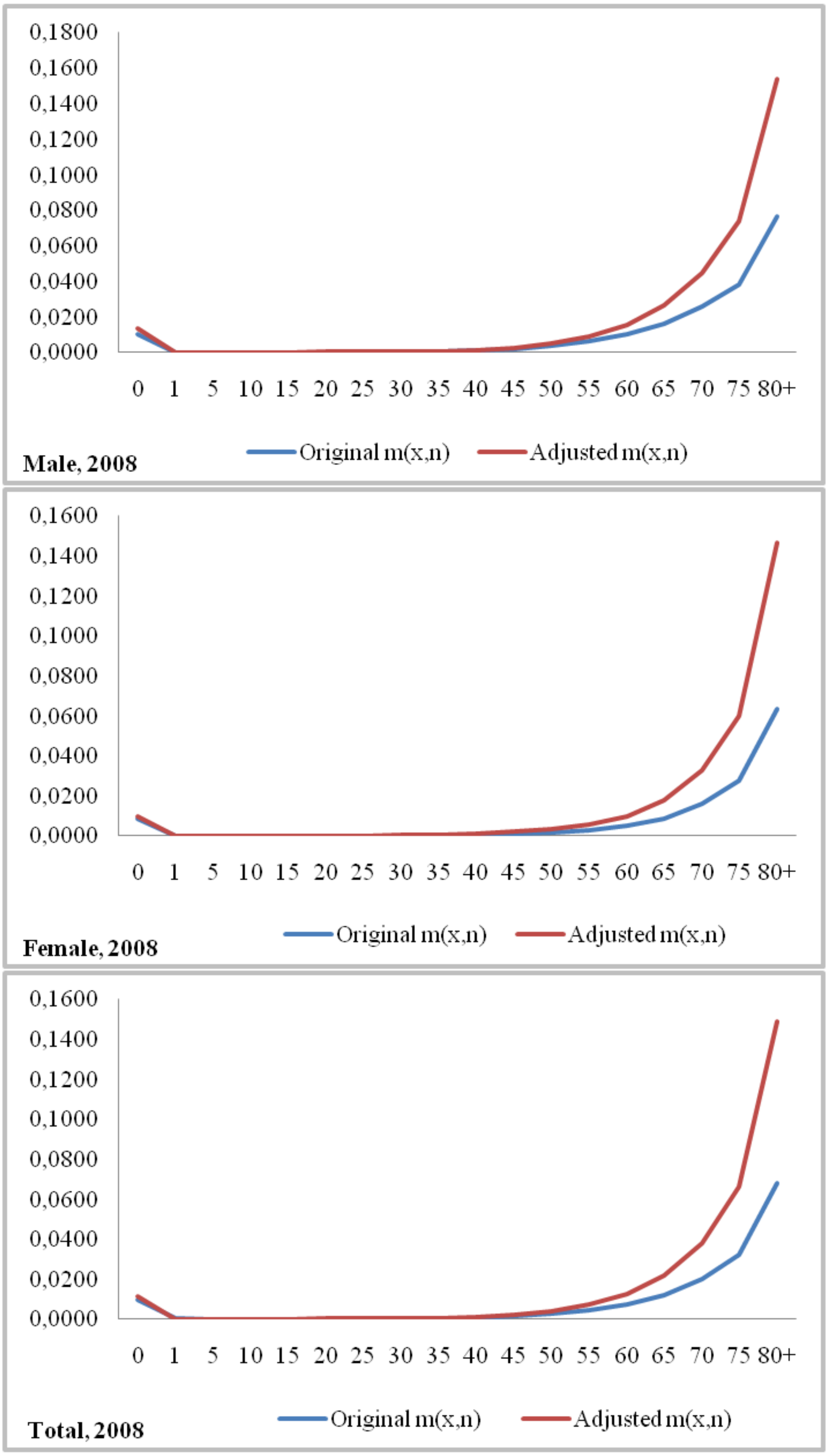
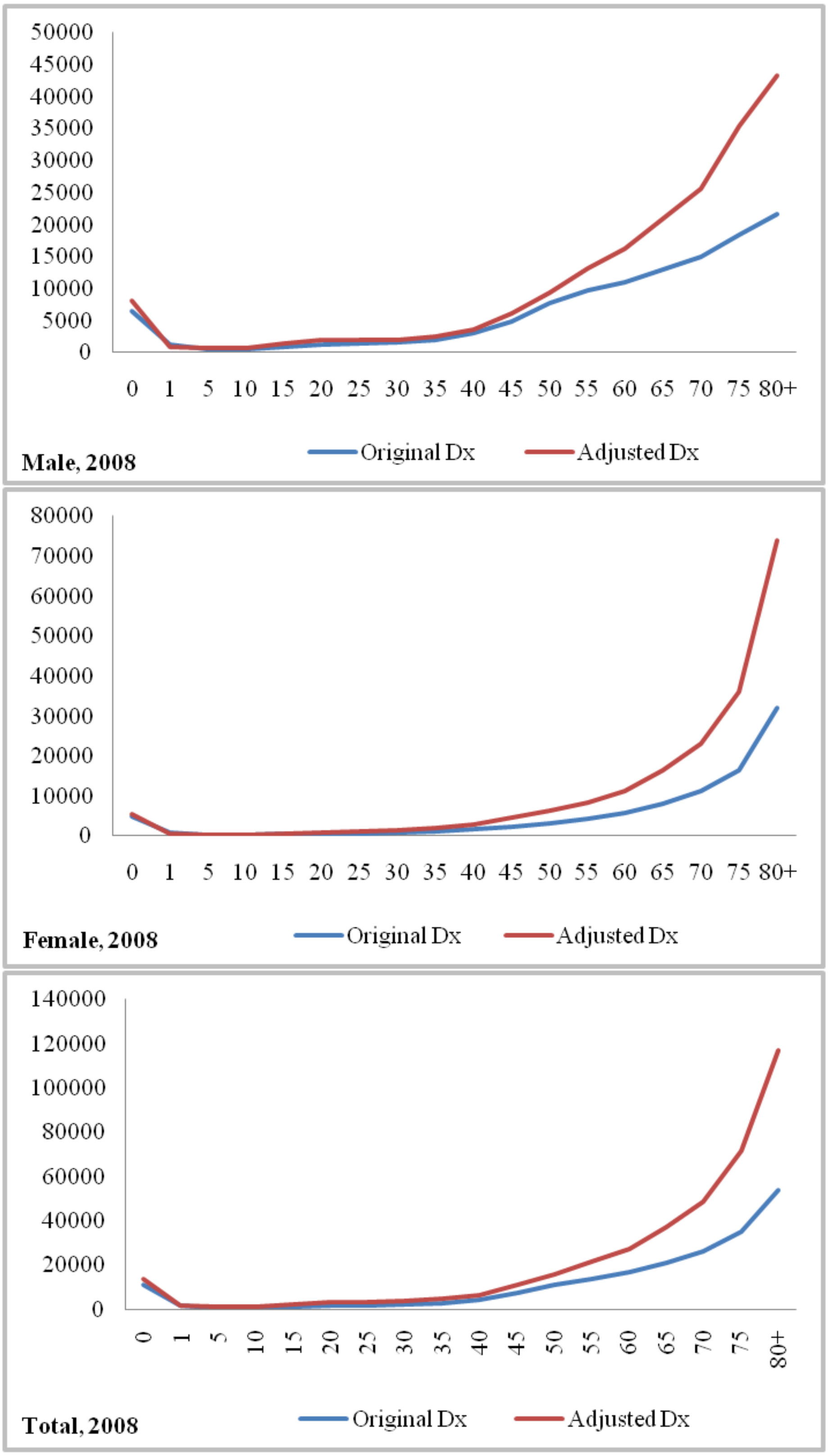


Figure 4.2.6. Number of deaths from original and adjusted death statistics, 2008



4.2.4. Multiple Decrement and Associated Single Decrement Life Tables

Multiple decrement life tables are constructed based on the life table for all causes combined. To construct a multiple decrement life table, ${}_nq_x$ values are taken from the main table and allocated to different causes of death by considering their relative rates of decrement.

To demonstrate the procedure of constructing a multiple decrement life table, functions derived from 2000 male life table for cause *i* = “cardiovascular diseases” at age group 0-1 are computed as an example.

Probability of dying from cause *i* is computed by using the formula:

${}_nq_x^i \;=\; {}_nq_x * \frac{{}_nD_x^i}{{}_nD_x}$, where

${}_nD_x^i$: number of deaths from cause *i* from adjusted number of deaths

${}_nD_x$: number of deaths from all causes combined from adjusted number of deaths

Hence, probability of dying from cardiovascular diseases between ages 0 and 1 is calculated as:

$${}_1q_0^i \;=\; {}_1q_0 * \frac{{}_1D_0^i}{{}_1D_0} = 0{,}03296 * \frac{500}{21806} = 0{,}00076$$

To calculate the number of deaths from cause *i* between ages *x* and *x+n*, the following formula is used:

${}_nd_x^i = {}_nq_x^i * l_x$, where l_x is derived from the main table.

The number of deaths from cardiovascular diseases between ages 0 and 1 is:

$${}_1d_0^i = {}_1q_0^i * l_0 = 0{,}00076 * 100000 = 76$$

The number of persons at age 0 who will eventually die from cardiovascular diseases is calculated by the equation:

$l_x^i = \sum_{a=x}^{\infty} {}_n d_a^i$ => $l_0^i = \sum_{a=0}^{\infty} {}_1 d_a^i$ = 51229

The rate of decrement from cardiovascular diseases between ages 0 and 1 is computed by the formula:

${}_n m_x^i$ = ${}_n d_x^i$ / ${}_n L_x$ => ${}_1 m_0^i$ = ${}_1 d_0^i$ / ${}_1 L_0$ = 76/ 97156 = 0,00078

The multiple decrement life table for cause i = “cardiovascular diseases” is presented in Table 4.2.12. The life table functions - l_x , ${}_n d_x$, ${}_n q_x$, ${}_n a_x$, ${}_n L_x$, T_x , e_x - from 2000 male life table for Turkey are also represented in the life table.

The impact of cardiovascular diseases on overall mortality can be observed from the multiple decrement life table. Proportion of male newborns that will die from cardiovascular diseases assuming that the conditions of 2000 prevailed throughout their life course is 0,512 (51229/100000). This means that more than 51% of newborn males may eventually die of cardiovascular diseases. Proportion of males who survive at age 75 that will die from cardiovascular diseases is 0,546 (24218/44312).

The multiple decrement life tables for cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases for both sexes, for the years 2000 and 2008 are shown separately for each cause of death and sex and year in Appendix B.

Table 4.2.12. Multiple decrement life table for cause i = cardiovascular diseases, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	500	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00076	76	51229	0,00078
1	4741	1035	96704	660	0,00682	1,554	385201	6718423	69,47	0,00149	144	51154	0,00037
5	2601	631	96044	357	0,00371	2,500	479328	6333222	65,94	0,00090	87	51010	0,00018
10	2178	491	95687	290	0,00304	2,500	477711	5853894	61,18	0,00068	65	50923	0,00014
15	4157	757	95397	533	0,00558	2,695	475756	5376183	56,36	0,00102	97	50858	0,00020
20	5378	1112	94864	739	0,00779	2,568	472523	4900427	51,66	0,00161	153	50761	0,00032
25	4686	966	94125	741	0,00787	2,524	468790	4427904	47,04	0,00162	153	50608	0,00033
30	4536	1220	93384	831	0,00890	2,574	464905	3959114	42,40	0,00239	223	50455	0,00048
35	5624	1940	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00394	365	50232	0,00079
40	7007	3026	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00724	663	49867	0,00146
45	9157	4340	89960	2401	0,02669	2,684	444241	2580052	28,68	0,01265	1138	49204	0,00256
50	11565	5796	87560	3707	0,04233	2,680	429198	2135811	24,39	0,02122	1858	48066	0,00433
55	13996	7290	83853	5676	0,06769	2,666	406016	1706613	20,35	0,03526	2957	46209	0,00728
60	18917	10313	78176	8191	0,10478	2,644	371585	1300597	16,64	0,05713	4466	43252	0,01202
65	27720	15665	69985	11259	0,16087	2,621	323135	929012	13,27	0,09091	6362	38786	0,01969
70	28738	16361	58726	14414	0,24544	2,580	258745	605877	10,32	0,13973	8206	32424	0,03171
75	21882	12358	44312	16163	0,36475	2,510	181316	347132	7,83	0,20599	9128	24218	0,05034
80+	30286	16235	28149	28149	1,00000	5,891	165816	165816	5,89	0,53606	15090	15090	0,09100

Associated single decrement life tables are constructed to estimate the expected gains in life expectancy when a cause of death is deleted from the set of multiple decrements. To demonstrate the procedure of constructing a cause deleted life table, functions derived from 2000 male life table for cause i = "cardiovascular diseases" at age group 0-1 are computed as an example.

Probability of surviving assuming that cause i is eliminated as a cause of death is calculated by the formula:

${}_n p_x^{-i} = [{}_n p_x]^{R^{-i}}$, where $R^{-i} = (({}_n D_x - {}_n D_x^i) / {}_n D_x)$

Thus, probability of surviving between ages 0 and 1 when cardiovascular diseases are eliminated is calculated:

$R^{-i} = (({}_1 D_0 - {}_1 D_0^i) / {}_1 D_0)$ = ((21806 – 500) / 21806) = 0,97707

${}_1 p_0^{-i} = [{}_1 p_0]^{R^{-i}}$ = $(0{,}96704)^{0{,}97707}$ = 0,96778

Probability of dying between ages 0 and 1 assuming that cardiovascular diseases are eliminated is computed:

${}_n q_x^{-i} = 1 - {}_n p_x^{-i}$ => ${}_1 q_0^{-i} = 1 - {}_1 p_0^{-i}$ = 1 - 0,96778 = 0,03222

The number of persons surviving at age 0 assuming that cardiovascular diseases are eliminated is calculated:

$l_{x+n}^{-i} = l_x^{-i} * {}_n p_x^{-i}$ => $l_1^{-i} = l_0^{-i} * {}_1 p_0^{-i}$ = 100000 * 0,96778 = 96778

The number of persons dying from between ages 0 and 1 assuming that when cardiovascular diseases are eliminated is:

$${}_{n}d_{x}^{-i} = l_{x}^{-i} - l_{x+n}^{-i} \Rightarrow {}_{1}d_{0}^{-i} = l_{0}^{-i} - l_{1}^{-i} = 100000 - 96778 = 3222$$

The average person years lived in the interval between ages 0 and 1 for persons dying in the interval assuming that cardiovascular diseases are eliminated is calculated by the formulas suggested by Preston et al (2001):

$${}_{n}a_{x}^{-i} = n + R^{-i} \frac{{}_{n}q_{x}}{{}_{n}q_{x}^{-i}} ({}_{n}a_{x} - \mathrm{n}) \quad \text{for } x = 0, 1, 5, 75$$

$${}_{5}a_{x}^{-i} = \frac{\frac{-5}{24}\, {}_{5}d_{x-5}^{-i} + 2.5\, {}_{5}d_{x}^{-i} + \frac{5}{24}\, {}_{5}d_{x+5}^{-i}}{{}_{5}d_{x}^{-i}} \quad \text{for } x = 10 \text{ to } 70$$

$${}_{\infty}a_{80}^{-i} = e_{80}^{-i} = \frac{e_{80}^{0}}{R^{-i}}$$

The associated single decrement life table for causes of death other than cardiovascular diseases is presented in Table 4.2.13. As seen in the table, probability of surviving to age 80 in the absence of cardiovascular diseases is 0,55 and life expectancy at birth is 77,84 for males when cardiovascular diseases are eliminated under the assumption that mortality conditions of 2000 prevailed throughout their life course.

The associated single decrement life tables for cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases for both sexes, for the years 2000 and 2008 are shown separately for each cause of death, sex and year in Appendix C.

Table 4.2.13. Associated single decrement life table for causes of death other than cardiovascular diseases, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,97707	0,96704	0,96778	0,03222	100000	3222	0,138	97221	7783906	77,84
1	4	0,78175	0,99318	0,99466	0,00534	96778	517	1,556	385850	7686684	79,43
5	5	0,75723	0,99629	0,99719	0,00281	96261	271	2,501	480631	7300835	75,84
10	5	0,77460	0,99696	0,99765	0,00235	95991	226	2,654	479424	6820204	71,05
15	5	0,81788	0,99442	0,99543	0,00457	95765	438	2,673	477807	6340780	66,21
20	5	0,79328	0,99221	0,99381	0,00619	95327	590	2,555	475194	5862973	61,50
25	5	0,79390	0,99213	0,99375	0,00625	94738	592	2,508	472211	5387779	56,87
30	5	0,73111	0,99110	0,99349	0,00651	94145	613	2,537	469216	4915567	52,21
35	5	0,65511	0,98856	0,99249	0,00751	93532	702	2,582	465963	4446351	47,54
40	5	0,56822	0,98323	0,99043	0,00957	92830	888	2,640	462054	3980389	42,88
45	5	0,52611	0,97331	0,98587	0,01413	91942	1299	2,668	456680	3518334	38,27
50	5	0,49879	0,95767	0,97866	0,02134	90643	1935	2,676	448717	3061654	33,78
55	5	0,47911	0,93231	0,96697	0,03303	88708	2930	2,662	436691	2612937	29,46
60	5	0,45482	0,89522	0,95090	0,04910	85778	4211	2,651	419001	2176246	25,37
65	5	0,43490	0,83913	0,92656	0,07344	81567	5990	2,654	393780	1757245	21,54
70	5	0,43069	0,75456	0,88577	0,11423	75577	8633	2,645	357553	1363464	18,04
75	5	0,43526	0,63525	0,82078	0,17922	66944	11997	2,794	308255	1005912	15,03
80+		0,46394	0,00000	0,00000	1,00000	54946	54946	12,697	697656	697656	12,70

4.3. ANALYSIS OF POTENTIAL GAINS IN LIFE EXPECTANCY

The gain in life expectancy from eliminating a cause of death is calculated by the difference of cause eliminated life expectancy and life expectancy for all causes combined.

$g_x^{-i} = e_x^{-i} - e_x$, where
e_x^{-i} : The expectation of life for a person who survives at age *x* assuming that cause *i* is eliminated as a cause of death
e_x : The expectation of life for a person who survives at age *x*

Potential gains in life expectancy for the year 2000 for males and females when cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases are eliminated are shown in Table 4.3.1 and 4.3.2. The gains are calculated for both sexes based on the sex ratios obtained from the life tables and results are presented in Table 4.3.3.

The potential gains in life expectancy among males by elimination of cardiovascular diseases are 9,68 years at birth, 9,72 years at age 40 and 8,27 years at age 65 according to the mortality conditions of 2000. The gains in female life expectancy when cardiovascular diseases are eliminated are; 10,89 years at birth, 10,8 years at age 40 and 9,42 years at age 65.

If cancers are eliminated, the gains in life expectancy are 2,16 years at birth and 1,25 years at age 65 for males; 1,74 years at birth and 0,7 years at age 65 for females. The average length of life for males would increase 1,08 years at birth and 0,70 years at age 65 when respiratory diseases are eliminated; for females an increase of 0,96 years at age 0 and 0,54 years at age 65 is estimated under the mortality conditions of 2000.

Table 4.3.1. Potential gains in life expectancy, 2000 males

Age	e_x	Cardiovascular Diseases e_x^{-i}	Gain	Cancers e_x^{-i}	Gain	Respiratory Diseases e_x^{-i}	Gain	Infectious Diseases e_x^{-i}	Gain	Injuries e_x^{-i}	Gain	Other Diseases e_x^{-i}	Gain	Total Gain
0	68,16	77,84	9,68	70,32	2,16	69,24	1,08	68,85	0,70	69,32	1,17	72,39	4,24	19,03
1	69,47	79,43	9,95	71,70	2,22	70,44	0,96	69,79	0,32	70,64	1,17	72,06	2,59	17,21
5	65,94	75,84	9,90	68,16	2,22	66,83	0,89	66,17	0,23	67,07	1,13	68,41	2,47	16,84
10	61,18	71,05	9,87	63,38	2,20	62,05	0,88	61,38	0,21	62,25	1,08	63,60	2,42	16,66
15	56,36	66,21	9,86	58,54	2,19	57,22	0,87	56,55	0,19	57,38	1,02	58,74	2,38	16,51
20	51,66	61,50	9,85	53,82	2,17	52,52	0,86	51,84	0,19	52,56	0,90	53,99	2,33	16,30
25	47,04	56,87	9,83	49,19	2,15	47,90	0,85	47,22	0,18	47,77	0,72	49,32	2,27	16,00
30	42,40	52,21	9,82	44,53	2,13	43,25	0,85	42,56	0,17	42,97	0,58	44,61	2,21	15,76
35	37,75	47,54	9,78	39,86	2,11	38,60	0,84	37,91	0,16	38,21	0,46	39,91	2,16	15,51
40	33,16	42,88	9,72	35,22	2,06	34,00	0,84	33,30	0,14	33,52	0,36	35,26	2,10	15,22
45	28,68	38,27	9,59	30,67	2,00	29,51	0,83	28,81	0,13	28,97	0,29	30,73	2,05	14,89
50	24,39	33,78	9,38	26,27	1,88	25,20	0,81	24,51	0,12	24,63	0,23	26,38	1,99	14,41
55	20,35	29,46	9,10	22,07	1,71	21,14	0,79	20,45	0,10	20,54	0,19	22,30	1,94	13,83
60	16,64	25,37	8,73	18,13	1,49	17,39	0,75	16,72	0,08	16,78	0,15	18,55	1,91	13,11
65	13,27	21,54	8,27	14,52	1,25	13,98	0,70	13,34	0,07	13,39	0,11	15,19	1,91	12,31
70	10,32	18,04	7,72	11,30	0,98	10,95	0,63	10,38	0,06	10,41	0,09	12,31	1,99	11,47
75	7,83	15,03	7,19	8,56	0,72	8,39	0,56	7,88	0,05	7,91	0,08	10,00	2,16	10,76
80+	5,89	12,70	6,81	6,39	0,50	6,36	0,47	5,92	0,03	5,96	0,07	8,36	2,46	10,34
Total														266,16

Table 4.3.2. Potential gains in life expectancy, 2000 females

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases		Total Gain
Age	e_x	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	
0	70,41	81,31	10,89	72,15	1,74	71,37	0,96	71,09	0,67	71,12	0,71	75,13	4,72	19,69
1	71,59	82,75	11,15	73,37	1,78	72,42	0,83	71,92	0,32	72,29	0,70	74,79	3,19	17,97
5	68,11	79,21	11,10	69,87	1,76	68,85	0,74	68,34	0,23	68,77	0,66	71,19	3,08	17,57
10	63,33	74,39	11,06	65,07	1,74	64,05	0,72	63,53	0,20	63,95	0,62	66,36	3,04	17,38
15	58,49	69,53	11,04	60,22	1,73	59,20	0,71	58,68	0,19	59,09	0,60	61,49	3,00	17,27
20	53,72	64,74	11,01	55,44	1,71	54,43	0,70	53,91	0,18	54,24	0,52	56,68	2,96	17,08
25	49,03	60,02	10,99	50,72	1,69	49,72	0,69	49,19	0,17	49,44	0,41	51,94	2,91	16,86
30	44,37	55,30	10,94	46,02	1,65	45,04	0,67	44,52	0,15	44,70	0,33	47,22	2,86	16,60
35	39,73	50,62	10,88	41,33	1,60	40,40	0,66	39,88	0,14	40,00	0,26	42,53	2,80	16,34
40	35,16	45,96	10,80	36,65	1,50	35,81	0,65	35,29	0,13	35,37	0,22	37,91	2,76	16,06
45	30,67	41,35	10,68	32,03	1,36	31,31	0,64	30,79	0,12	30,84	0,17	33,39	2,72	15,69
50	26,31	36,80	10,49	27,54	1,22	26,93	0,62	26,42	0,10	26,46	0,15	29,01	2,69	15,27
55	22,13	32,37	10,24	23,18	1,05	22,73	0,60	22,23	0,09	22,25	0,12	24,80	2,67	14,77
60	18,15	28,05	9,90	19,01	0,86	18,72	0,57	18,23	0,08	18,25	0,10	20,80	2,65	14,16
65	14,46	23,88	9,42	15,16	0,70	15,00	0,54	14,53	0,07	14,54	0,08	17,11	2,65	13,46
70	11,16	19,99	8,83	11,69	0,53	11,64	0,48	11,22	0,05	11,23	0,07	13,88	2,72	12,68
75	8,38	16,61	8,23	8,75	0,38	8,81	0,43	8,42	0,04	8,44	0,06	11,20	2,82	11,96
80+	6,17	13,92	7,75	6,41	0,25	6,56	0,40	6,20	0,03	6,22	0,05	9,21	3,04	11,52
Total														282,33

Elimination of infectious diseases provide an increased life expectancy of 0,7 years for males and 0,67 years for females at birth. The human life wasted by injuries among males is 1,17 years at age 0 and 0,71 years among females. When other diseases are eliminated, estimated potential gains are 4,24 years for males and 4,72 years for females.

When total gains in life expectancy are considered, an increase of 19,03 years at age 0, 15,22 years at age 40 and 12,31 years at age 65 in life expectancy is estimated among males. Females have a total gain of 19,69 years at age 0, 16,06 years at age 40 and 13,46 years at age 65.

Table 4.3.3. Potential gains in life expectancy, 2000 total population

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases	Total
0	10,29	1,95	1,02	0,68	0,94	4,48	19,36
1	10,55	2,00	0,89	0,32	0,93	2,89	17,59
5	10,50	1,99	0,81	0,23	0,89	2,78	17,21
10	10,47	1,97	0,80	0,20	0,85	2,73	17,02
15	10,45	1,96	0,79	0,19	0,81	2,69	16,89
20	10,43	1,94	0,78	0,18	0,71	2,65	16,69
25	10,41	1,92	0,77	0,17	0,56	2,59	16,43
30	10,38	1,89	0,76	0,16	0,45	2,54	16,18
35	10,33	1,85	0,75	0,15	0,36	2,48	15,93
40	10,26	1,78	0,74	0,13	0,29	2,43	15,64
45	10,14	1,68	0,73	0,12	0,23	2,39	15,29
50	9,94	1,55	0,71	0,11	0,19	2,34	14,84
55	9,68	1,37	0,69	0,09	0,15	2,31	14,31
60	9,33	1,17	0,66	0,08	0,12	2,29	13,65
65	8,87	0,96	0,62	0,07	0,09	2,30	12,91
70	8,31	0,74	0,55	0,05	0,08	2,38	12,12
75	7,76	0,53	0,49	0,04	0,07	2,52	11,42
80+	7,34	0,36	0,43	0,03	0,06	2,79	11,01
Total							274,49

The results reflect the situation that causes of death are completely eliminated; however it is not a realistic examination of potential gains in life expectancies. A further examination is based on the estimates obtained from partial elimination of causes of death. A slight modification to the formula of net probability of dying is made to allow the reduction in a cause of death (Tsai et al, 1978). The modified net probability is given by the formula:

$\hat{q}_{i,\delta}\ (\pi_{i\delta}) = 1 - \hat{p}_i^{(D_i - \pi_{i\delta}\ D_{i\delta})/D_i}$, where

$\hat{p}_i$: probability of surviving in age interval $(x_i + x_{i+1})$
D_i : total number of deaths in age interval $(x_i + x_{i+1})$
$D_{i\delta}$: number of deaths from cause R_δ in age interval $(x_i + x_{i+1})$
$\pi_{i\delta}$: improvement factor

The "improvement factor" allows for partial elimination of cause of death in an age group. 70, 50, 30 and 10 per cent of risks are reduced for each cause of death. The net probability of dying at age 0 for the year 2000 when cardiovascular diseases are reduced by 70 percent is calculated for males as an example:

$\hat{q}_{i,\delta}\ (\pi_{i\delta}) = 1 - \hat{p}_i^{(D_i - \pi_{i\delta}\ D_{i\delta})/D_i}$ = 1 - $0.96704^{(21806 - 0.7*500) / 21806}$ = 0,03244

The results of the partial eliminations for males, females and total population in 2000 are represented in Table 4.3.4. The gains for females are greater than males when cardiovascular diseases are totally or partially eliminated; for cancers, respiratory diseases, infectious diseases and injuries males are expected to gain more added years of life than females.

If cardiovascular diseases are reduced by 70 per cent, the gains for males and females are nearly one half the years gained by total elimination. For cancers, respiratory diseases, infectious diseases, injuries and other diseases; 50 per cent elimination provides a gain of approximately one half the years gained by 100 per cent elimination. The increase in life expectancy for the causes of death other than cardiovascular diseases have an almost linear relationship with the proportion eliminated. This linearity holds for the causes of death with relatively small mortality rates; however when the magnitude of a cause of death is larger, no linear relationship is expected (Tsai et al, 1978).

Table 4.3.4. Added years of life at birth by reducing causes of death, 2000

	Per cent of elimination				
	100	70	50	30	10
Cardiovascular Diseases					
Males	9,68	5,51	3,54	1,94	0,60
Females	10,89	6,05	3,85	2,10	0,65
Total Population	10,29	5,78	3,70	2,02	0,63
Cancers					
Males	2,16	1,48	1,04	0,61	0,20
Females	1,74	1,20	0,85	0,50	0,17
Total Population	1,95	1,34	0,94	0,55	0,18
Respiratory Diseases					
Males	1,08	0,75	0,53	0,31	0,10
Females	0,96	0,66	0,47	0,28	0,09
Total Population	1,02	0,70	0,50	0,29	0,09
Infectious Diseases					
Males	0,70	0,49	0,35	0,21	0,07
Females	0,67	0,47	0,34	0,20	0,07
Total Population	0,68	0,48	0,34	0,20	0,07
Injuries					
Males	1,17	0,81	0,58	0,35	0,11
Females	0,71	0,49	0,35	0,21	0,07
Total Population	0,94	0,65	0,46	0,28	0,09
Other					
Males	4,24	2,84	1,98	1,16	0,38
Females	4,72	3,10	2,14	1,24	0,40
Total Population	4,48	2,97	2,06	1,20	0,39

The results of partial elimination according to the age groups 0-14, 15-64 and 65+ are represented in Table 4.3.5. The results of per cent elimination by 5 year age group are weighted by L_x , the total number of person-years lived between ages x and $x+n$, and added years of life for the corresponding age groups are achieved. The gain in life expectancy for each age group is calculated by the following formulas:

$$g_{(0-14)}^{-i} = \sum_{X=0}^{10}(g_x^{-i} * L_x) / \sum_{X=0}^{10} L_x$$

$$g_{(15-64)}^{-i} = \sum_{X=15}^{60}(g_x^{-i} * L_x) / \sum_{X=15}^{60} L_x$$

$$g_{(65+)}^{-i} = \sum_{X=65}^{80}(g_x^{-i} * L_x) / \sum_{X=65}^{80} L_x$$

Table 4.3.5 indicates that added years of life gained by reduction of causes is greater in younger ages for each cause of death. The gains in life expectancy for females are larger than the gains for males when cardiovascular diseases are eliminated or reduced. The exact opposite situation is observed for cancers, respiratory diseases and injuries. For infectious diseases, there is no significant difference in added years of life among sex groups.

Table 4.3.5. Added years of life at birth for the age groups, 2000

	Males					Females				
	Per cent of elimination					Per cent of elimination				
	100	70	50	30	10	100	70	50	30	10
Cardiovascular Diseases										
0-14	9,89	5,61	3,60	1,97	0,61	11,09	6,14	3,90	2,13	0,65
15-64	9,59	5,38	3,43	1,87	0,57	10,72	5,86	3,70	2,00	0,61
65+	7,65	4,07	2,52	1,34	0,40	8,68	4,52	2,77	1,46	0,43
Cancers										
0-14	2,21	1,51	1,06	0,63	0,20	1,76	1,21	0,86	0,51	0,17
15-64	2,00	1,37	0,96	0,57	0,18	1,45	1,00	0,71	0,42	0,14
65+	0,94	0,64	0,45	0,26	0,09	0,50	0,34	0,24	0,14	0,05
Respiratory Diseases										
0-14	0,92	0,63	0,45	0,27	0,09	0,77	0,53	0,38	0,22	0,07
15-64	0,83	0,57	0,40	0,24	0,08	0,65	0,45	0,32	0,19	0,06
65+	0,61	0,42	0,29	0,17	0,06	0,47	0,32	0,23	0,14	0,04
Infectious Diseases										
0-14	0,28	0,19	0,14	0,08	0,03	0,27	0,19	0,14	0,08	0,03
15-64	0,15	0,10	0,07	0,04	0,01	0,14	0,10	0,07	0,04	0,01
65+	0,06	0,04	0,03	0,02	0,00	0,05	0,03	0,02	0,01	0,00
Injuries										
0-14	1,13	0,78	0,56	0,33	0,11	0,66	0,46	0,33	0,20	0,06
15-64	0,51	0,35	0,25	0,15	0,05	0,30	0,21	0,15	0,09	0,03
65+	0,09	0,06	0,04	0,03	0,01	0,07	0,05	0,03	0,02	0,01
Other										
0-14	2,60	1,71	1,18	0,68	0,22	3,21	2,06	1,40	0,80	0,26
15-64	2,15	1,39	0,95	0,55	0,17	2,81	1,78	1,20	0,68	0,22
65+	2,08	1,31	0,88	0,50	0,16	2,78	1,71	1,14	0,64	0,20

Potential gains in life expectancy for the year 2008 for males and females when cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases are eliminated are shown in Table 4.3.6 and 4.3.7. The gains for total population are presented in Table 4.3.8.

Table 4.3.6. Potential gains in life expectancy, 2008 males

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases		Total Gain
Age	e_x	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	
0	74,06	83,35	9,29	76,32	2,26	75,49	1,43	74,33	0,27	74,51	0,45	76,81	2,75	16,45
1	74,07	83,28	9,21	76,35	2,28	75,38	1,31	74,23	0,16	74,51	0,44	76,29	2,22	15,62
5	70,19	79,37	9,18	72,46	2,28	71,49	1,30	70,33	0,14	70,62	0,43	72,37	2,19	15,52
10	65,28	74,43	9,16	67,54	2,27	66,57	1,29	65,41	0,14	65,70	0,42	67,44	2,16	15,44
15	60,35	69,49	9,14	62,61	2,26	61,63	1,28	60,48	0,13	60,76	0,42	62,49	2,14	15,37
20	55,49	64,61	9,12	57,74	2,26	56,77	1,28	55,62	0,13	55,86	0,38	57,59	2,10	15,27
25	50,66	59,77	9,11	52,91	2,25	51,94	1,28	50,79	0,13	50,97	0,31	52,73	2,07	15,15
30	45,81	54,91	9,10	48,06	2,25	47,08	1,27	45,94	0,13	46,07	0,26	47,84	2,03	15,04
35	40,96	50,04	9,08	43,20	2,24	42,23	1,27	41,09	0,12	41,18	0,22	42,95	1,99	14,92
40	36,15	45,19	9,04	38,36	2,22	37,41	1,27	36,27	0,12	36,33	0,18	38,10	1,95	14,78
45	31,41	40,39	8,98	33,59	2,18	32,67	1,26	31,53	0,12	31,56	0,15	33,32	1,91	14,60
50	26,83	35,69	8,86	28,93	2,10	28,08	1,25	26,94	0,11	26,96	0,13	28,69	1,86	14,31
55	22,47	31,17	8,70	24,43	1,96	23,70	1,23	22,57	0,10	22,58	0,11	24,28	1,81	13,91
60	18,43	26,89	8,46	20,19	1,76	19,64	1,21	18,53	0,10	18,52	0,09	20,18	1,75	13,37
65	14,73	22,92	8,19	16,23	1,50	15,90	1,17	14,82	0,09	14,81	0,08	16,42	1,70	12,73
70	11,46	19,35	7,90	12,69	1,23	12,57	1,12	11,54	0,08	11,52	0,06	13,11	1,65	12,04
75	8,69	16,33	7,64	9,67	0,97	9,76	1,06	8,77	0,07	8,75	0,06	10,33	1,64	11,44
80+	6,50	14,01	7,51	7,28	0,77	7,51	1,01	6,57	0,06	6,55	0,05	8,19	1,69	11,09
Total														257,05

Table 4.3.7. Potential gains in life expectancy, 2008 females

		Cardiovascular Diseases		Cancers		Respiratory Diseases		Infectious Diseases		Injuries		Other Diseases		Total Gain
Age	e_x	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	e_x^{-i}	Gain	
0	77,25	88,93	11,68	78,70	1,45	78,34	1,09	77,50	0,25	77,47	0,21	80,12	2,87	17,55
1	77,01	88,64	11,63	78,46	1,45	78,01	1,00	77,17	0,16	77,21	0,20	79,48	2,48	16,92
5	73,09	84,71	11,61	74,55	1,45	74,08	0,99	73,25	0,16	73,29	0,20	75,55	2,45	16,86
10	68,14	79,74	11,60	69,59	1,45	69,13	0,98	68,29	0,15	68,33	0,19	70,58	2,44	16,81
15	63,18	74,77	11,59	64,63	1,45	64,16	0,98	63,33	0,15	63,37	0,19	65,61	2,43	16,79
20	58,24	69,83	11,59	59,69	1,44	59,22	0,98	58,39	0,15	58,41	0,17	60,66	2,42	16,75
25	53,32	64,90	11,58	54,76	1,44	54,30	0,97	53,47	0,14	53,47	0,15	55,72	2,40	16,68
30	48,42	59,98	11,56	49,84	1,42	49,39	0,97	48,56	0,14	48,55	0,13	50,79	2,37	16,59
35	43,54	55,08	11,55	44,94	1,40	44,50	0,96	43,68	0,14	43,65	0,12	45,89	2,35	16,52
40	38,69	50,20	11,51	40,05	1,36	39,65	0,96	38,83	0,14	38,79	0,10	41,02	2,33	16,40
45	33,91	45,38	11,47	35,22	1,30	34,86	0,95	34,05	0,13	34,00	0,09	36,22	2,30	16,24
50	29,26	40,65	11,39	30,47	1,21	30,19	0,93	29,39	0,13	29,34	0,08	31,54	2,28	16,02
55	24,74	36,01	11,27	25,83	1,09	25,66	0,92	24,86	0,12	24,81	0,07	26,98	2,24	15,71
60	20,40	31,51	11,11	21,35	0,95	21,30	0,90	20,51	0,11	20,46	0,06	22,60	2,19	15,32
65	16,30	27,19	10,89	17,11	0,82	17,16	0,86	16,39	0,10	16,35	0,05	18,43	2,13	14,85
70	12,59	23,18	10,59	13,25	0,66	13,41	0,82	12,68	0,09	12,64	0,04	14,66	2,07	14,27
75	9,40	19,65	10,25	9,91	0,52	10,17	0,78	9,47	0,08	9,44	0,04	11,44	2,05	13,72
80+	6,82	16,80	9,97	7,23	0,41	7,57	0,75	6,89	0,07	6,86	0,04	8,93	2,11	13,35
Total														287,35

The gains in male life expectancy by elimination of cardiovascular diseases are 9,29 years at age 0, 9,04 years at age 40 and 8,19 years at age 65 under the assumption of mortality conditions of 2008 prevailed during their life course. The average length of life for females would increase 11,68 years at birth, 11,51 years at age 40 and 10,89 years at age 65 when cardiovascular diseases are eliminated.

The potential gains in life expectancy among males by elimination of cancers are 2,26 years at birth and 1,5 years at age 65; for females an increase of 1,45 years at birth and 0,82 years at age 65 is estimated under the mortality conditions of 2008. Elimination of respiratory diseases provide an increased life expectancy of 1,43 years at birth and 1,17 years at age 65 for males and 1,09 years at birth and 0,86 years at age 65 for females.

Table 4.3.8. Potential gains in life expectancy, 2008 total population

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases	Total
0	10,49	1,85	1,26	0,26	0,33	2,81	17,00
1	10,42	1,86	1,15	0,16	0,32	2,35	16,27
5	10,40	1,86	1,14	0,15	0,31	2,32	16,19
10	10,38	1,86	1,13	0,15	0,30	2,30	16,13
15	10,37	1,85	1,13	0,14	0,30	2,29	16,08
20	10,36	1,85	1,13	0,14	0,27	2,26	16,01
25	10,35	1,84	1,12	0,14	0,23	2,24	15,92
30	10,34	1,83	1,12	0,14	0,19	2,20	15,82
35	10,32	1,82	1,11	0,13	0,17	2,17	15,72
40	10,28	1,79	1,11	0,13	0,14	2,14	15,60
45	10,23	1,74	1,10	0,13	0,12	2,11	15,43
50	10,14	1,65	1,09	0,12	0,10	2,07	15,17
55	10,01	1,52	1,07	0,11	0,09	2,03	14,82
60	9,82	1,34	1,05	0,11	0,07	1,98	14,37
65	9,60	1,14	1,01	0,10	0,06	1,92	13,84
70	9,34	0,92	0,96	0,09	0,05	1,87	13,23
75	9,08	0,72	0,91	0,08	0,05	1,87	12,70
80+	8,92	0,56	0,86	0,07	0,04	1,93	12,38
Total							272,70

If infectious diseases are eliminated, the gains in life expectancy are 0,27 years at birth for males and 0,25 years at birth for females. The human life wasted by injuries among males is 0,45 years at age 0 and 0,21 years among females. When other diseases are eliminated, estimated potential gains are 2,75 years for males and 2,87 years for females.

A total gain of 16,45 years at age 0, 14,78 years at age 40 and 12,73 years at age 65 is estimated for males according to the mortality conditions of 2008. For females, an increase of 17,55 years at birth, 16,40 years at age 40 and 14,85 years at age 65 in life expectancy is estimated.

The added years of life at birth by reducing causes of death in 2008 are represented in Table 4.3.9. The results of partial elimination according to the age groups 0-14, 15-64 and 65+ are represented in Table 4.3.10. The results indicate that the sex pattern of the gains in life expectancy by partial elimination is similar to the pattern of the year 2000. The gains are greater for females when cardiovascular diseases and other diseases are eliminated; for other diseases males are estimated to gain more added years of life than females. The linear relationship between the gains and proportion eliminated also holds for 2008 for the causes of death with relatively small mortality rates. When age groups are considered, the gains are greater for early ages as expected.

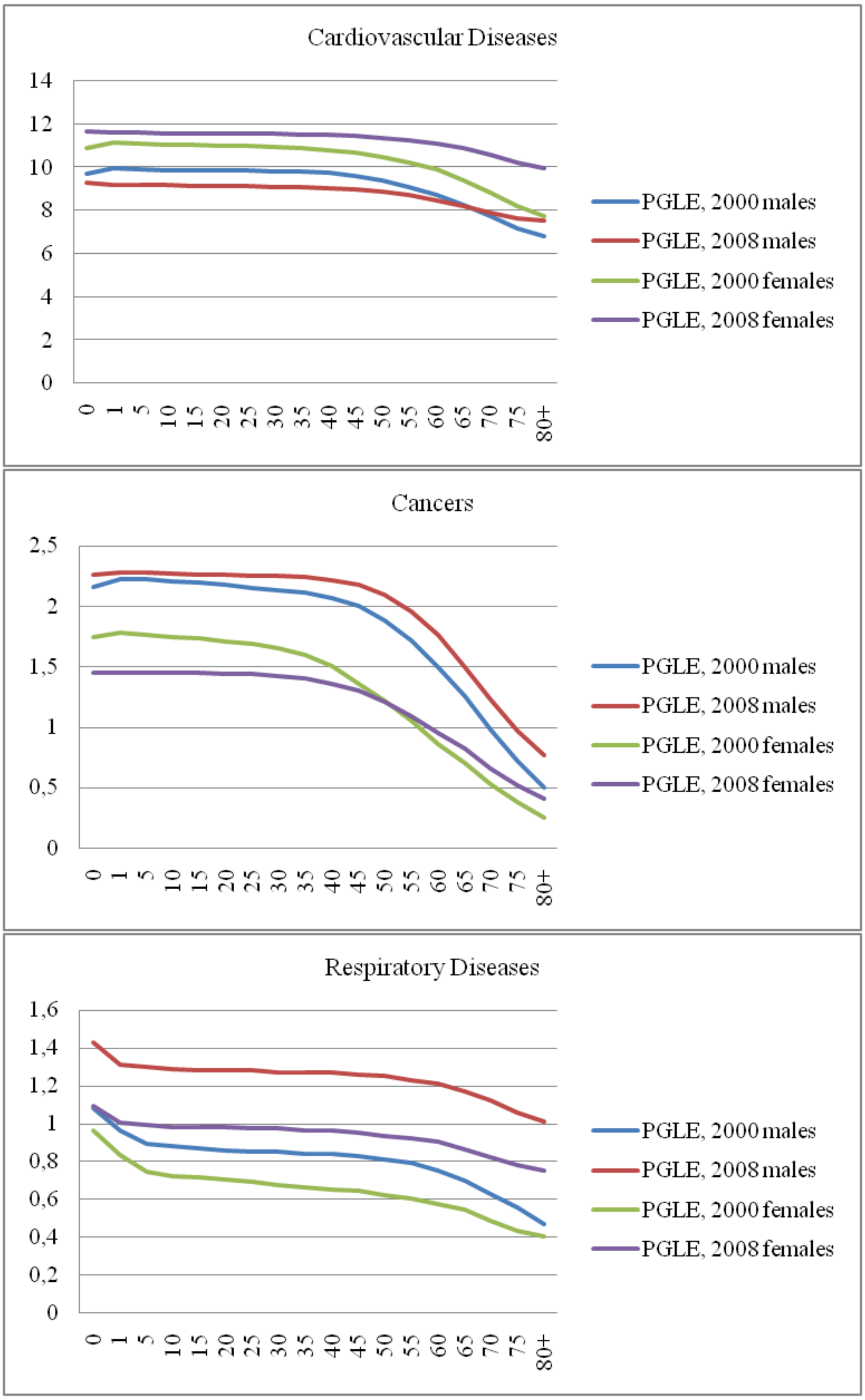
Table 4.3.9. Added years of life at birth by reducing causes of death, 2008

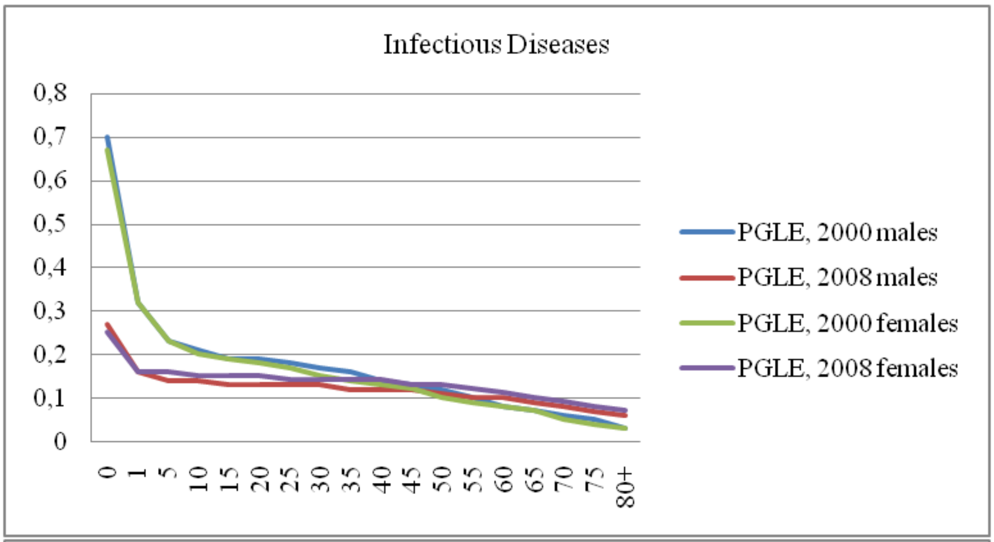
	Per cent of elimination				
	100	70	50	30	10
Cardiovascular Diseases					
Males	9,29	5,22	3,33	1,82	0,56
Females	11,68	6,09	3,77	2,01	0,61
Total population	10,49	5,66	3,55	1,92	0,59
Cancers					
Males	2,26	1,53	1,07	0,63	0,21
Females	1,45	1,00	0,71	0,42	0,14
Total population	1,85	1,26	0,89	0,52	0,17
Respiratory Diseases					
Males	1,43	0,97	0,68	0,40	0,13
Females	1,09	0,75	0,53	0,31	0,10
Total population	1,26	0,86	0,60	0,35	0,11
Infectious Diseases					
Males	0,27	0,19	0,13	0,08	0,03
Females	0,25	0,17	0,12	0,07	0,02
Total population	0,26	0,18	0,12	0,07	0,02
Injuries					
Males	0,45	0,32	0,23	0,13	0,04
Females	0,21	0,15	0,11	0,06	0,02
Total population	0,33	0,23	0,17	0,09	0,03
Other					
Males	2,75	1,85	1,29	0,75	0,25
Females	2,87	1,90	1,31	0,76	0,25
Total population	2,81	1,88	1,30	0,76	0,25

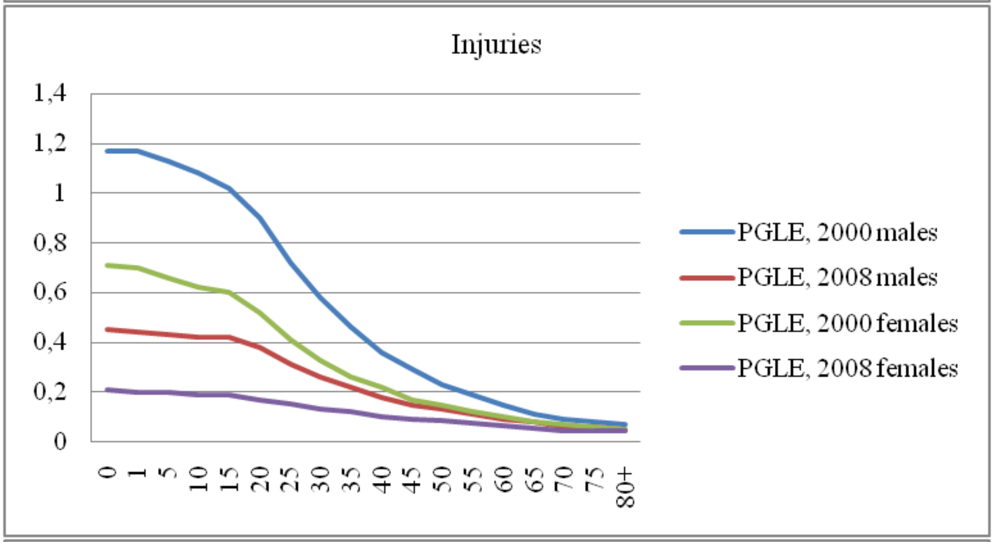
Table 4.3.10. Added years of life at birth for the age groups, 2008

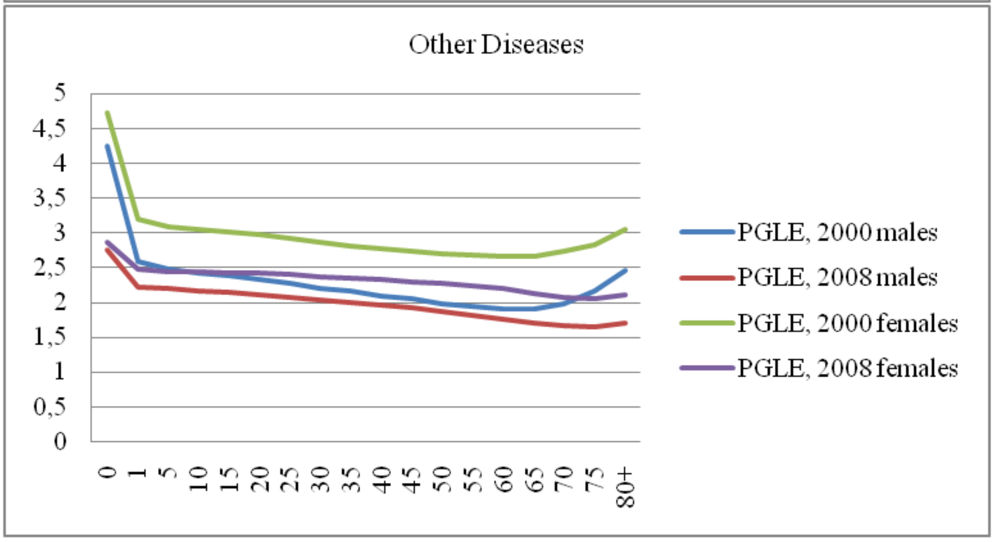
	Males					Females				
	Per cent of elimination					Per cent of elimination				
	100	70	50	30	10	100	70	50	30	10
Cardiovascular Diseases										
0-14	9,19	5,13	3,27	1,78	0,55	11,62	6,03	3,72	1,98	0,60
15-64	8,97	4,97	3,15	1,71	0,52	11,47	5,91	3,63	1,93	0,58
65+	7,86	4,17	2,57	1,36	0,41	10,46	5,18	3,11	1,62	0,48
Cancers										
0-14	2,27	1,54	1,08	0,64	0,21	1,45	1,00	0,71	0,42	0,14
15-64	2,15	1,46	1,02	0,60	0,20	1,31	0,90	0,64	0,38	0,13
65+	1,17	0,79	0,55	0,32	0,10	0,62	0,42	0,30	0,18	0,06
Respiratory Diseases										
0-14	1,31	0,89	0,62	0,36	0,12	1,00	0,68	0,48	0,28	0,09
15-64	1,26	0,85	0,60	0,35	0,11	0,95	0,65	0,46	0,27	0,09
65+	1,10	0,74	0,51	0,30	0,10	0,81	0,55	0,38	0,23	0,07
Infectious Diseases										
0-14	0,15	0,11	0,08	0,05	0,01	0,16	0,11	0,08	0,05	0,02
15-64	0,12	0,08	0,06	0,03	0,01	0,14	0,09	0,07	0,04	0,01
65+	0,08	0,05	0,04	0,02	0,01	0,08	0,06	0,04	0,02	0,01
Injuries										
0-14	0,43	0,30	0,22	0,13	0,04	0,20	0,14	0,10	0,06	0,02
15-64	0,23	0,16	0,11	0,07	0,02	0,12	0,08	0,06	0,03	0,01
65+	0,06	0,04	0,03	0,02	0,01	0,04	0,03	0,02	0,01	0,00
Other										
0-14	2,22	1,48	1,03	0,60	0,19	2,48	1,63	1,12	0,65	0,21
15-64	1,97	1,30	0,90	0,52	0,17	2,33	1,53	1,04	0,60	0,19
65+	1,67	1,09	0,75	0,43	0,14	2,09	1,35	0,92	0,52	0,17

Figure 4.3.1. Potential gains in life expectancy for each cause of death, 2000 and 2008




Infectious Diseases
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0 1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80+
PGLE, 2000 males
PGLE, 2008 males
PGLE, 2000 females
PGLE, 2008 females


Injuries
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0 1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80+
PGLE, 2000 males
PGLE, 2008 males
PGLE, 2000 females
PGLE, 2008 females


Other Diseases
5
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
0 1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80+
PGLE, 2000 males
PGLE, 2008 males
PGLE, 2000 females
PGLE, 2008 females

The comparison of potential gains in life expectancy in 2000 and 2008 for each cause of death is represented in Figure 4.3.1. The gains in the absence of cardiovascular diseases are greater for females in 2000 and 2008. The gains in life expectancy increased for females in the 8 year period; however a descending pattern is observed for males except older ages. It can be suggested that cardiovascular diseases have an expanding impact on female mortality in the period 2000-2008. For the males at younger ages, the impact of cardiovascular disease related mortality decreased in 8 years.

Cancers make greater contribution to male mortality in both years. The age pattern of cancer related mortality shows a slight difference until the age of 45 years for males and females in both years. After age 45, the gains in life expectancy have a descending pattern; however the gains in 2008 are greater than the gains in 2000 for females at older ages. It can be suggested that the impact of cancer on female mortality increased at older ages between 2000 and 2008.

The impact of respiratory diseases on mortality increased for both sexes in the period 2000-2008. The gains in life expectancy of males are larger than females in each age group for both years. The added years of life when respiratory diseases are eliminated is highest in childhood and gradually decreases by age.

The added years of life from elimination of infectious diseases show a significant decline in early ages during the 8 year period. A similar age pattern is observed for males and females in the corresponding years and the gains in life expectancy are greater after age 50 in 2008.

The years of life gained from elimination of injuries are greater for males at younger ages. The potential gains decreased between 2000 and 2008 for both sexes. At older ages, the age pattern of gains shows little difference for both sexes.

The impact of other diseases on added years of life decreased between 2000 and 2008 at the age group 0-1. The decrease may be due to the decline in the infant mortality rates. Females have more added years of life than males in both years; however the gap between the gains is wider for the year 2000 in all age groups.

4.4. ANALYSIS OF YEARS OF POTENTIAL LIFE LOST

Years of potential life lost is calculated by multiplying the number of deaths at each age group by the remaining life expectancy for that age group and the terms are summed to get the total YPLL. Lifetime YPLL and YPLL up to age 65 is calculated for all causes of death and for each cause of death.

Lifetime YPLL for all causes is calculated by using the formula:

YPLL: $\sum_{X=0}^{80}({}_{n}D_{x} \ * \ e_{x})$

YPLL up to age 65 is calculated by:

YPLL$_{65}$: $\sum_{X=0}^{60}[(65-1-x)+\ (n-{}_{n}a_{x})]\ *\ {}_{n}D_{x}$, where

${}_{n}D_{x}$: Number of deaths from all causes combined from adjusted number of deaths
e_{x} : The expectation of life for a person who survives at age *x*
${}_{n}a_{x}$: The average person years lived in the interval between ages *x* and *x*+*n* for persons dying in the interval

Table 4.4.1. Years of potential life lost for all causes of death

	2000			2008		
Age	Males	Females	Total Population	Males	Females	Total Population
0	1.486.217	1.317.644	1.401.819	603.582	424.652	513.961
1	329.364	343.933	336.658	75.331	52.762	64.024
5	171.486	145.793	158.623	59.074	31.081	45.045
10	133.231	110.274	121.735	49.869	25.046	37.425
15	234.284	174.125	204.146	92.344	38.700	65.440
20	277.798	208.796	243.200	116.788	52.645	84.592
25	220.426	206.553	213.465	104.623	65.320	84.880
30	192.297	189.665	190.976	94.420	70.092	82.193
35	212.340	215.704	214.028	104.149	86.525	95.287
40	232.351	215.601	223.942	134.382	110.878	122.556
45	262.631	229.409	245.931	194.902	157.177	175.897
50	282.092	239.890	260.810	251.162	187.797	219.153
55	284.857	231.605	257.819	297.654	208.799	252.489
60	314.711	281.272	297.531	298.731	229.317	263.037
65	367.972	328.999	347.611	307.472	269.752	287.736
70	296.485	332.635	315.780	292.886	291.047	291.901
75	171.417	201.341	187.803	307.871	340.421	325.822
80+	178.403	271.852	231.405	281.633	503.808	408.880
Total	5.648.363	5.245.092	5.453.281	3.666.872	3.145.819	3.420.318

Lifetime YPLL and YPLL up to age 65 for all causes of death are represented in Table 4.4.1 and 4.4.2. In Turkey, the burden of premature mortality is estimated as a total of 5.648.363 YPLL for males and 5.245.092 YPLL for females in 2000. In 2008, premature deaths led to 3.666.872 YPLL for males and 3.145.819 YPLL for females. From 2000 to 2008, years of potential life lost declined for males and females until the age of 70; the decline is substantial in early ages. The relative percentage of YPLL up to age 65 decreased significantly in the period 2000-2008. In 2000, the proportion of YPLL up to age 65 to overall YPLL is 0,61 for males and 0,56 for females; in 2008, the corresponding values are 0,40 and 0,30, respectively. YPLL in productive years (15-64) shows a decreasing trend in the 8-year period, especially for females.

Table 4.4.2. Years of potential life lost up to age 65 for all causes of death

	2000			2008		
Age	Males	Females	Total Population	Males	Females	Total Population
0	1.414.408	1.213.716	1.313.930	529.076	356.867	442.821
4	296.046	300.367	298.209	63.450	42.817	53.112
9	149.535	123.074	136.287	48.395	24.450	36.395
14	114.334	91.417	102.858	40.109	19.296	29.676
19	196.659	140.909	168.730	72.350	28.977	50.598
24	228.184	164.743	196.374	89.338	38.296	63.718
29	175.597	157.655	166.595	77.417	45.797	61.533
34	147.073	138.552	142.797	66.810	46.843	56.775
39	153.950	148.666	151.298	69.501	54.289	61.852
44	156.460	137.128	146.755	82.792	63.845	73.259
49	158.567	129.766	144.089	107.072	80.097	93.483
54	142.476	112.557	127.388	114.815	78.957	96.701
59	102.647	76.817	89.532	96.555	61.622	78.799
64	44.562	36.139	40.235	37.571	25.704	31.469
0-64	3.480.498	2.971.505	3.225.076	1.495.251	967.857	1.230.190
15-64	1.506.175	1.242.931	1.373.792	814.221	524.427	668.186

Lifetime YPLL for cause i is calculated by using:

$\text{YPLL}_i : \sum_{X=0}^{80}({}_nD_x^i * e_x^{-i})$

YPLL up to age 65 for cause i is calculated by using:

$\text{YPLL}_{(65,\, i)} : \sum_{X=0}^{60}[(65 - 1 - x) + (n - {}_na_x^{-i})] * {}_nD_x^i$, where

${}_nD_x^i$: Number of deaths from cause *i* from adjusted number of deaths

e_x^{-i} : The expectation of life for a person who survives at age *x* assuming that cause *i* is eliminated as a cause of death

${}_na_x^{-i}$: The average person years lived in the interval between ages *x* and *x*+*n* for persons dying in the interval assuming that cause *i* is eliminated

Lifetime YPLL and YPLL up to age 65 for each cause of death are represented in Table 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.4.7, 4.4.8, 4.4.9 and 4.4.10.

Table 4.4.3. Years of potential life lost by causes of death, 2000 males

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	38.924	6.648	96.633	255.229	22.593	1.142.561
1	82.180	13.202	54.970	62.623	35.102	97.100
5	47.885	18.187	13.814	17.407	39.824	43.706
10	34.877	17.038	7.978	8.609	42.444	29.731
15	50.130	25.184	11.028	7.785	100.313	52.357
20	68.372	24.738	8.458	8.146	131.100	53.655
25	54.919	23.084	6.352	6.262	95.506	48.631
30	63.679	22.409	8.012	6.440	66.873	41.046
35	92.214	34.926	7.526	7.104	51.284	43.257
40	129.729	46.140	10.565	6.900	35.882	38.195
45	166.060	62.396	14.805	5.681	22.676	40.008
50	195.783	70.615	17.231	6.593	16.054	38.936
55	214.743	73.300	19.197	5.307	11.634	36.787
60	261.647	75.993	25.817	4.251	9.256	39.359
65	337.473	83.236	33.447	4.296	6.917	46.970
70	295.160	58.111	28.673	3.473	4.456	47.404
75	185.688	27.079	17.085	1.643	2.200	38.359
80+	206.138	15.080	14.165	1.013	2.130	74.649
Total	2.525.602	697.367	395.756	418.762	696.243	1.952.712

Table 4.4.4. Years of potential life lost up to age 65 by causes of death, 2000 males

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	32.435	6.132	90.527	240.432	21.139	1.023.568
4	64.610	11.499	48.732	56.032	31.028	84.138
9	36.303	15.342	11.885	15.126	34.142	36.735
14	25.696	14.078	6.732	7.342	35.769	24.480
19	35.832	20.354	9.119	6.514	82.807	42.171
24	47.186	19.506	6.835	6.669	105.857	42.180
29	36.205	17.587	4.970	4.970	74.827	36.957
34	39.592	16.324	6.006	4.905	50.347	29.825
39	53.186	23.991	5.336	5.127	36.646	29.637
44	67.650	29.257	6.937	4.623	23.844	24.163
49	75.213	35.228	8.686	3.413	13.535	22.528
54	71.436	33.101	8.421	3.312	8.022	18.162
59	53.498	24.322	6.664	1.903	4.151	12.091
64	24.221	9.799	3.501	599	1.297	4.989
0-64	663.063	276.521	224.350	360.967	523.410	1.431.624
15-64	504.019	229.470	66.474	42.034	401.333	262.703

Table 4.4.5. Years of potential life lost by causes of death, 2000 females

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	45.344	7.370	95.564	220.397	16.494	1.005.404
1	92.497	20.298	60.916	65.603	32.163	90.588
5	46.146	14.775	13.965	18.875	23.742	37.175
10	37.678	14.438	8.341	8.580	17.583	31.371
15	52.036	17.025	8.615	5.367	63.879	38.604
20	62.981	19.636	11.404	11.295	73.065	44.963
25	78.000	30.726	12.869	8.127	49.827	45.478
30	77.385	37.406	8.109	7.100	37.023	42.270
35	102.139	59.805	10.339	6.673	26.183	37.680
40	118.856	65.215	9.246	5.410	19.124	30.898
45	152.847	60.432	12.156	6.203	10.281	32.539
50	172.614	63.248	12.511	3.494	8.792	34.811
55	187.853	51.984	12.977	4.360	6.646	33.544
60	263.643	48.484	16.209	4.165	4.684	45.707
65	335.970	48.560	24.103	4.226	4.392	56.088
70	365.356	38.373	23.260	3.368	4.006	77.551
75	241.247	17.608	13.542	1.765	2.106	61.627
80+	341.805	10.850	17.531	1.394	2.337	134.152
Total	2.774.395	626.233	371.657	386.403	402.326	1.880.449

Table 4.4.6. Years of potential life lost up to age 65 by causes of death, 2000 females

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	36.171	6.625	86.846	201.086	15.042	867.813
4	69.888	17.297	52.592	57.033	27.816	75.732
9	33.497	12.158	11.662	15.880	19.850	30.024
14	26.546	11.632	6.826	7.076	14.436	24.774
19	35.423	13.382	6.889	4.330	51.211	29.713
24	41.263	15.022	8.884	8.883	57.047	33.630
29	48.662	22.684	9.685	6.182	37.673	32.768
34	45.375	26.368	5.834	5.168	26.811	28.993
39	55.316	39.655	7.007	4.581	17.907	24.239
44	57.934	39.750	5.773	3.427	12.074	18.212
49	64.208	32.701	6.735	3.494	5.778	16.899
54	58.003	28.308	5.734	1.633	4.100	14.810
59	42.769	16.380	4.188	1.439	2.189	9.923
64	21.901	5.877	2.019	532	597	5.110
0-64	636.958	287.840	220.674	320.744	292.532	1.212.639
15-64	470.854	240.127	62.748	39.668	215.388	214.297

Table 4.4.7. Years of potential life lost by causes of death, 2008 males

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	125.829	5.987	83.364	68.767	9.725	338.102
1	29.049	3.423	9.778	7.762	6.376	23.155
5	21.652	5.855	6.143	4.015	6.333	18.482
10	16.746	5.834	5.225	2.218	6.298	16.478
15	28.204	7.127	5.318	2.270	26.999	27.642
20	30.374	9.974	5.664	2.607	44.839	29.523
25	27.839	8.216	5.108	1.851	35.988	31.810
30	31.951	11.136	3.941	1.821	24.743	28.081
35	44.143	16.199	6.047	2.136	21.041	24.878
40	67.840	27.862	7.632	2.630	15.229	30.268
45	111.861	50.994	12.530	2.870	13.240	34.092
50	149.903	75.759	19.847	3.563	8.324	40.014
55	196.296	88.166	25.361	3.650	6.867	43.819
60	206.110	89.494	29.576	3.660	4.757	43.412
65	233.735	79.794	37.537	3.922	4.160	46.882
70	249.339	65.846	39.098	3.538	3.045	49.941
75	301.752	55.745	45.850	3.334	3.057	59.263
80+	325.141	33.493	43.861	2.788	2.034	73.130
Total	2.197.763	640.905	391.880	123.403	243.055	958.972

Table 4.4.8. Years of potential life lost up to age 65 by causes of death, 2008 males

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	97.998	5.093	71.686	60.061	8.473	285.748
4	21.762	2.797	8.092	6.524	5.339	18.936
9	15.686	4.646	4.941	3.282	5.156	14.683
14	11.761	4.517	4.104	1.773	5.022	12.776
19	19.195	5.386	4.082	1.775	21.050	20.920
24	19.954	7.333	4.235	1.990	34.084	21.765
29	17.468	5.822	3.687	1.366	26.437	22.622
34	18.881	7.514	2.713	1.285	17.381	19.008
39	24.136	10.252	3.912	1.420	13.930	15.811
44	33.450	16.176	4.538	1.613	9.310	17.649
49	47.791	26.218	6.618	1.570	7.226	17.633
54	51.512	32.080	8.662	1.621	3.781	17.074
59	45.875	26.290	7.805	1.179	2.216	13.150
64	17.674	10.147	3.496	458	594	4.974
0-64	443.141	164.269	138.570	85.916	160.000	502.750
15-64	295.934	147.217	49.747	14.277	136.009	170.608

Table 4.4.9. Years of potential life lost by causes of death, 2008 females

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	90.151	6.275	57.830	47.816	7.596	236.383
1	22.097	2.038	7.072	5.386	4.073	15.634
5	11.928	2.713	3.711	3.054	2.589	9.135
10	9.256	2.380	2.461	1.641	3.802	7.200
15	12.191	3.344	3.128	893	11.233	10.342
20	17.418	5.941	4.250	1.320	12.564	14.889
25	22.546	10.247	5.128	1.278	12.617	18.731
30	28.417	15.918	3.870	1.576	9.433	17.745
35	41.748	23.903	4.981	2.630	7.268	16.469
40	56.725	34.242	7.541	2.216	6.233	19.402
45	93.308	49.345	10.429	2.937	5.491	22.833
50	122.605	54.623	10.964	4.299	4.374	29.976
55	148.756	51.931	17.055	3.968	3.486	35.966
60	188.751	45.524	20.072	4.159	2.351	41.993
65	252.886	45.872	23.408	4.064	2.511	51.675
70	314.654	38.878	28.903	3.920	1.821	58.655
75	432.045	34.149	35.674	4.169	2.202	75.662
80+	736.385	30.027	55.031	5.037	2.777	155.739
Total	2.601.868	457.349	301.509	100.364	102.420	838.428

Table 4.4.10. Years of potential life lost up to age 65 by causes of death, 2008 females

Age	Cardiovascular Diseases	Cancers	Respiratory Diseases	Infectious Diseases	Injuries	Other Diseases
0	65.809	5.176	47.921	40.055	6.366	191.531
4	15.578	1.623	5.665	4.361	3.297	12.292
9	8.097	2.092	2.880	2.398	2.031	6.953
14	6.077	1.792	1.865	1.258	2.919	5.343
19	7.714	2.449	2.307	667	8.388	7.458
24	10.571	4.219	3.041	958	9.109	10.401
29	12.993	7.001	3.530	894	8.814	12.563
34	15.341	10.341	2.535	1.050	6.279	11.290
39	20.707	14.534	3.056	1.644	4.543	9.792
44	25.185	19.035	4.234	1.270	3.575	10.521
49	35.585	24.201	5.170	1.491	2.790	10.896
54	37.129	21.995	4.467	1.798	1.832	11.689
59	30.243	14.603	4.850	1.164	1.025	9.726
64	13.715	4.788	2.139	460	261	4.218
0-64	304.743	133.849	93.658	59.468	61.227	314.673
15-64	209.182	123.166	35.328	11.396	46.615	98.554

Cardiovascular diseases are the major causes of premature mortality, responsible for 2.525.602 YPLL for males and 2.774.395 YPLL for females in 2000. Other diseases rank as the second cause of premature mortality for males and females, followed by cancers and injuries with 697.367 YPLL for males, 626.233 for females and 696.243 for males and 402.326 for females, respectively. The infectious diseases and respiratory diseases rank fifth and sixth, representing 418.762 YPLL for males, 386.403 for females and 395.756 YPLL for males, 371.657 for females, respectively.

When YPLL up to age 65 is considered for the year 2000, the major contributor to YPLL is cardiovascular diseases with 663.063 YPLL for males and 636.958 YPLL for females. Injuries are the second cause of premature mortality for males with 523.410 YPLL, followed by infectious diseases (360.967 YPLL), cancers (276.521 YPLL) and respiratory diseases (224.350 YPLL). For females, infectious diseases rank second with 320.744 YPLL; third, fourth and fifth causes are injuries (292.532 YPLL), cancers (287.840 YPLL) and respiratory diseases (220.674 YPLL), respectively. For males and females, other diseases account for the largest YPLL, substantially consisted of the years life lost in the age group (0-1). In the productive years (15-64), the leading causes of premature mortality are cardiovascular diseases, injuries and cancers for males and cardiovascular diseases, cancers and injuries for females, respectively.

In 2008, the major contribution is made by cardiovascular diseases for males (2.197.763 YPLL) and females (2.601.868 YPLL). Other diseases are the second cause of years life lost followed by cancers, representing 640.905 YPLL for males and 457.349 YPLL for females. Respiratory diseases, injuries and infectious diseases are estimated as the fourth, fifth and sixth causes of premature mortality; they represent 391.880 YPLL for males, 301.509 YPLL for females; 243.055 YPLL for males, 102.420 YPLL for females and 123.403 YPLL for males, 100.364 YPLL for females, respectively.

The major cause of premature mortality at cut-off age 65 is cardiovascular diseases in 2008 with 443.141 YPLL for males and 304.743 YPLL for females. Cancers rank second for males with 164.269 YPLL, followed by injuries (160.000 YPLL), respiratory diseases (138.570 YPLL) and infectious diseases (85.916 YPLL). Cancers are the second cause of premature mortality for females with 133.849 YPLL, respiratory diseases (93.658 YPLL), injuries (61.227 YPLL) and infectious diseases (59.468 YPLL) are the following causes of years life lost. In the age group (15-64), the leading causes of premature mortality are cardiovascular diseases, cancers and injuries for males and cardiovascular diseases, cancers and respiratory diseases for females, respectively.

Table 4.4.11. Percentage distribution of YPLL by causes of death (%), 2000 and 2008

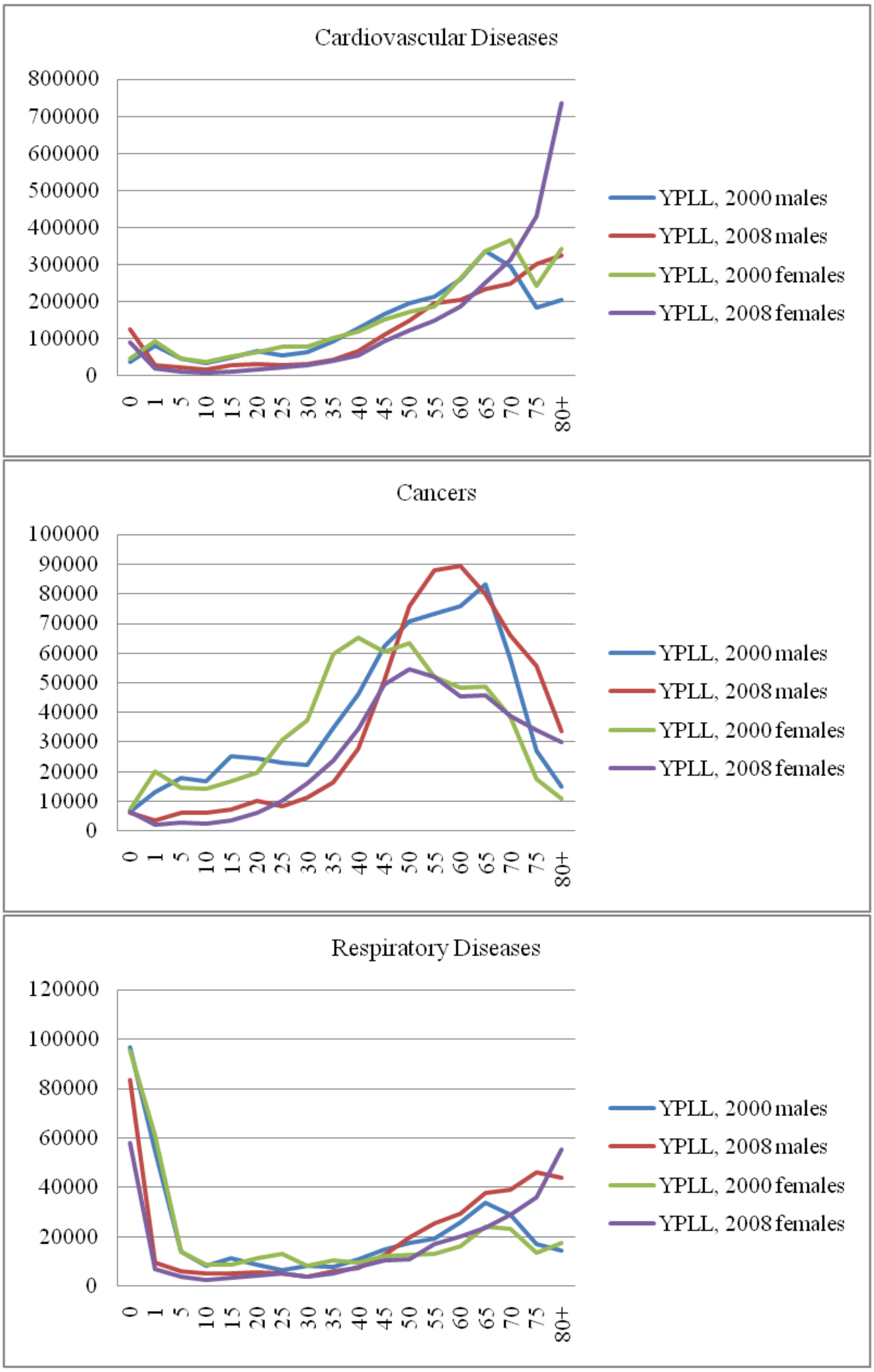
	2000			2008		
	Males	Females	Total Population	Males	Females	Total Population
Cardiovascular Diseases						
Lifetime	37,8	43,1	40,5	48,2	59,1	53,9
Ages 15-64	33,5	37,9	35,6	36,4	39,9	37,7
Cancers						
Lifetime	10,4	9,7	10,0	14,1	10,4	12,1
Ages 15-64	15,2	19,3	17,1	18,1	23,5	20,2
Respiratory Diseases						
Lifetime	5,9	5,7	5,8	8,6	6,8	7,6
Ages 15-64	4,4	5,1	4,7	6,1	6,7	6,4
Infectious Diseases						
Lifetime	6,3	6,0	6,1	2,7	2,3	2,5
Ages 15-64	2,8	3,2	2,9	1,8	2,2	1,9
Injuries						
Lifetime	10,4	6,3	8,3	5,3	2,3	3,8
Ages 15-64	26,7	17,3	22,4	16,7	8,9	13,6
Other Diseases						
Lifetime	29,2	29,2	29,2	21,1	19,1	20,0
Ages 15-64	17,4	17,2	17,3	20,9	18,8	20,1

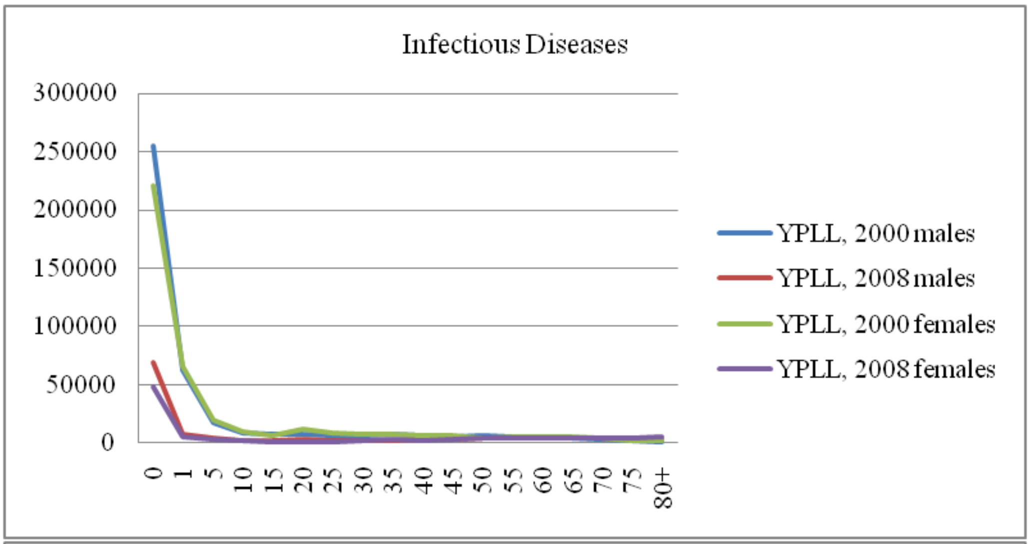
The percentage distribution of lifetime YPLL and YPLL for the age group (15-64) according to major causes of death are represented in Table 4.4.11. The impact of cardiovascular diseases shows an increasing pattern for both sexes, but especially for females. The sharp increase can be explained by the age pattern of female population in the older ages. When working ages are considered, the relative percentage of YPLL from cardiovascular diseases decreases considerably for both sexes. It should also be pointed out that; the contribution of cancers and injuries to premature mortality significantly increases in the working ages and this contribution increases for cancers between 2000 and 2008 but the exact opposite situation is observed for injuries.

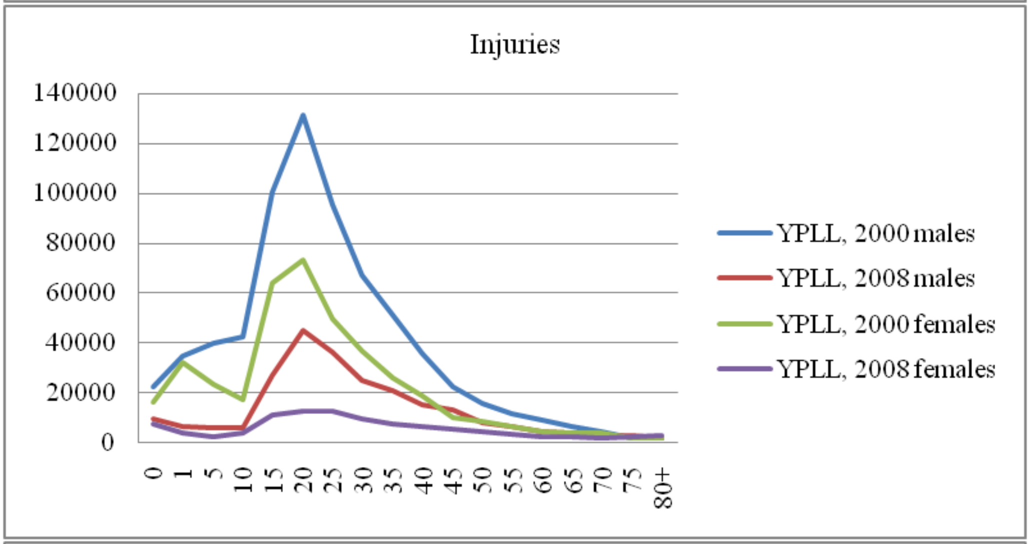
Years of potential life lost for each cause of death in 2000 and 2008 are represented in Figure 4.4.1. The age pattern of YPLL for cardiovascular diseases shows slight difference between the ages 1 and 70. In 2008, YPLL due to cardiovascular diseases increased sharply for females in the older ages.

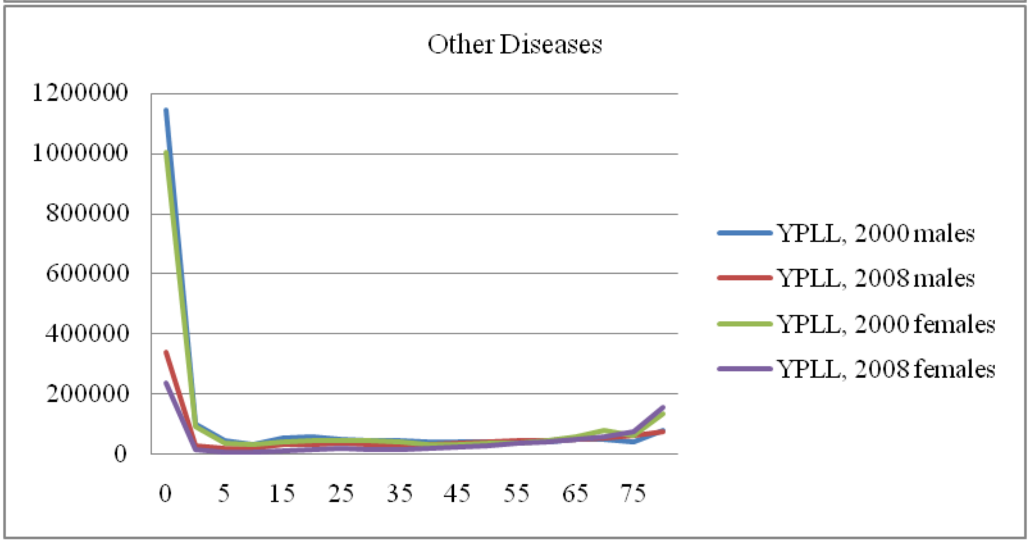
In 2000, age distribution of cancer related premature mortality shows an increasing trend for males and females after age of 30. When females reach the age of 55, the reverse trend is observed; however males reach the pick value at the age of 65. In 2008, the trend of YPLL increases substantially between ages 30 and 60 for males and then decreases; for females less increase is observed in YPLL till the age of 50.

Figure 4.4.1. Years of potential life lost for each cause of death, 2000 and 2008




Infectious Diseases
300000
250000
200000
150000
100000
50000
0
0
1
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80+
YPLL, 2000 males
YPLL, 2008 males
YPLL, 2000 females
YPLL, 2008 females


Injuries
140000
120000
100000
80000
60000
40000
20000
0
0
1
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80+
YPLL, 2000 males
YPLL, 2008 males
YPLL, 2000 females
YPLL, 2008 females


Other Diseases
1200000
1000000
800000
600000
400000
200000
0
0
5
15
25
35
45
55
65
75
YPLL, 2000 males
YPLL, 2008 males
YPLL, 2000 females
YPLL, 2008 females

Years of potential life lost due to respiratory diseases are highest in the age group (0-1) for both years. The age distribution shows slight differences between the ages of 5 and 70, after age 70 an increasing pattern is observed for males and females in 2008; however the exact opposite situation is observed in the year 2000. The infectious diseases show a similar pattern to the respiratory diseases in the early ages, after age of 5 the age distribution of YPLL is almost identical for both sexes and both years.

Age distribution of YPLL related to injuries shows an increasing pattern in the younger ages and after age 25 the burden of premature mortality is decreasing for males and females. Years of potential life lost due to injuries is greater for males in all age groups for both years. YPLL caused by other diseases show the pick values in the age group (0-1); that can be explained by the decline in infant mortality rate during the period 2000-2008, as expected.

4.5. COMPARISON OF THE RESULTS

In this section, comparisons of the results are presented in two parts. In the first part, the results are compared with the studies conducted in Turkey. Comparisons of the results with some selected countries are represented in the second part.

4.5.1. Comparison of the Results at National Level

In Turkey, the national burden of disease project was implemented as a part of global burden of disease (GBD) framework for the year 2000. Years of life lost related to premature deaths are disability adjusted life years are quantified by using the GBD methodology (Refik Saydam Hygiene Center Presidency, 2004).

Distribution of the number of deaths and years life lost calculated by the national burden of disease project are compared with the results of this study for the year 2000. Here, it should be considered that the methodologies of this study and the burden of disease project are completely different and it is unlikely to obtain similar results from these two studies. When the percentage distributions of major causes of death are compared; cardiovascular diseases cover nearly 47 percent of causes of death for both studies. Cancers, respiratory diseases and injuries also show a similar pattern for burden of disease project and adjusted number of deaths from this study. It can be suggested that the distribution of major causes of death are consistent for these two studies.

The rate of years life lost estimated by the national burden of disease study is 87,6/1000 for total population. The rate is 98,6 YLL/1000 population for males and 76,4 YLL/1000 population for females according to this study. When the results of the YPLL analyses from this study for the year 2000 are considered; the corresponding rates are 160,9/1000 for total population, 164,7/1000 for males and 157,2/1000 for females. The disparity of the results may be explained by the different methods used in the calculations as well as the data quality. In fact, cause of death data derived by TURKSTAT is mainly used in the national burden of disease study but in order to deal with the underreporting and misreporting problems, verbal autopsy survey is implemented as a part of the study. Cause of death statistics are estimated by using specific methods of GBD framework and years life lost are calculated according to the GBD methodology.

Two other studies were conducted in Turkey related to premature mortality estimates. First study was related to GBD methodology and the results of the national burden of disease project (Akgün, Rao, et al.,2007). The characteristics of national mortality data and accordingly the estimates of cause specific mortality are described. Overall measures of mortality and leading causes of death from national burden of disease project and their implications for public health policies are presented. Other study was implemented by Naci and Baker (2008); premature mortality measures are used to estimate the productivity losses from road traffic deaths in Turkey. Years of potential life lost due to road traffic deaths are calculated; however it is improbable to compare the results since the road traffic deaths are not taken into consideration separately in this study.

4.5.2. Comparison of the Results with Selected Countries

The analyses of premature mortality are widely carried out for quantifying and comparing the health status of countries related to mortality. Main references related to these analyses are provided by World Health Organization (WHO), particularly connected with the Global Burden of Disease (GBD) study. Mortality and global health statistics published by WHO include data about cause-specific mortality, adult and child mortality, age-standardized death rate, life expectancy, morbidity indicators and disease and injury estimates for different countries and regions of the world (WHO, 2013). The Organisation for Economic Co-operation and Development (OECD) and Eurostat also publish data on mortality conditions and health status of countries. Percentage distribution of deaths by cause and WHO regions and potential years of life lost estimated by OECD are compared with the results of this study.

When cause of death pattern of WHO regions are examined; cardiovascular diseases cover nearly 50 percent of causes of death in the European Region for both years; that is quite compatible with the percentage of the cardiovascular diseases in Turkey. In the World, the contribution of cardiovascular diseases to overall mortality is about 30 percent; this is because the impact of this disease is smaller in the less developed areas of the world. In the European Region, nearly 20 percent of deaths are caused by cancers for both years; the corresponding percentages are around 15 percent for Turkey according to this study. The impact of infectious diseases shows a similar pattern for the European Region and Turkey; however it is considerably greater for the less developed areas of the world. Injuries cover 5 and 3 percent of causes of death in Turkey for the years 2000 and 2008, respectively. In the European Region, the corresponding values are nearly 8 and 7 percent for 2000 and 2008. Here, it can be suggested that the cause of death pattern of Turkey is similar to the European Region for the years under concern.

Potential years of life lost (PYLL) for the ages of 0-69 are estimated by OECD for the member countries by using the raw data provided from World Health Organization. In this study, the YPLL are calculated for whole lifetime, for the working ages (15-64) and for the ages of 0-64. The comparison of the results of OECD estimates for 0-69 age group and the results of this study for the ages of 0-64 will give an idea about the cause of death patterns of the corresponding countries. In Table 4.5.1, the years lost from all causes of death for Turkey calculated as a result of this study and the years lost calculated by OECD are presented. The results are shown per 100.000 population for males and females separately for the years 2000 and 2008.

When the results are examined; years lost due to premature mortality in Turkey show a similar pattern with Eastern European countries for the year 2000 especially for males. In 2000, a slight difference is observed between males and females in terms of years lost in Turkey, while the difference is greater for other countries. For the year 2008, a sharp decrease is observed in the total years lost in Turkey; the pattern is similar to Western and Northern Europe countries as well as some other countries like Canada, Japan and New Zealand. Here, it should be pointed out that, none of the countries show a remarkably decreasing pattern as Turkey during the 8 year period; and this situation can be explained by the limitations of the methodology related to the data quality in Turkey.

Table 4.5.1. Years lost/100 000 for all causes of death, OECD Countries

Country	2000		2008	
	Males	Females	Males	Females
Turkey	10692	9497	4438	2954
Austria	5461	2754	4209	2138
Canada	4604	2758	4065	2539
Chile	6705	3553	5660	3013
Czech Republic	7161	3211	5751	2597
Estonia	14487	5266	10665	3573
Finland	6065	2729	5271	2291
France	5946	2705	4788	2320
Germany	5305	2732	4169	2269
Greece	5252	2344	4451	1905
Hungary	11831	5168	9193	4036
Iceland	4559	2303	2865	1723
Ireland	5632	3200	4161	2470
Israel	4835	2605	3727	2030
Italy	4539	2360	3541	1887
Japan	4162	2132	3561	1889
Korea	6929	3005	4549	2191
Luxembourg	5472	2908	3840	1846
Mexico	9247	5554	8571	4828
Netherlands	4463	2972	3353	2417
New Zealand	5212	3165	4366	2749
Norway	4855	2667	3660	2125
Poland	9508	3886	8498	3299
Portugal	7331	3211	5155	2351
Slovak Republic	9439	3724	8138	3172
Slovenia	7080	3136	5162	2202
Spain	5398	2357	4119	1938
Sweden	3841	2331	3243	2023
United States	6688	3889	6152	3592

Source: OECD Health Statistics, 2013

5. CONCLUSION

The estimates of number of years gained or lost due to specified causes of death are powerful summary measures of premature mortality. The indicators YPLL and PGLE are used to estimate the demographic cost of mortality in a population. YPLLs represent the total number of years that people would have lived if they had not died prematurely. PGLEs represent the difference between the life expectancies before and after the elimination of a cause of death. Unlike YPLL, competing risks of death are taken into consideration in the PGLE analysis.

The main objective of this thesis was to calculate the gains and losses in life expectancy according to the major groups of causes of death. Single and multiple decrement life tables and then associated single decrement life tables are constructed to analyze the premature mortality trends for the years 2000 and 2008. Thereafter, PGLE and YPLL are calculated and the changes in PGLE and YPLL in the period of 2000-2008 are analyzed. The analyses are carried out for the years 2000 and 2008 since the last demographic survey is conducted in 2008.

In this thesis, major groups of causes of death are grouped as cardiovascular diseases, cancers, respiratory diseases, infectious diseases, injuries and other diseases. In Turkey, cardiovascular diseases are the leading causes of death, covering nearly 50 percent of all death events. Cancers are following the cardiovascular diseases, nearly 15 percent of death events occur due to cancers.

The life tables are constructed by using the infant mortality rates derived from Turkish Demographic and Health Survey 1998, 2003 and 2008. TDHS results provide the estimates of IMR for five years preceding the survey for both sexes combined. Infant mortality rates are calculated for males and females separately for the years under concern by using a segregation procedure. As a result, infant mortality rates are estimated as 30 per 1000 live births for females, 33 per 1000 live births for males for the year 2000; 9 per 1000 live births for females, 13 per 1000 live births for males for 2008.

By using the infant mortality rates segregated according to sex, Coale and Demeny West model pattern is used to construct the life tables for Turkey. The abridged life tables are composed by using the MATCH procedure of MORTPAK software. According to the life tables for Turkey for the years 2000 and 2008, life expectancy at birth is estimated as 68 years for males, 70 years for females and 74 years for males, 77 years for females, respectively. The results demonstrate that life expectancy is getting longer in Turkey for both males and females, as expected.

Multiple decrement and associated single decrement life tables are constructed by using the adjusted number of deaths by cause, age and sex. Number of deaths for each group of causes of death is estimated by using the age specific death rates. When age specific death rates from original and adjusted death statistics are compared; adjusted age specific death rates are higher than the original death rates for the years 2000 and 2008. Adjusted death rates are significantly higher than the original death rates especially for the infants and older age groups, as a result of underreporting problems of data collection procedure.

The multiple decrement methodology requires the assumption of independence of causes of death; so these analyses have been done under the assumption of different causes of death act independently. Another assumption is related to the death statistics; it is assumed that available information on causes of death from province and district centers are representing the mortality pattern of whole country. Underlying reason for this assumption is the lack of country wide and reliable death statistics; therefore instead of actual number of deaths, proportions of causes of death are used. Actually, this is one of the major limitations of this method and if this limitation is eliminated, further studies can be carried out.

Potential gains in life expectancy are calculated by the difference between cause eliminated life expectancy and life expectancy for all causes combined. Beside complete elimination of causes of death, partial elimination is also applied in PGLE analysis since the assumption of complete elimination is not realistic. Years of potential life lost are calculated by the product of number of deaths at each age group by the remaining life expectancy for the corresponding age group. Lifetime YPLL and YPLL up to age 65 are calculated separately for each cause of death.

When the results of PGLE analyses are considered; total gains in life expectancy decreased nearly 2 years during the period 2000 – 2008. As mentioned, life expectancy is getting longer in Turkey; it can be suggested that the reduction in mortality from specified diseases play a part in this improvement. The most significant contribution to the gains in life expectancy was made by elimination of cardiovascular diseases. Nearly one half of the contribution to the total gain was made by elimination of cardiovascular diseases as a cause of death. Elimination of cancers and respiratory diseases make a remarkable contribution to the potential gains in life expectancy. When the results of partial reduction in mortality according to age groups are considered; more added years of life expectancy is observed in younger ages. With a 50 percent reduction; cancer related mortality have a considerable impact on the gains in working ages as well as younger age groups when compared with the results of complete elimination. Injuries have a more significant effect on the added years of life expectancy for younger ages. Under the hypothesis of partial reduction; the relative impact of cardiovascular disease related mortality shifted from working ages to older ages in the period 2000-2008.

According to the results of YPLL analyses; a decline of nearly 2.000.000 YPLL is observed in the estimates of premature mortality in the 8 year period. Also relative impact of total YPLL in working ages shows a decreasing trend in the same period. When causes of death are considered; cardiovascular diseases are the leading causes of years life lost and the relative impact of cardiovascular disease related mortality remarkably increases during the period 2000-2008. Cancers are the secondary causes of premature mortality according to the YPLL analyses. The relative impact of years life lost due to cancers and injuries significantly increases in the working ages for both years.

When the relative ratios of PGLE and YPLL results are considered; the YPLL underestimated the impact of cardiovascular diseases when compared to the PGLE.

A slight difference is observed in the relative impact of cancers, respiratory diseases and other diseases with YPLL and PGLE analyses. On the other hand, the YPLL overestimated the impact of infectious diseases and injuries when compared to the PGLE. However, the overall pattern of the results obtained from two methods has sufficient consistency to draw a conclusion about premature mortality trends in Turkey.

The results of this study represent useful information for effective allocation of public health resources and improvement of research programs as well as setting up health goals. The analyses of gains and losses in life expectancies indicate that cardiovascular diseases and cancers are the leading causes of death affecting premature mortality in Turkey. The potential decrease in mortality due to cardiovascular diseases and cancers may be possible by improving treatment and prevention programs. As well as primary prevention actions such as modification of lifestyle behaviours associated with these specific causes of death, secondary preventive measures like screening programs should be implemented. Additionally, improvement in medical therapies is an essential measure for achieving a reduction in mortality due to cardiovascular diseases and cancers.

Deaths occurring in the early ages and working ages require a particular consideration in terms of economic and social consequences. The analyses of premature mortality for the corresponding ages provide the opportunity to determine the economic burden of diseases. On the basis of the results of this study, the relative impact of cancers and injuries are greater for the corresponding age groups in Turkey. It should be pointed out that males are exposed to risk of dying more than females for causes of death related to lifestyle factors. Therefore, programs against preventable causes of death should be taken into consideration as well as the treatment and prevention programs previously stated.

The results of the health transformation program should also be considered when analyzing the health status in Turkey. The health transformation program is implemented since 2003 and one of the main components of this program is to strengthen the preventive health services. New programmes are developed related to the maternal and child health, communicable diseases, mental health, non-communicable diseases and so on. Chronic diseases control programs are developed and cancer early diagnosis, screening and training centers are established as a part of the program. When the evaluation of the program in the period 2003-2010 is considered, the most significant improvement is observed in tobacco control; the rate of smokers decreased substantially in this period (Ministry of Health, 2011). The consequences of these prevention programs and their effect on the improvements in the health status may be evaluated by observing the long term outcomes of the programs.

In conclusion, a range of preventive actions and improvement of treatment programs will provide the opportunity to improve life expectancy in Turkey. The public health areas such as tobacco control, prevention of chronic diseases and injuries, early diagnosis of cancers, obesity control or road traffic safety should be supported to improve the health status. Further analyses that will support the efforts in planning the prevention and intervention programs will be possible by improving the health information system and obtaining accurate cause of death statistics at the national level.

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APPENDIX A

GROUPS OF CAUSES OF DEATH ACCORDING TO 150 DISEASES

INFECTIOUS DISEASES

1. Cholera
2. Typhoid fever
3. Paratyphoid fever and other Salmonella infections
4. Bacillary dysentery and amoebiasis
5. Enteritis and other diarrhoeal diseases
6. Tuberculosis of respiratory system
7. Tuberculosis of meninges and central nervous system
8. Tuberculosis of intestines, peritoneum and mesenteric glands
9. Tuberculosis of bones and joints
10. Other tuberculosis, including late effects
11. Plague
12. Anthrax
13. Brucellosis
14. Leprosy
15. Diphtheria
16. Whooping cough
17. Streptococcal sore throat and scarlet fever
18. Erysipelas
19. Meningococcal infection
20. Tetanus
21. Other bacterial diseases
22. Acute poliomyelitis
23. Late effects of acute poliomyelitis
24. Smallpox
25. Measles
26. Yellow fever
27. Viral hepatitis
28. Infectious hepatitis
29. Other viral diseases
30. Typhus and other rickettsioses
31. Malaria
32. Trypanosomiasis
33. Relapsing fever
34. Congenital syphilis

35. Early syphilis, symptomatic
36. Syphilis of central nervous system
37. Other syphilis
38. Gonococcal infections
39. Schistosomiasis
40. Hydatidosis
41. Filarial infection
42. Ankylostomiasis
43. Other helminthiases
44. All other infective and parasitic diseases

CANCERS

45. Malignant neoplasm of buccal cavity and pharynx
46. Malignant neoplasm of oesophagus
47. Malignant neoplasm of stomach
48. Malignant neoplasm of intestine, except rectum
49. Malignant neoplasm of rectum and rectosigmoid junction
50. Malignant neoplasm of larynx
51. Malignant neoplasm of trachea, bronchus and lung
52. Malignant neoplasm of bone
53. Malignant neoplasm of skin
54. Malignant neoplasm of breast
55. Malignant neoplasm of cervix uteri
56. Other malignant neoplasm of uterus
57. Malignant neoplasm of prostate
58. Malignant neoplasm of other and unspecified sites
59. Leukaemia
60. Other neoplasms of lymphatic and haematopoietic tissue
61. Benign neoplasms and neoplasms of unspecified nature

CARDIOVASCULAR DISEASES

62. Acute rheumatic fever
63. Chronic rheumatic heart disease
64. Hypertensive disease
65. Ischaemic heart disease

66. Other forms of heart disease
67. Cerebrovascular disease
68. Diseases of arteries, arterioles and capillaries
69. Venous thrombosis and embolism
70. Other diseases of circulatory system

RESPIRATORY DISEASES

71. Acute respiratory infections
72. Influenza
73. Viral pneumonia
74. Other pneumonia
75. Bronchitis, emphysema and asthma
76. Hypertrophy of tonsils and adenoids
77. Empyema and abscess of lung
78. Other diseases of respiratory system

INJURIES

79. Motor vehicle accidents
80. Other transport accidents
81. Accidental poisoning
82. Accidental falls
83. Accidents caused by fires
84. Accidental drowning and submersion
85. Accident caused by firearm missiles
86. Accidents mainly of industrial type
87. All other accidents
88. Suicide and self-inflicted injury
89. Homicide and injury purposely inflicted by other persons; legal intervention
90. Injury undetermined whether accidentally or purposely inflicted
91. Injury resulting from operations of war

OTHER DISEASES

92. Non-toxic goitre
93. Thyrotoxicosis with or without goitre
94. Diabetes mellitus

95. Avitaminosis and other nutritional deficiency
96. Other endocrine and metabolic diseases
97. Anaemias
98. Other diseases of blood and blood-forming organs
99. Psychoses
100. Neuroses, personality disorders and other non-psychotic mental disorders
101. Mental retardation
102. Meningitis
103. Multiple sclerosis
104. Epilepsy
105. Inflammatory diseases of eye
106. Cataract
107. Glaucoma
108. Otitis media and mastoiditis
109. Other diseases of nervous system and sense organs
110. Diseases of teeth and supporting structures
111. Peptic ulcer
112. Gastritis and duodenitis
113. Appendicitis
114. Intestinal obstruction and hernia
115. Cirrhosis of liver
116. Cholelithiasis and cholecystitis
117. Other diseases of digestive system
118. Acute nephritis
119. Other nephritis and nephrosis
120. Infections of kidney
121. Calculus of urinary system
122. Hyperplasia of prostate
123. Diseases of breast
124. Other diseases of genito-urinary system
125. Toxaemias of pregnancy and the puerperium
126. Haemorrhage of pregnancy and childbirth
127. Abortion induced for legal indications
128. Other and unspecified abortion
129. Sepsis of childbirth and the puerperium
130. Other complications of pregnancy, childbirth and the puerperium
131. Delivery without mention of complication
132. Infections of skin and subcutaneous tissue

133. Other diseases of skin and subcutaneous tissue
134. Arthritis and spondylitis
135. Non-articular rheumatism and rheumatism unspecified
136. Osteomyelitis and periostitis
137. Ankylosis and acquired musculoskeletal deformities
138. Other diseases of musculoskeletal system and connective tissue
139. Spina bifida
140. Congenital anomalies of heart
141. Other congenital anomalies of circulatory system
142. Cleft palate and cleft lip
143. All other congenital anomalies
144. Birth injury and difficult labour
145. Conditions of placenta and cord
146. Haemolytic disease of newborn
147. Anoxic and hypoxic conditions not elsewhere classified
148. Other causes of perinatal morbidity and mortality
149. Senility without mention of psychosis
150. Symptoms and other ill-defined conditions

APPENDIX B

MULTIPLE DECREMENT LIFE TABLES

Table B.1. Multiple decrement life table for cause i = cardiovascular diseases, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	500	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00076	76	51229	0,00078
1	4741	1035	96704	660	0,00682	1,554	385201	6718423	69,47	0,00149	144	51154	0,00037
5	2601	631	96044	357	0,00371	2,500	479328	6333222	65,94	0,00090	87	51010	0,00018
10	2178	491	95687	290	0,00304	2,500	477711	5853894	61,18	0,00068	65	50923	0,00014
15	4157	757	95397	533	0,00558	2,695	475756	5376183	56,36	0,00102	97	50858	0,00020
20	5378	1112	94864	739	0,00779	2,568	472523	4900427	51,66	0,00161	153	50761	0,00032
25	4686	966	94125	741	0,00787	2,524	468790	4427904	47,04	0,00162	153	50608	0,00033
30	4536	1220	93384	831	0,00890	2,574	464905	3959114	42,40	0,00239	223	50455	0,00048
35	5624	1940	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00394	365	50232	0,00079
40	7007	3026	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00724	663	49867	0,00146
45	9157	4340	89960	2401	0,02669	2,684	444241	2580052	28,68	0,01265	1138	49204	0,00256
50	11565	5796	87560	3707	0,04233	2,680	429198	2135811	24,39	0,02122	1858	48066	0,00433
55	13996	7290	83853	5676	0,06769	2,666	406016	1706613	20,35	0,03526	2957	46209	0,00728
60	18917	10313	78176	8191	0,10478	2,644	371585	1300597	16,64	0,05713	4466	43252	0,01202
65	27720	15665	69985	11259	0,16087	2,621	323135	929012	13,27	0,09091	6362	38786	0,01969
70	28738	16361	58726	14414	0,24544	2,580	258745	605877	10,32	0,13973	8206	32424	0,03171
75	21882	12358	44312	16163	0,36475	2,510	181316	347132	7,83	0,20599	9128	24218	0,05034
80+	30286	16235	28149	28149	1,00000	5,891	165816	165816	5,89	0,53606	15090	15090	0,09100

Table B.2. Multiple decrement life table for cause i = cancers, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	95	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00014	14	14845	0,00015
1	4741	184	96704	660	0,00682	1,554	385201	6718423	69,47	0,00027	26	14831	0,00007
5	2601	267	96044	357	0,00371	2,500	479328	6333222	65,94	0,00038	37	14805	0,00008
10	2178	269	95687	290	0,00304	2,500	477711	5853894	61,18	0,00037	36	14769	0,00008
15	4157	430	95397	533	0,00558	2,695	475756	5376183	56,36	0,00058	55	14733	0,00012
20	5378	460	94864	739	0,00779	2,568	472523	4900427	51,66	0,00067	63	14678	0,00013
25	4686	469	94125	741	0,00787	2,524	468790	4427904	47,04	0,00079	74	14615	0,00016
30	4536	503	93384	831	0,00890	2,574	464905	3959114	42,40	0,00099	92	14541	0,00020
35	5624	876	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00178	165	14448	0,00036
40	7007	1310	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00314	287	14283	0,00063
45	9157	2034	89960	2401	0,02669	2,684	444241	2580052	28,68	0,00593	533	13997	0,00120
50	11565	2688	87560	3707	0,04233	2,680	429198	2135811	24,39	0,00984	862	13463	0,00201
55	13996	3322	83853	5676	0,06769	2,666	406016	1706613	20,35	0,01607	1347	12602	0,00332
60	18917	4191	78176	8191	0,10478	2,644	371585	1300597	16,64	0,02322	1815	11254	0,00488
65	27720	5731	69985	11259	0,16087	2,621	323135	929012	13,27	0,03326	2328	9440	0,00720
70	28738	5144	58726	14414	0,24544	2,580	258745	605877	10,32	0,04394	2580	7112	0,00997
75	21882	3165	44312	16163	0,36475	2,510	181316	347132	7,83	0,05275	2338	4532	0,01289
80+	30286	2361	28149	28149	1,00000	5,891	165816	165816	5,89	0,07794	2194	2194	0,01323

Table B.3. Multiple decrement life table for cause i = respiratory diseases, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	1396	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00211	211	7794	0,00217
1	4741	780	96704	660	0,00682	1,554	385201	6718423	69,47	0,00112	109	7583	0,00028
5	2601	207	96044	357	0,00371	2,500	479328	6333222	65,94	0,00030	28	7474	0,00006
10	2178	129	95687	290	0,00304	2,500	477711	5853894	61,18	0,00018	17	7446	0,00004
15	4157	193	95397	533	0,00558	2,695	475756	5376183	56,36	0,00026	25	7429	0,00005
20	5378	161	94864	739	0,00779	2,568	472523	4900427	51,66	0,00023	22	7404	0,00005
25	4686	133	94125	741	0,00787	2,524	468790	4427904	47,04	0,00022	21	7382	0,00004
30	4536	185	93384	831	0,00890	2,574	464905	3959114	42,40	0,00036	34	7361	0,00007
35	5624	195	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00040	37	7327	0,00008
40	7007	311	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00074	68	7290	0,00015
45	9157	502	89960	2401	0,02669	2,684	444241	2580052	28,68	0,00146	132	7222	0,00030
50	11565	684	87560	3707	0,04233	2,680	429198	2135811	24,39	0,00250	219	7091	0,00051
55	13996	908	83853	5676	0,06769	2,666	406016	1706613	20,35	0,00439	368	6872	0,00091
60	18917	1484	78176	8191	0,10478	2,644	371585	1300597	16,64	0,00822	643	6503	0,00173
65	27720	2393	69985	11259	0,16087	2,621	323135	929012	13,27	0,01389	972	5860	0,00301
70	28738	2619	58726	14414	0,24544	2,580	258745	605877	10,32	0,02237	1314	4888	0,00508
75	21882	2036	44312	16163	0,36475	2,510	181316	347132	7,83	0,03395	1504	3575	0,00830
80+	30286	2228	28149	28149	1,00000	5,891	165816	165816	5,89	0,07356	2071	2071	0,01249

Table B.4. Multiple decrement life table for cause i = infectious diseases, 2000 males

x	$_nD_x$	$_nD_x^i$	l_x	$_nd_x$	$_nq_x$	$_na_x$	L_x	T_x	e_x	$_nq_x^i$	$_nd_x^i$	l_x^i	$_nm_x^i$
0	21806	3707	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00560	560	1873	0,00577
1	4741	897	96704	660	0,00682	1,554	385201	6718423	69,47	0,00129	125	1313	0,00032
5	2601	263	96044	357	0,00371	2,500	479328	6333222	65,94	0,00038	36	1188	0,00008
10	2178	140	95687	290	0,00304	2,500	477711	5853894	61,18	0,00020	19	1152	0,00004
15	4157	138	95397	533	0,00558	2,695	475756	5376183	56,36	0,00018	18	1133	0,00004
20	5378	157	94864	739	0,00779	2,568	472523	4900427	51,66	0,00023	22	1116	0,00005
25	4686	133	94125	741	0,00787	2,524	468790	4427904	47,04	0,00022	21	1094	0,00004
30	4536	151	93384	831	0,00890	2,574	464905	3959114	42,40	0,00030	28	1073	0,00006
35	5624	187	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00038	35	1045	0,00008
40	7007	207	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00050	45	1010	0,00010
45	9157	197	89960	2401	0,02669	2,684	444241	2580052	28,68	0,00057	52	965	0,00012
50	11565	269	87560	3707	0,04233	2,680	429198	2135811	24,39	0,00098	86	913	0,00020
55	13996	259	83853	5676	0,06769	2,666	406016	1706613	20,35	0,00125	105	827	0,00026
60	18917	254	78176	8191	0,10478	2,644	371585	1300597	16,64	0,00141	110	722	0,00030
65	27720	322	69985	11259	0,16087	2,621	323135	929012	13,27	0,00187	131	612	0,00040
70	28738	335	58726	14414	0,24544	2,580	258745	605877	10,32	0,00286	168	481	0,00065
75	21882	209	44312	16163	0,36475	2,510	181316	347132	7,83	0,00348	154	313	0,00085
80+	30286	171	28149	28149	1,00000	5,891	165816	165816	5,89	0,00565	159	159	0,00096

Table B.5. Multiple decrement life table for cause i = injuries, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	326	100000	3296	0,03296	0,137	97156	6815579	68,16	0,00049	49	3791	0,00051
1	4741	497	96704	660	0,00682	1,554	385201	6718423	69,47	0,00072	69	3741	0,00018
5	2601	594	96044	357	0,00371	2,500	479328	6333222	65,94	0,00085	81	3672	0,00017
10	2178	682	95687	290	0,00304	2,500	477711	5853894	61,18	0,00095	91	3591	0,00019
15	4157	1748	95397	533	0,00558	2,695	475756	5376183	56,36	0,00235	224	3500	0,00047
20	5378	2494	94864	739	0,00779	2,568	472523	4900427	51,66	0,00361	343	3276	0,00073
25	4686	1999	94125	741	0,00787	2,524	468790	4427904	47,04	0,00336	316	2933	0,00067
30	4536	1556	93384	831	0,00890	2,574	464905	3959114	42,40	0,00305	285	2617	0,00061
35	5624	1342	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00273	253	2332	0,00055
40	7007	1070	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00256	234	2079	0,00052
45	9157	783	89960	2401	0,02669	2,684	444241	2580052	28,68	0,00228	205	1845	0,00046
50	11565	652	87560	3707	0,04233	2,680	429198	2135811	24,39	0,00239	209	1640	0,00049
55	13996	566	83853	5676	0,06769	2,666	406016	1706613	20,35	0,00274	230	1431	0,00057
60	18917	552	78176	8191	0,10478	2,644	371585	1300597	16,64	0,00306	239	1201	0,00064
65	27720	517	69985	11259	0,16087	2,621	323135	929012	13,27	0,00300	210	962	0,00065
70	28738	428	58726	14414	0,24544	2,580	258745	605877	10,32	0,00366	215	752	0,00083
75	21882	278	44312	16163	0,36475	2,510	181316	347132	7,83	0,00463	205	537	0,00113
80+	30286	357	28149	28149	1,00000	5,891	165816	165816	5,89	0,01180	332	332	0,00200

Table B.6. Multiple decrement life table for cause i = other diseases, 2000 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	21806	15783	100000	3296	0,03296	0,137	97156	6815579	68,16	0,02386	2386	20467	0,02456
1	4741	1347	96704	660	0,00682	1,554	385201	6718423	69,47	0,00194	188	18082	0,00049
5	2601	639	96044	357	0,00371	2,500	479328	6333222	65,94	0,00091	88	17894	0,00018
10	2178	468	95687	290	0,00304	2,500	477711	5853894	61,18	0,00065	62	17807	0,00013
15	4157	891	95397	533	0,00558	2,695	475756	5376183	56,36	0,00120	114	17744	0,00024
20	5378	994	94864	739	0,00779	2,568	472523	4900427	51,66	0,00144	137	17630	0,00029
25	4686	986	94125	741	0,00787	2,524	468790	4427904	47,04	0,00166	156	17493	0,00033
30	4536	920	93384	831	0,00890	2,574	464905	3959114	42,40	0,00180	169	17337	0,00036
35	5624	1084	92553	1058	0,01144	2,628	460256	3494209	37,75	0,00220	204	17169	0,00044
40	7007	1083	91495	1535	0,01677	2,671	453900	3033952	33,16	0,00259	237	16965	0,00052
45	9157	1302	89960	2401	0,02669	2,684	444241	2580052	28,68	0,00379	341	16728	0,00077
50	11565	1476	87560	3707	0,04233	2,680	429198	2135811	24,39	0,00540	473	16386	0,00110
55	13996	1650	83853	5676	0,06769	2,666	406016	1706613	20,35	0,00798	669	15913	0,00165
60	18917	2122	78176	8191	0,10478	2,644	371585	1300597	16,64	0,01175	919	15244	0,00247
65	27720	3092	69985	11259	0,16087	2,621	323135	929012	13,27	0,01795	1256	14325	0,00389
70	28738	3851	58726	14414	0,24544	2,580	258745	605877	10,32	0,03289	1932	13069	0,00747
75	21882	3837	44312	16163	0,36475	2,510	181316	347132	7,83	0,06395	2834	11138	0,01563
80+	30286	8934	28149	28149	1,00000	5,891	165816	165816	5,89	0,29499	8304	8304	0,05008

Table B.7. Multiple decrement life table for cause i = cardiovascular diseases, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	558	100000	3009	0,03009	0,140	97413	7041354	70,41	0,00090	90	54875	0,00092
1	4804	1118	96991	715	0,00737	1,475	386158	6943941	71,59	0,00172	166	54785	0,00043
5	2140	583	96276	314	0,00326	2,500	480594	6557783	68,11	0,00089	85	54619	0,00018
10	1741	506	95962	252	0,00262	2,500	479181	6077189	63,33	0,00076	73	54534	0,00015
15	2977	748	95710	402	0,00420	2,668	477615	5598008	58,49	0,00106	101	54460	0,00021
20	3886	973	95309	564	0,00592	2,611	475194	5120393	53,72	0,00148	141	54359	0,00030
25	4213	1300	94744	684	0,00722	2,578	472064	4645199	49,03	0,00223	211	54218	0,00045
30	4275	1399	94060	820	0,00871	2,590	468326	4173135	44,37	0,00285	268	54007	0,00057
35	5429	2018	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00420	391	53739	0,00084
40	6132	2586	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00651	600	53348	0,00131
45	7481	3696	90765	2047	0,02256	2,653	449022	2783534	30,67	0,01115	1012	52748	0,00225
50	9116	4691	88718	2962	0,03339	2,653	436640	2334512	26,31	0,01718	1524	51736	0,00349
55	10465	5804	85756	4268	0,04977	2,660	418792	1897872	22,13	0,02760	2367	50212	0,00565
60	15496	9398	81488	6350	0,07793	2,668	392629	1479081	18,15	0,04726	3851	47845	0,00981
65	22753	14071	75138	9481	0,12618	2,660	353504	1086451	14,46	0,07804	5863	43994	0,01659
70	29797	18273	65657	13510	0,20576	2,625	296196	732948	11,16	0,12618	8285	38130	0,02797
75	24040	14527	52147	16910	0,32428	2,559	219463	436752	8,38	0,19596	10219	29846	0,04656
80+	44085	24555	35237	35237	1,00000	6,166	217289	217289	6,17	0,55700	19627	19627	0,09033

Table B.8. Multiple decrement life table for cause i = cancers, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	102	100000	3009	0,03009	0,140	97413	7041354	70,41	0,00016	16	9970	0,00017
1	4804	277	96991	715	0,00737	1,475	386158	6943941	71,59	0,00042	41	9954	0,00011
5	2140	211	96276	314	0,00326	2,500	480594	6557783	68,11	0,00032	31	9913	0,00006
10	1741	222	95962	252	0,00262	2,500	479181	6077189	63,33	0,00033	32	9882	0,00007
15	2977	283	95710	402	0,00420	2,668	477615	5598008	58,49	0,00040	38	9850	0,00008
20	3886	354	95309	564	0,00592	2,611	475194	5120393	53,72	0,00054	51	9811	0,00011
25	4213	606	94744	684	0,00722	2,578	472064	4645199	49,03	0,00104	98	9760	0,00021
30	4275	813	94060	820	0,00871	2,590	468326	4173135	44,37	0,00166	156	9662	0,00033
35	5429	1447	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00301	280	9506	0,00060
40	6132	1779	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00448	413	9225	0,00090
45	7481	1887	90765	2047	0,02256	2,653	449022	2783534	30,67	0,00569	516	8813	0,00115
50	9116	2297	88718	2962	0,03339	2,653	436640	2334512	26,31	0,00841	746	8296	0,00171
55	10465	2243	85756	4268	0,04977	2,660	418792	1897872	22,13	0,01067	915	7550	0,00218
60	15496	2550	81488	6350	0,07793	2,668	392629	1479081	18,15	0,01282	1045	6635	0,00266
65	22753	3203	75138	9481	0,12618	2,660	353504	1086451	14,46	0,01776	1335	5590	0,00378
70	29797	3282	65657	13510	0,20576	2,625	296196	732948	11,16	0,02266	1488	4255	0,00502
75	24040	2012	52147	16910	0,32428	2,559	219463	436752	8,38	0,02714	1415	2767	0,00645
80+	44085	1692	35237	35237	1,00000	6,166	217289	217289	6,17	0,03838	1352	1352	0,00622

Table B.9. Multiple decrement life table for cause i = respiratory diseases, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	1339	100000	3009	0,03009	0,140	97413	7041354	70,41	0,00215	215	6262	0,00221
1	4804	841	96991	715	0,00737	1,475	386158	6943941	71,59	0,00129	125	6046	0,00032
5	2140	203	96276	314	0,00326	2,500	480594	6557783	68,11	0,00031	30	5921	0,00006
10	1741	130	95962	252	0,00262	2,500	479181	6077189	63,33	0,00020	19	5891	0,00004
15	2977	146	95710	402	0,00420	2,668	477615	5598008	58,49	0,00021	20	5873	0,00004
20	3886	210	95309	564	0,00592	2,611	475194	5120393	53,72	0,00032	30	5853	0,00006
25	4213	259	94744	684	0,00722	2,578	472064	4645199	49,03	0,00044	42	5823	0,00009
30	4275	180	94060	820	0,00871	2,590	468326	4173135	44,37	0,00037	35	5781	0,00007
35	5429	256	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00053	50	5746	0,00011
40	6132	258	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00065	60	5696	0,00013
45	7481	388	90765	2047	0,02256	2,653	449022	2783534	30,67	0,00117	106	5637	0,00024
50	9116	465	88718	2962	0,03339	2,653	436640	2334512	26,31	0,00170	151	5530	0,00035
55	10465	571	85756	4268	0,04977	2,660	418792	1897872	22,13	0,00272	233	5379	0,00056
60	15496	866	81488	6350	0,07793	2,668	392629	1479081	18,15	0,00435	355	5146	0,00090
65	22753	1607	75138	9481	0,12618	2,660	353504	1086451	14,46	0,00891	670	4792	0,00189
70	29797	1998	65657	13510	0,20576	2,625	296196	732948	11,16	0,01379	906	4122	0,00306
75	24040	1538	52147	16910	0,32428	2,559	219463	436752	8,38	0,02074	1082	3216	0,00493
80+	44085	2671	35237	35237	1,00000	6,166	217289	217289	6,17	0,06058	2135	2135	0,00982

Table B.10. Multiple decrement life table for cause i = infectious diseases, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	3100	100000	3009	0,03009	0,140	97413	7041354	70,41	0,00499	499	1719	0,00512
1	4804	912	96991	715	0,00737	1,475	386158	6943941	71,59	0,00140	136	1220	0,00035
5	2140	276	96276	314	0,00326	2,500	480594	6557783	68,11	0,00042	40	1085	0,00008
10	1741	135	95962	252	0,00262	2,500	479181	6077189	63,33	0,00020	20	1044	0,00004
15	2977	91	95710	402	0,00420	2,668	477615	5598008	58,49	0,00013	12	1025	0,00003
20	3886	210	95309	564	0,00592	2,611	475194	5120393	53,72	0,00032	30	1012	0,00006
25	4213	165	94744	684	0,00722	2,578	472064	4645199	49,03	0,00028	27	982	0,00006
30	4275	159	94060	820	0,00871	2,590	468326	4173135	44,37	0,00033	31	955	0,00007
35	5429	167	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00035	32	924	0,00007
40	6132	153	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00039	36	892	0,00008
45	7481	201	90765	2047	0,02256	2,653	449022	2783534	30,67	0,00061	55	856	0,00012
50	9116	132	88718	2962	0,03339	2,653	436640	2334512	26,31	0,00048	43	801	0,00010
55	10465	196	85756	4268	0,04977	2,660	418792	1897872	22,13	0,00093	80	758	0,00019
60	15496	228	81488	6350	0,07793	2,668	392629	1479081	18,15	0,00115	94	678	0,00024
65	22753	291	75138	9481	0,12618	2,660	353504	1086451	14,46	0,00161	121	585	0,00034
70	29797	300	65657	13510	0,20576	2,625	296196	732948	11,16	0,00207	136	463	0,00046
75	24040	210	52147	16910	0,32428	2,559	219463	436752	8,38	0,00283	147	327	0,00067
80+	44085	225	35237	35237	1,00000	6,166	217289	217289	6,17	0,00510	180	180	0,00083

Table B.11. Multiple decrement life table for cause i = injuries, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	232	100000	3009	0,03009	0,140	97413	7041354	70,41	0,00037	37	2300	0,00038
1	4804	445	96991	715	0,00737	1,475	386158	6943941	71,59	0,00068	66	2262	0,00017
5	2140	345	96276	314	0,00326	2,500	480594	6557783	68,11	0,00053	51	2196	0,00011
10	1741	275	95962	252	0,00262	2,500	479181	6077189	63,33	0,00041	40	2146	0,00008
15	2977	1081	95710	402	0,00420	2,668	477615	5598008	58,49	0,00152	146	2106	0,00031
20	3886	1347	95309	564	0,00592	2,611	475194	5120393	53,72	0,00205	196	1960	0,00041
25	4213	1008	94744	684	0,00722	2,578	472064	4645199	49,03	0,00173	164	1764	0,00035
30	4275	828	94060	820	0,00871	2,590	468326	4173135	44,37	0,00169	159	1601	0,00034
35	5429	655	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00136	127	1442	0,00027
40	6132	541	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00136	125	1315	0,00027
45	7481	333	90765	2047	0,02256	2,653	449022	2783534	30,67	0,00101	91	1190	0,00020
50	9116	332	88718	2962	0,03339	2,653	436640	2334512	26,31	0,00122	108	1098	0,00025
55	10465	299	85756	4268	0,04977	2,660	418792	1897872	22,13	0,00142	122	990	0,00029
60	15496	257	81488	6350	0,07793	2,668	392629	1479081	18,15	0,00129	105	869	0,00027
65	22753	302	75138	9481	0,12618	2,660	353504	1086451	14,46	0,00168	126	763	0,00036
70	29797	357	65657	13510	0,20576	2,625	296196	732948	11,16	0,00246	162	638	0,00055
75	24040	250	52147	16910	0,32428	2,559	219463	436752	8,38	0,00337	176	476	0,00080
80+	44085	376	35237	35237	1,00000	6,166	217289	217289	6,17	0,00852	300	300	0,00138

Table B.12. Multiple decrement life table for cause i = other diseases, 2000 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	18713	13382	100000	3009	0,03009	0,140	97413	7041354	70,41	0,02152	2152	24874	0,02209
1	4804	1211	96991	715	0,00737	1,475	386158	6943941	71,59	0,00186	180	22722	0,00047
5	2140	522	96276	314	0,00326	2,500	480594	6557783	68,11	0,00079	77	22542	0,00016
10	1741	473	95962	252	0,00262	2,500	479181	6077189	63,33	0,00071	68	22466	0,00014
15	2977	628	95710	402	0,00420	2,668	477615	5598008	58,49	0,00089	85	22397	0,00018
20	3886	793	95309	564	0,00592	2,611	475194	5120393	53,72	0,00121	115	22312	0,00024
25	4213	876	94744	684	0,00722	2,578	472064	4645199	49,03	0,00150	142	22197	0,00030
30	4275	895	94060	820	0,00871	2,590	468326	4173135	44,37	0,00182	172	22055	0,00037
35	5429	886	93241	1052	0,01129	2,615	463693	3704809	39,73	0,00184	172	21883	0,00037
40	6132	815	92188	1423	0,01543	2,639	457582	3241116	35,16	0,00205	189	21712	0,00041
45	7481	974	90765	2047	0,02256	2,653	449022	2783534	30,67	0,00294	267	21523	0,00059
50	9116	1200	88718	2962	0,03339	2,653	436640	2334512	26,31	0,00439	390	21256	0,00089
55	10465	1353	85756	4268	0,04977	2,660	418792	1897872	22,13	0,00643	552	20866	0,00132
60	15496	2197	81488	6350	0,07793	2,668	392629	1479081	18,15	0,01105	900	20314	0,00229
65	22753	3278	75138	9481	0,12618	2,660	353504	1086451	14,46	0,01818	1366	19414	0,00386
70	29797	5588	65657	13510	0,20576	2,625	296196	732948	11,16	0,03859	2533	18048	0,00855
75	24040	5504	52147	16910	0,32428	2,559	219463	436752	8,38	0,07424	3872	15515	0,01764
80+	44085	14567	35237	35237	1,00000	6,166	217289	217289	6,17	0,33042	11643	11643	0,05358

Table B.13. Multiple decrement life table for cause i = cardiovascular diseases, 2008 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	8150	1510	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00249	249	50293	0,00252
1	1017	349	98654	160	0,00162	1,612	394234	7307321	74,07	0,00056	55	50044	0,00014
5	842	273	98494	127	0,00129	2,500	492151	6913087	70,19	0,00042	41	49989	0,00008
10	764	225	98367	113	0,00114	2,500	491552	6420936	65,28	0,00034	33	49948	0,00007
15	1530	406	98254	234	0,00239	2,719	490736	5929384	60,35	0,00063	62	49914	0,00013
20	2105	470	98020	322	0,00328	2,556	489313	5438647	55,49	0,00073	72	49852	0,00015
25	2065	466	97698	307	0,00314	2,514	487728	4949334	50,66	0,00071	69	49780	0,00014
30	2061	582	97391	344	0,00353	2,585	486126	4461606	45,81	0,00100	97	49711	0,00020
35	2542	882	97048	462	0,00476	2,663	484159	3975481	40,96	0,00165	160	49614	0,00033
40	3718	1501	96586	752	0,00779	2,730	481222	3491322	36,15	0,00314	304	49454	0,00063
45	6205	2770	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00647	620	49150	0,00130
50	9361	4200	94445	2433	0,02576	2,734	466711	2534063	26,83	0,01156	1092	48530	0,00234
55	13248	6298	92012	4266	0,04636	2,712	450296	2067352	22,47	0,02204	2028	47439	0,00450
60	16210	7666	87746	6695	0,07629	2,682	423213	1617056	18,43	0,03608	3166	45411	0,00748
65	20875	10198	81051	10153	0,12527	2,661	381508	1193844	14,73	0,06120	4960	42245	0,01300
70	25562	12883	70898	14321	0,20200	2,620	320411	812335	11,46	0,10180	7218	37285	0,02253
75	35409	18476	56577	17759	0,31389	2,559	239534	491924	8,69	0,16378	9266	30067	0,03869
80+	43315	23211	38818	38818	1,00000	6,502	252390	252390	6,50	0,53585	20801	20801	0,08241

Table B.14. Multiple decrement life table for cause i = cancers, 2008 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	8150	78	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00013	13	16696	0,00013
1	1017	45	98654	160	0,00162	1,612	394234	7307321	74,07	0,00007	7	16683	0,00002
5	842	81	98494	127	0,00129	2,500	492151	6913087	70,19	0,00012	12	16676	0,00002
10	764	86	98367	113	0,00114	2,500	491552	6420936	65,28	0,00013	13	16663	0,00003
15	1530	114	98254	234	0,00239	2,719	490736	5929384	60,35	0,00018	17	16651	0,00004
20	2105	173	98020	322	0,00328	2,556	489313	5438647	55,49	0,00027	26	16633	0,00005
25	2065	155	97698	307	0,00314	2,514	487728	4949334	50,66	0,00024	23	16607	0,00005
30	2061	232	97391	344	0,00353	2,585	486126	4461606	45,81	0,00040	39	16584	0,00008
35	2542	375	97048	462	0,00476	2,663	484159	3975481	40,96	0,00070	68	16545	0,00014
40	3718	726	96586	752	0,00779	2,730	481222	3491322	36,15	0,00152	147	16477	0,00031
45	6205	1518	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00355	340	16330	0,00071
50	9361	2618	94445	2433	0,02576	2,734	466711	2534063	26,83	0,00721	681	15990	0,00146
55	13248	3609	92012	4266	0,04636	2,712	450296	2067352	22,47	0,01263	1162	15310	0,00258
60	16210	4432	87746	6695	0,07629	2,682	423213	1617056	18,43	0,02086	1830	14147	0,00433
65	20875	4917	81051	10153	0,12527	2,661	381508	1193844	14,73	0,02950	2391	12317	0,00627
70	25562	5190	70898	14321	0,20200	2,620	320411	812335	11,46	0,04101	2907	9926	0,00907
75	35409	5767	56577	17759	0,31389	2,559	239534	491924	8,69	0,05112	2892	7018	0,01208
80+	43315	4604	38818	38818	1,00000	6,502	252390	252390	6,50	0,10629	4126	4126	0,01635

Table B.15. Multiple decrement life table for cause i = respiratory diseases, 2008 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	8150	1104	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00182	182	12066	0,00185
1	1017	130	98654	160	0,00162	1,612	394234	7307321	74,07	0,00021	20	11883	0,00005
5	842	86	98494	127	0,00129	2,500	492151	6913087	70,19	0,00013	13	11863	0,00003
10	764	78	98367	113	0,00114	2,500	491552	6420936	65,28	0,00012	12	11850	0,00002
15	1530	86	98254	234	0,00239	2,719	490736	5929384	60,35	0,00013	13	11838	0,00003
20	2105	100	98020	322	0,00328	2,556	489313	5438647	55,49	0,00016	15	11825	0,00003
25	2065	98	97698	307	0,00314	2,514	487728	4949334	50,66	0,00015	15	11810	0,00003
30	2061	84	97391	344	0,00353	2,585	486126	4461606	45,81	0,00014	14	11795	0,00003
35	2542	143	97048	462	0,00476	2,663	484159	3975481	40,96	0,00027	26	11781	0,00005
40	3718	204	96586	752	0,00779	2,730	481222	3491322	36,15	0,00043	41	11755	0,00009
45	6205	384	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00090	86	11714	0,00018
50	9361	707	94445	2433	0,02576	2,734	466711	2534063	26,83	0,00194	184	11628	0,00039
55	13248	1070	92012	4266	0,04636	2,712	450296	2067352	22,47	0,00374	345	11445	0,00077
60	16210	1506	87746	6695	0,07629	2,682	423213	1617056	18,43	0,00709	622	11100	0,00147
65	20875	2360	81051	10153	0,12527	2,661	381508	1193844	14,73	0,01416	1148	10478	0,00301
70	25562	3110	70898	14321	0,20200	2,620	320411	812335	11,46	0,02457	1742	9330	0,00544
75	35409	4700	56577	17759	0,31389	2,559	239534	491924	8,69	0,04166	2357	7588	0,00984
80+	43315	5837	38818	38818	1,00000	6,502	252390	252390	6,50	0,13475	5231	5231	0,02072

Table B.16. Multiple decrement life table for cause i = infectious diseases, 2008 males

x	$_nD_x$	$_nD_x^i$	l_x	$_nd_x$	$_nq_x$	$_na_x$	L_x	T_x	e_x	$_nq_x^i$	$_nd_x^i$	l_x^i	$_nm_x^i$
0	8150	925	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00153	153	1292	0,00155
1	1017	105	98654	160	0,00162	1,612	394234	7307321	74,07	0,00017	16	1139	0,00004
5	842	57	98494	127	0,00129	2,500	492151	6913087	70,19	0,00009	9	1123	0,00002
10	764	34	98367	113	0,00114	2,500	491552	6420936	65,28	0,00005	5	1114	0,00001
15	1530	38	98254	234	0,00239	2,719	490736	5929384	60,35	0,00006	6	1109	0,00001
20	2105	47	98020	322	0,00328	2,556	489313	5438647	55,49	0,00007	7	1104	0,00001
25	2065	36	97698	307	0,00314	2,514	487728	4949334	50,66	0,00006	5	1096	0,00001
30	2061	40	97391	344	0,00353	2,585	486126	4461606	45,81	0,00007	7	1091	0,00001
35	2542	52	97048	462	0,00476	2,663	484159	3975481	40,96	0,00010	9	1084	0,00002
40	3718	73	96586	752	0,00779	2,730	481222	3491322	36,15	0,00015	15	1075	0,00003
45	6205	91	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00021	20	1060	0,00004
50	9361	132	94445	2433	0,02576	2,734	466711	2534063	26,83	0,00036	34	1040	0,00007
55	13248	162	92012	4266	0,04636	2,712	450296	2067352	22,47	0,00057	52	1006	0,00012
60	16210	198	87746	6695	0,07629	2,682	423213	1617056	18,43	0,00093	82	953	0,00019
65	20875	265	81051	10153	0,12527	2,661	381508	1193844	14,73	0,00159	129	872	0,00034
70	25562	307	70898	14321	0,20200	2,620	320411	812335	11,46	0,00242	172	743	0,00054
75	35409	380	56577	17759	0,31389	2,559	239534	491924	8,69	0,00337	191	571	0,00080
80+	43315	425	38818	38818	1,00000	6,502	252390	252390	6,50	0,00980	381	381	0,00151

Table B.17. Multiple decrement life table for cause i = injuries, 2008 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	8150	131	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00022	22	1742	0,00022
1	1017	86	98654	160	0,00162	1,612	394234	7307321	74,07	0,00014	13	1720	0,00003
5	842	90	98494	127	0,00129	2,500	492151	6913087	70,19	0,00014	14	1707	0,00003
10	764	96	98367	113	0,00114	2,500	491552	6420936	65,28	0,00014	14	1693	0,00003
15	1530	444	98254	234	0,00239	2,719	490736	5929384	60,35	0,00069	68	1679	0,00014
20	2105	803	98020	322	0,00328	2,556	489313	5438647	55,49	0,00125	123	1611	0,00025
25	2065	706	97698	307	0,00314	2,514	487728	4949334	50,66	0,00107	105	1488	0,00022
30	2061	537	97391	344	0,00353	2,585	486126	4461606	45,81	0,00092	90	1383	0,00018
35	2542	511	97048	462	0,00476	2,663	484159	3975481	40,96	0,00096	93	1294	0,00019
40	3718	419	96586	752	0,00779	2,730	481222	3491322	36,15	0,00088	85	1201	0,00018
45	6205	419	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00098	94	1116	0,00020
50	9361	309	94445	2433	0,02576	2,734	466711	2534063	26,83	0,00085	80	1022	0,00017
55	13248	304	92012	4266	0,04636	2,712	450296	2067352	22,47	0,00106	98	942	0,00022
60	16210	257	87746	6695	0,07629	2,682	423213	1617056	18,43	0,00121	106	844	0,00025
65	20875	281	81051	10153	0,12527	2,661	381508	1193844	14,73	0,00169	137	738	0,00036
70	25562	264	70898	14321	0,20200	2,620	320411	812335	11,46	0,00209	148	602	0,00046
75	35409	349	56577	17759	0,31389	2,559	239534	491924	8,69	0,00310	175	453	0,00073
80+	43315	311	38818	38818	1,00000	6,502	252390	252390	6,50	0,00717	278	278	0,00110

Table B.18. Multiple decrement life table for cause i = other diseases, 2008 males

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	8150	1346	100000	1346	0,01346	0,081	98763	7406084	74,06	0,00222	222	62445	0,00225
1	1017	160	98654	160	0,00162	1,612	394234	7307321	74,07	0,00026	25	62223	0,00006
5	842	127	98494	127	0,00129	2,500	492151	6913087	70,19	0,00020	19	62198	0,00004
10	764	113	98367	113	0,00114	2,500	491552	6420936	65,28	0,00017	17	62178	0,00003
15	1530	234	98254	234	0,00239	2,719	490736	5929384	60,35	0,00037	36	62162	0,00007
20	2105	322	98020	322	0,00328	2,556	489313	5438647	55,49	0,00050	49	62126	0,00010
25	2065	307	97698	307	0,00314	2,514	487728	4949334	50,66	0,00047	46	62077	0,00009
30	2061	344	97391	344	0,00353	2,585	486126	4461606	45,81	0,00059	57	62031	0,00012
35	2542	462	97048	462	0,00476	2,663	484159	3975481	40,96	0,00086	84	61974	0,00017
40	3718	752	96586	752	0,00779	2,730	481222	3491322	36,15	0,00158	152	61890	0,00032
45	6205	1389	95834	1389	0,01450	2,745	476036	3010099	31,41	0,00325	311	61738	0,00065
50	9361	2433	94445	2433	0,02576	2,734	466711	2534063	26,83	0,00669	632	61427	0,00135
55	13248	4266	92012	4266	0,04636	2,712	450296	2067352	22,47	0,01493	1374	60795	0,00305
60	16210	6695	87746	6695	0,07629	2,682	423213	1617056	18,43	0,03151	2765	59421	0,00653
65	20875	10153	81051	10153	0,12527	2,661	381508	1193844	14,73	0,06093	4938	56656	0,01294
70	25562	14321	70898	14321	0,20200	2,620	320411	812335	11,46	0,11317	8024	51718	0,02504
75	35409	17759	56577	17759	0,31389	2,559	239534	491924	8,69	0,15743	8907	43694	0,03719
80+	43315	38818	38818	38818	1,00000	6,502	252390	252390	6,50	0,89617	34787	34787	0,13783

Table B.19. Multiple decrement life table for cause i = cardiovascular diseases, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	1014	100000	968	0,00968	0,079	99109	7725239	77,25	0,00179	179	57505	0,00180
1	685	249	99032	114	0,00116	1,508	395843	7626130	77,01	0,00042	42	57327	0,00011
5	425	141	98918	68	0,00069	2,500	494418	7230287	73,09	0,00023	23	57285	0,00005
10	368	116	98849	57	0,00058	2,500	494104	6735870	68,14	0,00018	18	57263	0,00004
15	613	163	98792	99	0,00101	2,692	493731	6241766	63,18	0,00027	26	57245	0,00005
20	904	249	98693	145	0,00147	2,633	493121	5748035	58,24	0,00040	40	57218	0,00008
25	1225	347	98548	188	0,00191	2,614	492290	5254914	53,32	0,00054	53	57178	0,00011
30	1448	474	98360	250	0,00254	2,640	491208	4762624	48,42	0,00083	82	57125	0,00017
35	1987	758	98110	369	0,00377	2,683	489692	4271416	43,54	0,00144	141	57043	0,00029
40	2866	1130	97740	602	0,00616	2,721	487329	3781724	38,69	0,00243	237	56902	0,00049
45	4635	2056	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00487	473	56665	0,00098
50	6418	3016	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00835	803	56192	0,00168
55	8439	4131	94365	2749	0,02913	2,698	465498	2334703	24,74	0,01426	1345	55389	0,00289
60	11240	5989	91616	4411	0,04815	2,713	447993	1869206	20,40	0,02566	2351	54044	0,00525
65	16552	9302	87205	7586	0,08699	2,715	418695	1421212	16,30	0,04888	4263	51693	0,01018
70	23115	13573	79619	12267	0,15408	2,682	369656	1002517	12,59	0,09048	7204	47430	0,01949
75	36229	21991	67352	17774	0,26390	2,625	294545	632862	9,40	0,16019	10789	40227	0,03663
80+	73829	43837	49578	49578	1,00000	6,824	338316	338316	6,82	0,59377	29438	29438	0,08701

Table B.20. Multiple decrement life table for cause i = cancers, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	80	100000	968	0,00968	0,079	99109	7725239	77,25	0,00014	14	9971	0,00014
1	685	26	99032	114	0,00116	1,508	395843	7626130	77,01	0,00004	4	9957	0,00001
5	425	36	98918	68	0,00069	2,500	494418	7230287	73,09	0,00006	6	9953	0,00001
10	368	34	98849	57	0,00058	2,500	494104	6735870	68,14	0,00005	5	9947	0,00001
15	613	52	98792	99	0,00101	2,692	493731	6241766	63,18	0,00008	8	9941	0,00002
20	904	100	98693	145	0,00147	2,633	493121	5748035	58,24	0,00016	16	9933	0,00003
25	1225	187	98548	188	0,00191	2,614	492290	5254914	53,32	0,00029	29	9917	0,00006
30	1448	319	98360	250	0,00254	2,640	491208	4762624	48,42	0,00056	55	9888	0,00011
35	1987	532	98110	369	0,00377	2,683	489692	4271416	43,54	0,00101	99	9833	0,00020
40	2866	855	97740	602	0,00616	2,721	487329	3781724	38,69	0,00184	180	9734	0,00037
45	4635	1401	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00332	322	9555	0,00067
50	6418	1793	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00497	477	9233	0,00100
55	8439	2011	94365	2749	0,02913	2,698	465498	2334703	24,74	0,00694	655	8756	0,00141
60	11240	2132	91616	4411	0,04815	2,713	447993	1869206	20,40	0,00913	837	8101	0,00187
65	16552	2680	87205	7586	0,08699	2,715	418695	1421212	16,30	0,01409	1228	7264	0,00293
70	23115	2934	79619	12267	0,15408	2,682	369656	1002517	12,59	0,01955	1557	6036	0,00421
75	36229	3445	67352	17774	0,26390	2,625	294545	632862	9,40	0,02509	1690	4479	0,00574
80+	73829	4153	49578	49578	1,00000	6,824	338316	338316	6,82	0,05625	2789	2789	0,00824

Table B.21. Multiple decrement life table for cause i = respiratory diseases, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	738	100000	968	0,00968	0,079	99109	7725239	77,25	0,00130	130	9390	0,00131
1	685	91	99032	114	0,00116	1,508	395843	7626130	77,01	0,00015	15	9260	0,00004
5	425	50	98918	68	0,00069	2,500	494418	7230287	73,09	0,00008	8	9245	0,00002
10	368	36	98849	57	0,00058	2,500	494104	6735870	68,14	0,00006	6	9237	0,00001
15	613	49	98792	99	0,00101	2,692	493731	6241766	63,18	0,00008	8	9231	0,00002
20	904	72	98693	145	0,00147	2,633	493121	5748035	58,24	0,00012	11	9223	0,00002
25	1225	94	98548	188	0,00191	2,614	492290	5254914	53,32	0,00015	15	9212	0,00003
30	1448	78	98360	250	0,00254	2,640	491208	4762624	48,42	0,00014	14	9197	0,00003
35	1987	112	98110	369	0,00377	2,683	489692	4271416	43,54	0,00021	21	9184	0,00004
40	2866	190	97740	602	0,00616	2,721	487329	3781724	38,69	0,00041	40	9163	0,00008
45	4635	299	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00071	69	9123	0,00014
50	6418	363	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00101	97	9054	0,00020
55	8439	665	94365	2749	0,02913	2,698	465498	2334703	24,74	0,00229	216	8958	0,00046
60	11240	942	91616	4411	0,04815	2,713	447993	1869206	20,40	0,00404	370	8741	0,00083
65	16552	1364	87205	7586	0,08699	2,715	418695	1421212	16,30	0,00717	625	8371	0,00149
70	23115	2155	79619	12267	0,15408	2,682	369656	1002517	12,59	0,01436	1143	7746	0,00309
75	36229	3507	67352	17774	0,26390	2,625	294545	632862	9,40	0,02554	1720	6603	0,00584
80+	73829	7270	49578	49578	1,00000	6,824	338316	338316	6,82	0,09847	4882	4882	0,01443

Table B.22. Multiple decrement life table for cause i = infectious diseases, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	617	100000	968	0,00968	0,079	99109	7725239	77,25	0,00109	109	1344	0,00110
1	685	70	99032	114	0,00116	1,508	395843	7626130	77,01	0,00012	12	1235	0,00003
5	425	42	98918	68	0,00069	2,500	494418	7230287	73,09	0,00007	7	1224	0,00001
10	368	24	98849	57	0,00058	2,500	494104	6735870	68,14	0,00004	4	1217	0,00001
15	613	14	98792	99	0,00101	2,692	493731	6241766	63,18	0,00002	2	1213	0,00000
20	904	23	98693	145	0,00147	2,633	493121	5748035	58,24	0,00004	4	1211	0,00001
25	1225	24	98548	188	0,00191	2,614	492290	5254914	53,32	0,00004	4	1207	0,00001
30	1448	32	98360	250	0,00254	2,640	491208	4762624	48,42	0,00006	6	1204	0,00001
35	1987	60	98110	369	0,00377	2,683	489692	4271416	43,54	0,00011	11	1198	0,00002
40	2866	57	97740	602	0,00616	2,721	487329	3781724	38,69	0,00012	12	1187	0,00002
45	4635	86	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00020	20	1175	0,00004
50	6418	146	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00041	39	1155	0,00008
55	8439	160	94365	2749	0,02913	2,698	465498	2334703	24,74	0,00055	52	1116	0,00011
60	11240	203	91616	4411	0,04815	2,713	447993	1869206	20,40	0,00087	80	1064	0,00018
65	16552	248	87205	7586	0,08699	2,715	418695	1421212	16,30	0,00130	114	984	0,00027
70	23115	309	79619	12267	0,15408	2,682	369656	1002517	12,59	0,00206	164	871	0,00044
75	36229	440	67352	17774	0,26390	2,625	294545	632862	9,40	0,00321	216	707	0,00073
80+	73829	731	49578	49578	1,00000	6,824	338316	338316	6,82	0,00990	491	491	0,00145

Table B.23. Multiple decrement life table for cause i = injuries, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	98	100000	968	0,00968	0,079	99109	7725239	77,25	0,00017	17	939	0,00017
1	685	53	99032	114	0,00116	1,508	395843	7626130	77,01	0,00009	9	922	0,00002
5	425	35	98918	68	0,00069	2,500	494418	7230287	73,09	0,00006	6	913	0,00001
10	368	56	98849	57	0,00058	2,500	494104	6735870	68,14	0,00009	9	907	0,00002
15	613	177	98792	99	0,00101	2,692	493731	6241766	63,18	0,00029	29	898	0,00006
20	904	215	98693	145	0,00147	2,633	493121	5748035	58,24	0,00035	34	870	0,00007
25	1225	236	98548	188	0,00191	2,614	492290	5254914	53,32	0,00037	36	835	0,00007
30	1448	194	98360	250	0,00254	2,640	491208	4762624	48,42	0,00034	34	799	0,00007
35	1987	167	98110	369	0,00377	2,683	489692	4271416	43,54	0,00032	31	765	0,00006
40	2866	161	97740	602	0,00616	2,721	487329	3781724	38,69	0,00035	34	734	0,00007
45	4635	161	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00038	37	701	0,00008
50	6418	149	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00041	40	664	0,00008
55	8439	141	94365	2749	0,02913	2,698	465498	2334703	24,74	0,00048	46	624	0,00010
60	11240	115	91616	4411	0,04815	2,713	447993	1869206	20,40	0,00049	45	578	0,00010
65	16552	154	87205	7586	0,08699	2,715	418695	1421212	16,30	0,00081	70	533	0,00017
70	23115	144	79619	12267	0,15408	2,682	369656	1002517	12,59	0,00096	76	463	0,00021
75	36229	233	67352	17774	0,26390	2,625	294545	632862	9,40	0,00170	114	386	0,00039
80+	73829	405	49578	49578	1,00000	6,824	338316	338316	6,82	0,00548	272	272	0,00080

Table B.24. Multiple decrement life table for cause i = other diseases, 2008 females

x	${}_nD_x$	${}_nD_x^i$	l_x	${}_nd_x$	${}_nq_x$	${}_na_x$	L_x	T_x	e_x	${}_nq_x^i$	${}_nd_x^i$	l_x^i	${}_nm_x^i$
0	5497	2950	100000	968	0,00968	0,079	99109	7725239	77,25	0,00520	520	20851	0,00524
1	685	197	99032	114	0,00116	1,508	395843	7626130	77,01	0,00033	33	20331	0,00008
5	425	121	98918	68	0,00069	2,500	494418	7230287	73,09	0,00020	19	20299	0,00004
10	368	102	98849	57	0,00058	2,500	494104	6735870	68,14	0,00016	16	20279	0,00003
15	613	158	98792	99	0,00101	2,692	493731	6241766	63,18	0,00026	26	20263	0,00005
20	904	245	98693	145	0,00147	2,633	493121	5748035	58,24	0,00040	39	20238	0,00008
25	1225	336	98548	188	0,00191	2,614	492290	5254914	53,32	0,00052	52	20198	0,00011
30	1448	349	98360	250	0,00254	2,640	491208	4762624	48,42	0,00061	60	20147	0,00012
35	1987	359	98110	369	0,00377	2,683	489692	4271416	43,54	0,00068	67	20086	0,00014
40	2866	473	97740	602	0,00616	2,721	487329	3781724	38,69	0,00102	99	20020	0,00020
45	4635	630	97138	1066	0,01097	2,717	483259	3294395	33,91	0,00149	145	19920	0,00030
50	6418	950	96073	1708	0,01778	2,698	476432	2811135	29,26	0,00263	253	19775	0,00053
55	8439	1333	94365	2749	0,02913	2,698	465498	2334703	24,74	0,00460	434	19522	0,00093
60	11240	1858	91616	4411	0,04815	2,713	447993	1869206	20,40	0,00796	729	19088	0,00163
65	16552	2804	87205	7586	0,08699	2,715	418695	1421212	16,30	0,01473	1285	18359	0,00307
70	23115	4000	79619	12267	0,15408	2,682	369656	1002517	12,59	0,02666	2123	17074	0,00574
75	36229	6613	67352	17774	0,26390	2,625	294545	632862	9,40	0,04817	3244	14951	0,01101
80+	73829	17433	49578	49578	1,00000	6,824	338316	338316	6,82	0,23613	11707	11707	0,03460

APPENDIX C

ASSOCIATED SINGLE DECREMENT LIFE TABLES

Table C.1. Associated single decrement life table for causes of death other than cardiovascular diseases, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,97707	0,96704	0,96778	0,03222	100000	3222	0,138	97221	7783906	77,84
1	4	0,78175	0,99318	0,99466	0,00534	96778	517	1,556	385850	7686684	79,43
5	5	0,75723	0,99629	0,99719	0,00281	96261	271	2,501	480631	7300835	75,84
10	5	0,77460	0,99696	0,99765	0,00235	95991	226	2,654	479424	6820204	71,05
15	5	0,81788	0,99442	0,99543	0,00457	95765	438	2,673	477807	6340780	66,21
20	5	0,79328	0,99221	0,99381	0,00619	95327	590	2,555	475194	5862973	61,50
25	5	0,79390	0,99213	0,99375	0,00625	94738	592	2,508	472211	5387779	56,87
30	5	0,73111	0,99110	0,99349	0,00651	94145	613	2,537	469216	4915567	52,21
35	5	0,65511	0,98856	0,99249	0,00751	93532	702	2,582	465963	4446351	47,54
40	5	0,56822	0,98323	0,99043	0,00957	92830	888	2,640	462054	3980389	42,88
45	5	0,52611	0,97331	0,98587	0,01413	91942	1299	2,668	456680	3518334	38,27
50	5	0,49879	0,95767	0,97866	0,02134	90643	1935	2,676	448717	3061654	33,78
55	5	0,47911	0,93231	0,96697	0,03303	88708	2930	2,662	436691	2612937	29,46
60	5	0,45482	0,89522	0,95090	0,04910	85778	4211	2,651	419001	2176246	25,37
65	5	0,43490	0,83913	0,92656	0,07344	81567	5990	2,654	393780	1757245	21,54
70	5	0,43069	0,75456	0,88577	0,11423	75577	8633	2,645	357553	1363464	18,04
75	5	0,43526	0,63525	0,82078	0,17922	66944	11997	2,794	308255	1005912	15,03
80+		0,46394	0,00000	0,00000	1,00000	54946	54946	12,697	697656	697656	12,70

Table C.2. Associated single decrement life table for causes of death other than cancers, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,99566	0,96704	0,96718	0,03282	100000	3282	0,137	97169	7031733	70,32
1	4	0,96116	0,99318	0,99344	0,00656	96718	634	1,554	385320	6934565	71,70
5	5	0,89740	0,99629	0,99667	0,00333	96083	320	2,500	479617	6549245	68,16
10	5	0,87657	0,99696	0,99734	0,00266	95763	255	2,629	478212	6069628	63,38
15	5	0,89652	0,99442	0,99499	0,00501	95508	478	2,684	476434	5591416	58,54
20	5	0,91454	0,99221	0,99287	0,00713	95030	678	2,558	473496	5114982	53,82
25	5	0,89985	0,99213	0,99292	0,00708	94353	668	2,520	470105	4641486	49,19
30	5	0,88904	0,99110	0,99209	0,00791	93684	741	2,565	466615	4171382	44,53
35	5	0,84421	0,98856	0,99034	0,00966	92943	898	2,620	462576	3704767	39,86
40	5	0,81306	0,98323	0,98634	0,01366	92045	1257	2,664	457287	3242190	35,22
45	5	0,77787	0,97331	0,97918	0,02082	90787	1890	2,681	449554	2784903	30,67
50	5	0,76757	0,95767	0,96734	0,03266	88897	2903	2,686	437767	2335349	26,27
55	5	0,76266	0,93231	0,94794	0,05206	85994	4476	2,678	419576	1897582	22,07
60	5	0,77843	0,89522	0,91744	0,08256	81518	6730	2,662	391855	1478006	18,13
65	5	0,79325	0,83913	0,87012	0,12988	74788	9714	2,644	351052	1086151	14,52
70	5	0,82099	0,75456	0,79357	0,20643	65074	13433	2,607	293225	735099	11,30
75	5	0,85537	0,63525	0,67833	0,32167	51641	16611	2,585	218086	441874	8,56
80+		0,92206	0,00000	0,00000	1,00000	35030	35030	6,389	223788	223788	6,39

Table C.3. Associated single decrement life table for causes of death other than respiratory diseases, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,93600	0,96704	0,96911	0,03089	100000	3089	0,138	97338	6923682	69,24
1	4	0,83539	0,99318	0,99430	0,00570	96911	553	1,555	386294	6826343	70,44
5	5	0,92052	0,99629	0,99658	0,00342	96359	329	2,500	480970	6440049	66,83
10	5	0,94097	0,99696	0,99714	0,00286	96029	274	2,637	479499	5959079	62,05
15	5	0,95364	0,99442	0,99467	0,00533	95755	510	2,682	477593	5479580	57,22
20	5	0,97005	0,99221	0,99244	0,00756	95245	720	2,562	474469	5001987	52,52
25	5	0,97170	0,99213	0,99235	0,00765	94525	723	2,523	470834	4527518	47,90
30	5	0,95916	0,99110	0,99147	0,00853	93802	800	2,579	467072	4056684	43,25
35	5	0,96533	0,98856	0,98896	0,01104	93001	1027	2,637	462581	3589612	38,60
40	5	0,95565	0,98323	0,98396	0,01604	91975	1475	2,678	456448	3127032	34,00
45	5	0,94521	0,97331	0,97476	0,02524	90500	2284	2,686	447213	2670584	29,51
50	5	0,94088	0,95767	0,96012	0,03988	88215	3518	2,683	432924	2223371	25,20
55	5	0,93512	0,93231	0,93655	0,06345	84697	5374	2,662	410921	1790447	21,14
60	5	0,92153	0,89522	0,90303	0,09697	79323	7692	2,642	378477	1379526	17,39
65	5	0,91366	0,83913	0,85193	0,14807	71631	10606	2,620	332909	1001049	13,98
70	5	0,90887	0,75456	0,77417	0,22583	61025	13781	2,581	271783	668140	10,95
75	5	0,90693	0,63525	0,66265	0,33735	47244	15938	2,558	197304	396357	8,39
80+		0,92644	0,00000	0,00000	1,00000	31306	31306	6,358	199053	199053	6,36

Table C.4. Associated single decrement life table for causes of death other than infectious diseases, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,83001	0,96704	0,97256	0,02744	100000	2744	0,140	97640	6885199	68,85
1	4	0,81073	0,99318	0,99446	0,00554	97256	538	1,555	387709	6787559	69,79
5	5	0,89884	0,99629	0,99666	0,00334	96718	323	2,500	482783	6399850	66,17
10	5	0,93560	0,99696	0,99716	0,00284	96395	274	2,649	481332	5917067	61,38
15	5	0,96689	0,99442	0,99460	0,00540	96121	519	2,680	479403	5435735	56,55
20	5	0,97078	0,99221	0,99243	0,00757	95602	723	2,559	476246	4956332	51,84
25	5	0,97170	0,99213	0,99235	0,00765	94879	726	2,525	472598	4480086	47,22
30	5	0,96664	0,99110	0,99140	0,00860	94153	810	2,579	468806	4007488	42,56
35	5	0,96668	0,98856	0,98894	0,01106	93344	1032	2,640	464282	3538682	37,91
40	5	0,97043	0,98323	0,98372	0,01628	92311	1503	2,686	458079	3074400	33,30
45	5	0,97847	0,97331	0,97388	0,02612	90808	2372	2,689	448562	2616321	28,81
50	5	0,97674	0,95767	0,95863	0,04137	88437	3659	2,686	433716	2167759	24,51
55	5	0,98146	0,93231	0,93352	0,06648	84778	5636	2,667	410743	1734042	20,45
60	5	0,98656	0,89522	0,89655	0,10345	79142	8187	2,644	376419	1323300	16,72
65	5	0,98839	0,83913	0,84084	0,15916	70955	11293	2,616	327854	946881	13,34
70	5	0,98835	0,75456	0,75704	0,24296	59661	14496	2,573	263122	619026	10,38
75	5	0,99047	0,63525	0,63800	0,36200	45166	16350	2,515	185199	355905	7,88
80+		0,99435	0,00000	0,00000	1,00000	28816	28816	5,924	170706	170706	5,92

Table C.5. Associated single decrement life table for causes of death other than injures, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,98505	0,96704	0,96752	0,03248	100000	3248	0,137	97199	6932216	69,32
1	4	0,89519	0,99318	0,99389	0,00611	96752	591	1,555	385563	6835018	70,64
5	5	0,77168	0,99629	0,99713	0,00287	96161	276	2,501	480116	6449455	67,07
10	5	0,68694	0,99696	0,99791	0,00209	95885	200	2,536	478934	5969338	62,25
15	5	0,57947	0,99442	0,99676	0,00324	95685	310	2,634	477693	5490404	57,38
20	5	0,53616	0,99221	0,99581	0,00419	95375	399	2,562	475903	5012711	52,56
25	5	0,57329	0,99213	0,99548	0,00452	94976	429	2,575	473839	4536807	47,77
30	5	0,65691	0,99110	0,99415	0,00585	94547	553	2,647	471432	4062968	42,97
35	5	0,76137	0,98856	0,99128	0,00872	93994	819	2,696	468080	3591536	38,21
40	5	0,84724	0,98323	0,98577	0,01423	93174	1326	2,724	462852	3123456	33,52
45	5	0,91452	0,97331	0,97557	0,02443	91848	2244	2,710	454101	2660603	28,97
50	5	0,94363	0,95767	0,96000	0,04000	89604	3584	2,695	439759	2206502	24,63
55	5	0,95953	0,93231	0,93495	0,06505	86020	5595	2,672	417073	1766744	20,54
60	5	0,97084	0,89522	0,89811	0,10189	80425	8194	2,648	382852	1349670	16,78
65	5	0,98136	0,83913	0,84188	0,15812	72231	11421	2,619	333962	966818	13,39
70	5	0,98510	0,75456	0,75773	0,24227	60809	14732	2,574	268302	632856	10,41
75	5	0,98729	0,63525	0,63892	0,36108	46077	16638	2,517	189068	364554	7,91
80+		0,98820	0,00000	0,00000	1,00000	29439	29439	5,961	175486	175486	5,96

Table C.6. Associated single decrement life table for causes of death other than other diseases, 2000 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,27621	0,96704	0,99078	0,00922	100000	922	0,148	99215	7239166	72,39
1	4	0,71578	0,99318	0,99511	0,00489	99078	484	1,556	395130	7139952	72,06
5	5	0,75434	0,99629	0,99720	0,00280	98594	276	2,501	492280	6744822	68,41
10	5	0,78533	0,99696	0,99762	0,00238	98318	234	2,637	491035	6252542	63,60
15	5	0,78560	0,99442	0,99561	0,00439	98083	431	2,687	489421	5761507	58,74
20	5	0,81519	0,99221	0,99364	0,00636	97653	621	2,558	486748	5272086	53,99
25	5	0,78955	0,99213	0,99378	0,00622	97032	603	2,522	483664	4785338	49,32
30	5	0,79714	0,99110	0,99290	0,00710	96428	684	2,586	480490	4301674	44,61
35	5	0,80729	0,98856	0,99076	0,00924	95744	885	2,656	476647	3821183	39,91
40	5	0,84540	0,98323	0,98580	0,01420	94859	1347	2,695	471192	3344537	35,26
45	5	0,85781	0,97331	0,97706	0,02294	93512	2145	2,698	462624	2873345	30,73
50	5	0,87240	0,95767	0,96297	0,03703	91368	3384	2,693	449031	2410721	26,38
55	5	0,88211	0,93231	0,94004	0,05996	87984	5275	2,672	427639	1961690	22,30
60	5	0,88782	0,89522	0,90640	0,09360	82708	7741	2,649	395344	1534052	18,55
65	5	0,88845	0,83913	0,85571	0,14429	74967	10817	2,618	349073	1138708	15,19
70	5	0,86599	0,75456	0,78358	0,21642	64150	13883	2,573	287057	789635	12,31
75	5	0,82467	0,63525	0,68785	0,31215	50267	15691	2,601	213684	502578	10,00
80+		0,70501	0,00000	0,00000	1,00000	34576	34576	8,355	288895	288895	8,36

Table C.7. Associated single decrement life table for causes of death other than cardiovascular diseases, 2000 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,97020	0,96991	0,97079	0,02921	100000	2921	0,141	97490	8130630	81,31
1	4	0,76732	0,99263	0,99434	0,00566	97079	550	1,477	386930	8033140	82,75
5	5	0,72782	0,99674	0,99763	0,00237	96529	229	2,501	482075	7646210	79,21
10	5	0,70914	0,99738	0,99814	0,00186	96300	179	2,585	481070	7164135	74,39
15	5	0,74860	0,99580	0,99686	0,00314	96121	302	2,670	479902	6683065	69,53
20	5	0,74968	0,99408	0,99556	0,00444	95819	426	2,585	478067	6203163	64,74
25	5	0,69150	0,99278	0,99500	0,00500	95393	477	2,557	475803	5725096	60,02
30	5	0,67268	0,99129	0,99413	0,00587	94917	557	2,572	473231	5249293	55,30
35	5	0,62829	0,98871	0,99289	0,00711	94359	670	2,588	470180	4776062	50,62
40	5	0,57829	0,98457	0,99105	0,00895	93689	839	2,598	466430	4305882	45,96
45	5	0,50588	0,97744	0,98852	0,01148	92850	1066	2,629	461724	3839452	41,35
50	5	0,48549	0,96661	0,98365	0,01635	91785	1501	2,634	455372	3377728	36,80
55	5	0,44544	0,95023	0,97751	0,02249	90284	2030	2,631	446609	2922356	32,37
60	5	0,39352	0,92207	0,96858	0,03142	88254	2773	2,670	434807	2475747	28,05
65	5	0,38156	0,87382	0,94984	0,05016	85481	4288	2,702	417547	2040940	23,88
70	5	0,38675	0,79424	0,91476	0,08524	81193	6921	2,692	389990	1623393	19,99
75	5	0,39570	0,67572	0,85633	0,14367	74271	10671	2,820	348097	1233403	16,61
80+		0,44300	0,00000	0,00000	1,00000	63601	63601	13,920	885306	885306	13,92

Table C.8. Associated single decrement life table for causes of death other than cancers, 2000 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,99454	0,96991	0,97007	0,02993	100000	2993	0,140	97427	7214916	72,15
1	4	0,94241	0,99263	0,99305	0,00695	97007	674	1,476	386326	7117489	73,37
5	5	0,90121	0,99674	0,99706	0,00294	96333	283	2,500	480957	6731162	69,87
10	5	0,87258	0,99738	0,99771	0,00229	96050	220	2,577	479717	6250205	65,07
15	5	0,90503	0,99580	0,99620	0,00380	95830	364	2,668	478301	5770489	60,22
20	5	0,90886	0,99408	0,99462	0,00538	95466	514	2,590	476091	5292188	55,44
25	5	0,85621	0,99278	0,99382	0,00618	94952	587	2,554	473324	4816097	50,72
30	5	0,80987	0,99129	0,99294	0,00706	94365	667	2,559	470197	4342773	46,02
35	5	0,73345	0,98871	0,99171	0,00829	93698	777	2,595	466623	3872576	41,33
40	5	0,70987	0,98457	0,98902	0,01098	92921	1020	2,659	462219	3405953	36,65
45	5	0,74780	0,97744	0,98308	0,01692	91901	1555	2,667	455879	2943734	32,03
50	5	0,74805	0,96661	0,97492	0,02508	90346	2266	2,675	446465	2487856	27,54
55	5	0,78567	0,95023	0,96068	0,03932	88081	3463	2,697	432428	2041390	23,18
60	5	0,83546	0,92207	0,93446	0,06554	84617	5545	2,695	410304	1608963	19,01
65	5	0,85921	0,87382	0,89057	0,10943	79072	8653	2,681	375291	1198659	15,16
70	5	0,88986	0,79424	0,81465	0,18535	70419	13052	2,638	321268	823367	11,69
75	5	0,91631	0,67572	0,69826	0,30174	57367	17310	2,597	245231	502099	8,75
80+		0,96162	0,00000	0,00000	1,00000	40057	40057	6,413	256868	256868	6,41

Table C.9. Associated single decrement life table for causes of death other than respiratory diseases, 2000 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,92844	0,96991	0,97203	0,02797	100000	2797	0,141	97598	7136952	71,37
1	4	0,82490	0,99263	0,99391	0,00609	97203	592	1,477	387320	7039354	72,42
5	5	0,90524	0,99674	0,99705	0,00295	96612	285	2,500	482345	6652034	68,85
10	5	0,92521	0,99738	0,99757	0,00243	96327	234	2,588	481069	6169689	64,05
15	5	0,95112	0,99580	0,99601	0,00399	96093	384	2,664	479568	5688620	59,20
20	5	0,94608	0,99408	0,99440	0,00560	95709	536	2,601	477259	5209052	54,43
25	5	0,93856	0,99278	0,99322	0,00678	95173	645	2,582	474304	4731794	49,72
30	5	0,95788	0,99129	0,99165	0,00835	94528	789	2,596	470742	4257490	45,04
35	5	0,95286	0,98871	0,98924	0,01076	93739	1008	2,620	466294	3786748	40,40
40	5	0,95789	0,98457	0,98521	0,01479	92730	1371	2,644	460420	3320454	35,81
45	5	0,94809	0,97744	0,97860	0,02140	91359	1955	2,656	452212	2860034	31,31
50	5	0,94904	0,96661	0,96829	0,03171	89404	2835	2,656	440374	2407822	26,93
55	5	0,94544	0,95023	0,95288	0,04712	86569	4079	2,666	423322	1967447	22,73
60	5	0,94412	0,92207	0,92626	0,07374	82489	6083	2,669	398266	1544125	18,72
65	5	0,92936	0,87382	0,88218	0,11782	76407	9002	2,661	360978	1145859	15,00
70	5	0,93296	0,79424	0,80660	0,19340	67405	13036	2,623	306037	784881	11,64
75	5	0,93604	0,67572	0,69288	0,30712	54369	16698	2,588	231566	478844	8,81
80+		0,93942	0,00000	0,00000	1,00000	37671	37671	6,564	247278	247278	6,56

Table C.10. Associated single decrement life table for causes of death other than infectious diseases, 2000 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,83432	0,96991	0,97483	0,02517	100000	2517	0,142	97842	7108626	71,09
1	4	0,81012	0,99263	0,99402	0,00598	97483	583	1,477	388462	7010784	71,92
5	5	0,87097	0,99674	0,99716	0,00284	96900	275	2,501	483814	6622322	68,34
10	5	0,92244	0,99738	0,99758	0,00242	96625	234	2,604	482567	6138507	63,53
15	5	0,96927	0,99580	0,99593	0,00407	96392	392	2,662	481040	5655941	58,68
20	5	0,94608	0,99408	0,99440	0,00560	95999	538	2,604	478708	5174900	53,91
25	5	0,96078	0,99278	0,99306	0,00694	95461	662	2,581	475705	4696192	49,19
30	5	0,96270	0,99129	0,99161	0,00839	94799	795	2,596	472084	4220487	44,52
35	5	0,96917	0,98871	0,98906	0,01094	94004	1028	2,622	467574	3748403	39,88
40	5	0,97500	0,98457	0,98495	0,01505	92975	1399	2,646	461583	3280829	35,29
45	5	0,97307	0,97744	0,97804	0,02196	91576	2011	2,660	453176	2819246	30,79
50	5	0,98549	0,96661	0,96709	0,03291	89565	2947	2,657	440921	2366070	26,42
55	5	0,98125	0,95023	0,95114	0,04886	86618	4232	2,666	423213	1925149	22,23
60	5	0,98526	0,92207	0,92318	0,07682	82385	6329	2,673	397198	1501937	18,23
65	5	0,98721	0,87382	0,87533	0,12467	76056	9482	2,659	358085	1104739	14,53
70	5	0,98992	0,79424	0,79608	0,20392	66574	13575	2,616	300511	746654	11,22
75	5	0,99128	0,67572	0,67804	0,32196	52999	17064	2,563	223413	446143	8,42
80+		0,99490	0,00000	0,00000	1,00000	35935	35935	6,198	222730	222730	6,20

Table C.11. Associated single decrement life table for causes of death other than injures, 2000 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,98761	0,96991	0,97028	0,02972	100000	2972	0,140	97445	7112044	71,12
1	4	0,90739	0,99263	0,99331	0,00669	97028	649	1,476	386471	7014599	72,29
5	5	0,83871	0,99674	0,99727	0,00273	96378	263	2,501	481233	6628128	68,77
10	5	0,84211	0,99738	0,99779	0,00221	96115	212	2,493	480042	6146896	63,95
15	5	0,63687	0,99580	0,99732	0,00268	95902	257	2,628	478904	5666854	59,09
20	5	0,65340	0,99408	0,99613	0,00387	95646	370	2,650	477359	5187950	54,24
25	5	0,76078	0,99278	0,99450	0,00550	95275	524	2,618	475129	4710592	49,44
30	5	0,80626	0,99129	0,99297	0,00703	94752	666	2,628	472178	4235463	44,70
35	5	0,87942	0,98871	0,99007	0,00993	94085	934	2,644	468225	3763284	40,00
40	5	0,91184	0,98457	0,98592	0,01408	93151	1312	2,666	462693	3295059	35,37
45	5	0,95544	0,97744	0,97844	0,02156	91839	1980	2,666	454574	2832365	30,84
50	5	0,96355	0,96661	0,96781	0,03219	89859	2892	2,660	442527	2377791	26,46
55	5	0,97146	0,95023	0,95161	0,04839	86966	4208	2,671	425031	1935264	22,25
60	5	0,98344	0,92207	0,92331	0,07669	82758	6347	2,674	399032	1510233	18,25
65	5	0,98673	0,87382	0,87538	0,12462	76412	9522	2,659	359768	1111201	14,54
70	5	0,98803	0,79424	0,79643	0,20357	66890	13617	2,616	301991	751433	11,23
75	5	0,98962	0,67572	0,67848	0,32152	53273	17128	2,564	224640	449442	8,44
80+		0,99148	0,00000	0,00000	1,00000	36145	36145	6,219	224802	224802	6,22

Table C.12. Associated single decrement life table for causes of death other than other diseases, 2000 females

x	n	R^{-i}	$_np_x$	$_np_x^{-i}$	$_nq_x^{-i}$	l_x^{-i}	$_nd_x^{-i}$	$_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,28489	0,96991	0,99133	0,00867	100000	867	0,150	99263	7513236	75,13
1	4	0,74786	0,99263	0,99448	0,00552	99133	547	1,477	395153	7413973	74,79
5	5	0,75605	0,99674	0,99754	0,00246	98586	243	2,501	492324	7018820	71,19
10	5	0,72853	0,99738	0,99809	0,00191	98343	188	2,591	491263	6526496	66,36
15	5	0,78911	0,99580	0,99669	0,00331	98155	325	2,675	490020	6035233	61,49
20	5	0,79589	0,99408	0,99528	0,00472	97830	461	2,605	488044	5545213	56,68
25	5	0,79216	0,99278	0,99428	0,00572	97369	557	2,577	485493	5057169	51,94
30	5	0,79061	0,99129	0,99310	0,00690	96811	668	2,610	482461	4571676	47,22
35	5	0,83681	0,98871	0,99055	0,00945	96144	909	2,639	478573	4089215	42,53
40	5	0,86711	0,98457	0,98660	0,01340	95235	1276	2,653	473180	3610641	37,91
45	5	0,86974	0,97744	0,98035	0,01965	93959	1846	2,658	465472	3137461	33,39
50	5	0,86837	0,96661	0,97094	0,02906	92113	2676	2,659	454300	2671989	29,01
55	5	0,87073	0,95023	0,95652	0,04348	89437	3889	2,665	438102	2217689	24,80
60	5	0,85821	0,92207	0,93274	0,06726	85548	5754	2,674	414357	1779587	20,80
65	5	0,85592	0,87382	0,89097	0,10903	79794	8700	2,653	378548	1365230	17,11
70	5	0,81247	0,79424	0,82930	0,17070	71094	12136	2,615	326521	986682	13,88
75	5	0,77105	0,67572	0,73917	0,26083	58958	15378	2,660	258812	660161	11,20
80+		0,66958	0,00000	0,00000	1,00000	43580	43580	9,209	401350	401350	9,21

Table C.13. Associated single decrement life table for causes of death other than cardiovascular diseases, 2008 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,81477	0,98654	0,98902	0,01098	100000	1098	0,082	98992	8335432	83,35
1	4	0,65702	0,99838	0,99893	0,00107	98902	106	1,613	395356	8236439	83,28
5	5	0,67586	0,99871	0,99913	0,00087	98796	86	2,501	493767	7841084	79,37
10	5	0,70551	0,99886	0,99919	0,00081	98710	80	2,727	493370	7347317	74,43
15	5	0,73477	0,99761	0,99825	0,00175	98631	173	2,706	492756	6853947	69,49
20	5	0,77665	0,99672	0,99745	0,00255	98458	251	2,555	491674	6361191	64,61
25	5	0,77446	0,99686	0,99757	0,00243	98207	239	2,498	490435	5869516	59,77
30	5	0,71767	0,99647	0,99747	0,00253	97968	248	2,554	489230	5379082	54,91
35	5	0,65302	0,99524	0,99689	0,00311	97719	304	2,640	487880	4889851	50,04
40	5	0,59617	0,99221	0,99535	0,00465	97416	453	2,719	486045	4401971	45,19
45	5	0,55363	0,98550	0,99195	0,00805	96963	781	2,746	483053	3915927	40,39
50	5	0,55132	0,97424	0,98572	0,01428	96182	1374	2,735	477798	3432874	35,69
55	5	0,52461	0,95364	0,97540	0,02460	94808	2332	2,716	468713	2955076	31,17
60	5	0,52709	0,92371	0,95903	0,04097	92476	3789	2,694	453645	2486364	26,89
65	5	0,51147	0,87473	0,93384	0,06616	88687	5868	2,677	429805	2032719	22,92
70	5	0,49602	0,79800	0,89411	0,10589	82820	8770	2,651	393495	1602913	19,35
75	5	0,47822	0,68611	0,83514	0,16486	74050	12208	2,777	343116	1209418	16,33
80+		0,46415	0,00000	0,00000	1,00000	61842	61842	14,008	866302	866302	14,01

Table C.14. Associated single decrement life table for causes of death other than cancers, 2008 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,99037	0,98654	0,98667	0,01333	100000	1333	0,081	98775	7631684	76,32
1	4	0,95592	0,99838	0,99845	0,00155	98667	153	1,613	394302	7532909	76,35
5	5	0,90400	0,99871	0,99883	0,00117	98514	115	2,500	492281	7138607	72,46
10	5	0,88693	0,99886	0,99899	0,00101	98399	100	2,713	491766	6646326	67,54
15	5	0,92561	0,99761	0,99779	0,00221	98299	217	2,688	490993	6154560	62,61
20	5	0,91793	0,99672	0,99699	0,00301	98082	295	2,547	489685	5663567	57,74
25	5	0,92481	0,99686	0,99709	0,00291	97786	284	2,507	488224	5173882	52,91
30	5	0,88757	0,99647	0,99687	0,00313	97502	305	2,575	486770	4685658	48,06
35	5	0,85251	0,99524	0,99594	0,00406	97197	394	2,659	485061	4198888	43,20
40	5	0,80465	0,99221	0,99373	0,00627	96803	607	2,727	482633	3713827	38,36
45	5	0,75535	0,98550	0,98903	0,01097	96196	1055	2,730	478582	3231194	33,59
50	5	0,72027	0,97424	0,98138	0,01862	95140	1772	2,749	471713	2752612	28,93
55	5	0,72757	0,95364	0,96605	0,03395	93369	3170	2,716	459603	2280899	24,43
60	5	0,72658	0,92371	0,94397	0,05603	90199	5054	2,711	439424	1821296	20,19
65	5	0,76447	0,87473	0,90275	0,09725	85145	8281	2,691	406606	1381872	16,23
70	5	0,79698	0,79800	0,83541	0,16459	76864	12651	2,650	354586	975267	12,69
75	5	0,83713	0,68611	0,72952	0,27048	64213	17368	2,629	279877	620680	9,67
80+		0,89371	0,00000	0,00000	1,00000	46845	46845	7,275	340803	340803	7,28

Table C.15. Associated single decrement life table for causes of death other than respiratory diseases, 2008 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,86451	0,98654	0,98835	0,01165	100000	1165	0,082	98931	7549326	75,49
1	4	0,87246	0,99838	0,99858	0,00142	98835	140	1,613	395007	7450396	75,38
5	5	0,89791	0,99871	0,99884	0,00116	98695	114	2,500	493191	7055389	71,49
10	5	0,89725	0,99886	0,99897	0,00103	98581	101	2,721	492674	6562198	66,57
15	5	0,94362	0,99761	0,99775	0,00225	98480	222	2,694	491887	6069524	61,63
20	5	0,95260	0,99672	0,99687	0,00313	98258	307	2,549	490537	5577637	56,77
25	5	0,95238	0,99686	0,99701	0,00299	97951	293	2,517	489026	5087099	51,94
30	5	0,95939	0,99647	0,99661	0,00339	97658	331	2,591	487492	4598073	47,08
35	5	0,94368	0,99524	0,99551	0,00449	97327	437	2,683	485623	4110581	42,23
40	5	0,94513	0,99221	0,99264	0,00736	96890	713	2,755	482850	3624958	37,41
45	5	0,93819	0,98550	0,98639	0,01361	96177	1309	2,746	477936	3142108	32,67
50	5	0,92450	0,97424	0,97616	0,02384	94868	2261	2,744	469239	2664173	28,08
55	5	0,91923	0,95364	0,95730	0,04270	92607	3954	2,705	453960	2194934	23,70
60	5	0,90709	0,92371	0,93054	0,06946	88653	6158	2,679	428969	1740974	19,64
65	5	0,88693	0,87473	0,88807	0,11193	82495	9234	2,658	390852	1312005	15,90
70	5	0,87835	0,79800	0,82021	0,17979	73261	13172	2,619	334943	921153	12,57
75	5	0,86727	0,68611	0,72129	0,27871	60090	16748	2,616	260518	586210	9,76
80+		0,86525	0,00000	0,00000	1,00000	43342	43342	7,515	325692	325692	7,51

Table C.16. Associated single decrement life table for causes of death other than infectious diseases, 2008 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,88648	0,98654	0,98806	0,01194	100000	1194	0,082	98904	7432866	74,33
1	4	0,89718	0,99838	0,99854	0,00146	98806	144	1,613	394880	7333962	74,23
5	5	0,93218	0,99871	0,99880	0,00120	98662	119	2,500	493013	6939082	70,33
10	5	0,95563	0,99886	0,99891	0,00109	98543	108	2,713	492470	6446069	65,41
15	5	0,97548	0,99761	0,99767	0,00233	98436	229	2,689	491648	5953599	60,48
20	5	0,97773	0,99672	0,99679	0,00321	98206	315	2,548	490260	5461951	55,62
25	5	0,98235	0,99686	0,99691	0,00309	97891	302	2,516	488706	4971691	50,79
30	5	0,98076	0,99647	0,99654	0,00346	97589	338	2,593	487133	4482985	45,94
35	5	0,97955	0,99524	0,99534	0,00466	97251	453	2,685	485208	3995852	41,09
40	5	0,98049	0,99221	0,99236	0,00764	96798	739	2,759	482335	3510644	36,27
45	5	0,98533	0,98550	0,98571	0,01429	96059	1372	2,753	477212	3028308	31,53
50	5	0,98587	0,97424	0,97460	0,02540	94687	2405	2,747	468017	2551096	26,94
55	5	0,98780	0,95364	0,95419	0,04581	92282	4227	2,709	451723	2083079	22,57
60	5	0,98781	0,92371	0,92460	0,07540	88054	6639	2,684	424893	1631356	18,53
65	5	0,98732	0,87473	0,87622	0,12378	81415	10078	2,657	383468	1206463	14,82
70	5	0,98800	0,79800	0,80016	0,19984	71338	14256	2,612	322648	822995	11,54
75	5	0,98926	0,68611	0,68889	0,31111	57082	17759	2,564	242141	500347	8,77
80+		0,99020	0,00000	0,00000	1,00000	39323	39323	6,566	258205	258205	6,57

Table C.17. Associated single decrement life table for causes of death other than injures, 2008 males

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,98399	0,98654	0,98675	0,01325	100000	1325	0,081	98783	7451346	74,51
1	4	0,91586	0,99838	0,99851	0,00149	98675	147	1,613	394351	7352563	74,51
5	5	0,89346	0,99871	0,99885	0,00115	98529	114	2,500	492359	6958212	70,62
10	5	0,87452	0,99886	0,99900	0,00100	98415	98	2,612	491840	6465852	65,70
15	5	0,70962	0,99761	0,99831	0,00169	98317	166	2,626	491188	5974012	60,76
20	5	0,61865	0,99672	0,99797	0,00203	98150	199	2,538	490260	5482824	55,86
25	5	0,65812	0,99686	0,99793	0,00207	97951	203	2,557	489259	4992565	50,97
30	5	0,73942	0,99647	0,99739	0,00261	97748	255	2,637	488137	4503306	46,07
35	5	0,79905	0,99524	0,99620	0,00380	97493	371	2,734	486625	4015169	41,18
40	5	0,88725	0,99221	0,99309	0,00691	97122	671	2,790	484127	3528544	36,33
45	5	0,93240	0,98550	0,98648	0,01352	96451	1304	2,771	479348	3044417	31,56
50	5	0,96701	0,97424	0,97508	0,02492	95147	2371	2,755	470409	2565069	26,96
55	5	0,97704	0,95364	0,95468	0,04532	92775	4205	2,712	454258	2094660	22,58
60	5	0,98415	0,92371	0,92487	0,07513	88571	6655	2,686	427452	1640402	18,52
65	5	0,98654	0,87473	0,87631	0,12369	81916	10132	2,659	385857	1212951	14,81
70	5	0,98966	0,79800	0,79986	0,20014	71784	14367	2,612	324617	827094	11,52
75	5	0,99013	0,68611	0,68866	0,31134	57417	17876	2,563	243527	502476	8,75
80+		0,99283	0,00000	0,00000	1,00000	39541	39541	6,549	258950	258950	6,55

Table C.18. Associated single decrement life table for causes of death other than other diseases, 2008 males

x	n	R^{-i}	$_np_x$	$_np_x^{-i}$	$_nq_x^{-i}$	l_x^{-i}	$_nd_x^{-i}$	$_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,45988	0,98654	0,99379	0,00621	100000	621	0,085	99431	7680914	76,81
1	4	0,70156	0,99838	0,99886	0,00114	99379	113	1,613	397245	7581483	76,29
5	5	0,69659	0,99871	0,99910	0,00090	99266	89	2,500	496104	7184238	72,37
10	5	0,68016	0,99886	0,99922	0,00078	99176	77	2,713	495705	6688134	67,44
15	5	0,71091	0,99761	0,99830	0,00170	99099	168	2,709	495110	6192429	62,49
20	5	0,75644	0,99672	0,99752	0,00248	98931	246	2,544	494051	5697319	57,59
25	5	0,70787	0,99686	0,99777	0,00223	98685	220	2,503	492878	5203268	52,73
30	5	0,71520	0,99647	0,99748	0,00252	98466	249	2,618	491736	4710390	47,84
35	5	0,77218	0,99524	0,99633	0,00367	98217	361	2,703	490256	4218653	42,95
40	5	0,78631	0,99221	0,99387	0,00613	97856	600	2,784	487952	3728397	38,10
45	5	0,83510	0,98550	0,98788	0,01212	97256	1179	2,767	483650	3240445	33,32
50	5	0,85102	0,97424	0,97804	0,02196	96078	2110	2,756	475653	2756795	28,69
55	5	0,86375	0,95364	0,95983	0,04017	93967	3775	2,715	461209	2281142	24,28
60	5	0,86728	0,92371	0,93349	0,06651	90192	5999	2,688	437091	1819933	20,18
65	5	0,86326	0,87473	0,89089	0,10911	84193	9186	2,661	399481	1382841	16,42
70	5	0,85098	0,79800	0,82529	0,17471	75007	13104	2,620	343851	983360	13,11
75	5	0,83799	0,68611	0,72928	0,27072	61902	16758	2,628	269766	639510	10,33
80+		0,79386	0,00000	0,00000	1,00000	45144	45144	8,190	369744	369744	8,19

Table C.19. Associated single decrement life table for causes of death other than cardiovascular diseases, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,81559	0,99032	0,99210	0,00790	100000	790	0,080	99273	8893362	88,93
1	4	0,63616	0,99884	0,99926	0,00074	99210	73	1,509	396657	8794089	88,64
5	5	0,66884	0,99931	0,99954	0,00046	99137	46	2,500	495570	8397432	84,71
10	5	0,68420	0,99942	0,99960	0,00040	99091	39	2,645	495363	7901862	79,74
15	5	0,73382	0,99899	0,99926	0,00074	99052	73	2,687	495090	7406498	74,77
20	5	0,72404	0,99853	0,99894	0,00106	98979	105	2,624	494644	6911409	69,83
25	5	0,71641	0,99809	0,99863	0,00137	98874	135	2,598	494043	6416765	64,90
30	5	0,67273	0,99746	0,99829	0,00171	98738	169	2,616	493288	5922722	59,98
35	5	0,61863	0,99623	0,99767	0,00233	98569	230	2,680	492313	5429434	55,08
40	5	0,60572	0,99384	0,99627	0,00373	98340	367	2,710	490856	4937121	50,20
45	5	0,55637	0,98903	0,99388	0,00612	97972	599	2,693	488478	4446264	45,38
50	5	0,53001	0,98222	0,99054	0,00946	97373	921	2,691	484737	3957786	40,65
55	5	0,51048	0,97087	0,98502	0,01498	96452	1445	2,679	478906	3473049	36,01
60	5	0,46713	0,95185	0,97721	0,02279	95007	2165	2,710	470078	2994144	31,51
65	5	0,43802	0,91301	0,96092	0,03908	92842	3628	2,718	455930	2524066	27,19
70	5	0,41279	0,84592	0,93326	0,06674	89214	5954	2,704	432397	2068136	23,18
75	5	0,39299	0,73610	0,88656	0,11344	83260	9445	2,829	395791	1635739	19,65
80+		0,40623	0,00000	0,00000	1,00000	73815	73815	16,798	1239948	1239948	16,80

Table C.20. Associated single decrement life table for causes of death other than cancers, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,98550	0,99032	0,99046	0,00954	100000	954	0,079	99121	7870425	78,70
1	4	0,96209	0,99884	0,99889	0,00111	99046	110	1,508	395910	7771304	78,46
5	5	0,91443	0,99931	0,99937	0,00063	98936	62	2,500	494524	7375394	74,55
10	5	0,90695	0,99942	0,99947	0,00053	98874	52	2,615	494244	6880870	69,59
15	5	0,91552	0,99899	0,99908	0,00092	98821	91	2,676	493896	6386627	64,63
20	5	0,88988	0,99853	0,99870	0,00130	98730	129	2,611	493345	5892731	59,69
25	5	0,84724	0,99809	0,99838	0,00162	98602	160	2,586	492623	5399387	54,76
30	5	0,77938	0,99746	0,99802	0,00198	98442	195	2,619	491745	4906764	49,84
35	5	0,73235	0,99623	0,99724	0,00276	98247	271	2,676	490604	4415019	44,94
40	5	0,70168	0,99384	0,99568	0,00432	97976	424	2,734	488919	3924414	40,05
45	5	0,69767	0,98903	0,99233	0,00767	97552	748	2,728	486062	3435495	35,22
50	5	0,72067	0,98222	0,98716	0,01284	96804	1243	2,731	481201	2949433	30,47
55	5	0,76176	0,97087	0,97773	0,02227	95561	2128	2,737	472990	2468233	25,83
60	5	0,81033	0,95185	0,96080	0,03920	93433	3662	2,754	458940	1995243	21,35
65	5	0,83806	0,91301	0,92657	0,07343	89771	6592	2,742	433967	1536303	17,11
70	5	0,87309	0,84592	0,86408	0,13592	83179	11306	2,699	389883	1102337	13,25
75	5	0,90491	0,73610	0,75786	0,24214	71873	17403	2,658	318601	712454	9,91
80+		0,94375	0,00000	0,00000	1,00000	54470	54470	7,231	393853	393853	7,23

Table C.21. Associated single decrement life table for causes of death other than respiratory diseases, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,86572	0,99032	0,99161	0,00839	100000	839	0,080	99228	7834460	78,34
1	4	0,86769	0,99884	0,99900	0,00100	99161	99	1,508	396398	7735231	78,01
5	5	0,88221	0,99931	0,99939	0,00061	99062	60	2,500	495160	7338833	74,08
10	5	0,90314	0,99942	0,99947	0,00053	99002	52	2,626	494886	6843674	69,13
15	5	0,92041	0,99899	0,99907	0,00093	98950	92	2,685	494537	6348788	64,16
20	5	0,92060	0,99853	0,99865	0,00135	98858	133	2,629	493975	5854251	59,22
25	5	0,92290	0,99809	0,99824	0,00176	98725	174	2,624	493210	5360276	54,30
30	5	0,94586	0,99746	0,99760	0,00240	98551	237	2,654	492197	4867065	49,39
35	5	0,94368	0,99623	0,99645	0,00355	98314	349	2,695	490763	4374868	44,50
40	5	0,93363	0,99384	0,99425	0,00575	97964	563	2,741	488549	3884105	39,65
45	5	0,93545	0,98903	0,98973	0,01027	97401	1000	2,720	484725	3395555	34,86
50	5	0,94342	0,98222	0,98322	0,01678	96401	1618	2,699	478284	2910830	30,19
55	5	0,92126	0,97087	0,97314	0,02686	94784	2546	2,701	468065	2432546	25,66
60	5	0,91615	0,95185	0,95580	0,04420	92237	4077	2,731	451935	1964481	21,30
65	5	0,91757	0,91301	0,91989	0,08011	88160	7063	2,717	424674	1512547	17,16
70	5	0,90679	0,84592	0,85922	0,14078	81098	11417	2,679	378984	1087873	13,41
75	5	0,90321	0,73610	0,75826	0,24174	69681	16845	2,658	308957	708889	10,17
80+		0,90153	0,00000	0,00000	1,00000	52836	52836	7,569	399932	399932	7,57

Table C.22. Associated single decrement life table for causes of death other than infectious diseases, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,88776	0,99032	0,99140	0,00860	100000	860	0,080	99209	7749903	77,50
1	4	0,89814	0,99884	0,99896	0,00104	99140	103	1,508	396304	7650695	77,17
5	5	0,90194	0,99931	0,99938	0,00062	99037	61	2,500	495033	7254390	73,25
10	5	0,93462	0,99942	0,99946	0,00054	98976	54	2,638	494752	6759358	68,29
15	5	0,97698	0,99899	0,99902	0,00098	98922	97	2,688	494385	6264606	63,33
20	5	0,97499	0,99853	0,99857	0,00143	98825	141	2,630	493789	5770221	58,39
25	5	0,98048	0,99809	0,99813	0,00187	98684	185	2,616	492977	5276431	53,47
30	5	0,97758	0,99746	0,99752	0,00248	98499	245	2,648	491917	4783454	48,56
35	5	0,96970	0,99623	0,99635	0,00365	98254	359	2,701	490445	4291537	43,68
40	5	0,98009	0,99384	0,99397	0,00603	97895	591	2,743	488142	3801092	38,83
45	5	0,98139	0,98903	0,98923	0,01077	97304	1048	2,715	484128	3312950	34,05
50	5	0,97721	0,98222	0,98262	0,01738	96257	1672	2,706	477447	2828823	29,39
55	5	0,98109	0,97087	0,97142	0,02858	94584	2704	2,706	466719	2351376	24,86
60	5	0,98196	0,95185	0,95270	0,04730	91881	4346	2,730	449538	1884657	20,51
65	5	0,98502	0,91301	0,91426	0,08574	87534	7505	2,717	420541	1435120	16,39
70	5	0,98662	0,84592	0,84782	0,15218	80029	12179	2,675	371827	1014579	12,68
75	5	0,98785	0,73610	0,73884	0,26116	67850	17719	2,629	297241	642752	9,47
80+		0,99010	0,00000	0,00000	1,00000	50131	50131	6,892	345511	345511	6,89

Table C.23. Associated single decrement life table for causes of death other than injures, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,98216	0,99032	0,99049	0,00951	100000	951	0,079	99124	7746581	77,47
1	4	0,92301	0,99884	0,99893	0,00107	99049	106	1,508	395933	7647457	77,21
5	5	0,91694	0,99931	0,99937	0,00063	98944	62	2,500	494562	7251524	73,29
10	5	0,84864	0,99942	0,99951	0,00049	98881	49	2,535	494285	6756962	68,33
15	5	0,71060	0,99899	0,99929	0,00071	98832	71	2,682	493998	6262677	63,37
20	5	0,76203	0,99853	0,99888	0,00112	98762	110	2,654	493549	5768679	58,41
25	5	0,80738	0,99809	0,99846	0,00154	98651	152	2,645	492898	5275130	53,47
30	5	0,86578	0,99746	0,99780	0,00220	98499	217	2,680	491992	4782232	48,55
35	5	0,91622	0,99623	0,99655	0,00345	98282	339	2,717	490637	4290240	43,65
40	5	0,94393	0,99384	0,99419	0,00581	97943	569	2,753	488437	3799603	38,79
45	5	0,96516	0,98903	0,98941	0,01059	97374	1031	2,723	484521	3311166	34,00
50	5	0,97677	0,98222	0,98263	0,01737	96343	1673	2,709	477880	2826645	29,34
55	5	0,98335	0,97087	0,97135	0,02865	94669	2712	2,708	467131	2348765	24,81
60	5	0,98978	0,95185	0,95233	0,04767	91957	4383	2,730	449835	1881634	20,46
65	5	0,99072	0,91301	0,91378	0,08622	87574	7550	2,717	420634	1431799	16,35
70	5	0,99377	0,84592	0,84681	0,15319	80024	12259	2,674	371602	1011165	12,64
75	5	0,99356	0,73610	0,73755	0,26245	67765	17785	2,627	296623	639563	9,44
80+		0,99452	0,00000	0,00000	1,00000	49980	49980	6,862	342940	342940	6,86

Table C.24. Associated single decrement life table for causes of death other than other diseases, 2008 females

x	n	R^{-i}	${}_np_x$	${}_np_x^{-i}$	${}_nq_x^{-i}$	l_x^{-i}	${}_nd_x^{-i}$	${}_na_x^{-i}$	L_x^{-i}	T_x^{-i}	e_x^{-i}
0	1	0,46328	0,99032	0,99550	0,00450	100000	450	0,081	99587	8012083	80,12
1	4	0,71292	0,99884	0,99918	0,00082	99550	82	1,509	397997	7912496	79,48
5	5	0,71564	0,99931	0,99951	0,00049	99468	49	2,500	497219	7514499	75,55
10	5	0,72246	0,99942	0,99958	0,00042	99419	42	2,626	496998	7017280	70,58
15	5	0,74267	0,99899	0,99925	0,00075	99378	74	2,680	496716	6520282	65,61
20	5	0,72846	0,99853	0,99893	0,00107	99303	106	2,625	496265	6023566	60,66
25	5	0,72558	0,99809	0,99861	0,00139	99197	138	2,629	495660	5527301	55,72
30	5	0,75866	0,99746	0,99807	0,00193	99060	191	2,683	494856	5031641	50,79
35	5	0,81941	0,99623	0,99691	0,00309	98869	305	2,716	493646	4536786	45,89
40	5	0,83495	0,99384	0,99486	0,00514	98563	507	2,757	491680	4043140	41,02
45	5	0,86397	0,98903	0,99051	0,00949	98056	930	2,716	488158	3551460	36,22
50	5	0,85191	0,98222	0,98484	0,01516	97126	1473	2,701	482246	3063301	31,54
55	5	0,84206	0,97087	0,97542	0,02458	95654	2352	2,703	472866	2581056	26,98
60	5	0,83465	0,95185	0,95965	0,04035	93302	3765	2,731	457966	2108189	22,60
65	5	0,83061	0,91301	0,92720	0,07280	89537	6519	2,723	432840	1650223	18,43
70	5	0,82695	0,84592	0,87078	0,12922	83019	10728	2,684	390252	1217382	14,66
75	5	0,81747	0,73610	0,77844	0,22156	72291	16017	2,687	324414	827130	11,44
80+		0,76387	0,00000	0,00000	1,00000	56274	56274	8,933	502717	502717	8,93