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Israel and the Czech Republic: Comparative Study of Selected Health Indicators

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Contents

1. Summary 4
2. Introduction 4
3. Survey of literature 5
4. Aim of the research 5
5. Methods 5
6. Materials 6
7. Results 7
7.1 Demographics 7
7.2 Mortality 9
7.2.1 Life expectancy 9
7.2.2 Infant mortality 11
7.2.3 Rate of death 12
7.2.4 Leading causes of death 13
7.3 Morbidity and burden of disease 28
7.4 Lifestyle factors 32
7.4.1 Smoking 32
7.4.2 Alcohol 34
7.4.3 Overweight 35
7.5 Health Care Resources 37
7.5.1 Hospitals 37
7.5.2 Health care beds 37
7.5.3 Health care personnel 41
7.6 Health care utilization 43
7.7 Health care expenditure 48
8. Discussion 50
9. Conclusions and recommendations 52
10. References 52
11. Bibliography 53

Figures

Figure 1 - Age-sex distribution in the Czech Republic and Israel, 2006 8
Figure 2 - Age groups distribution of the Czech and Israeli populations 8
Figure 3 - Life expectancy at birth, all population 10
Figure 4 - Male life expectancy at birth 10
Figure 5 - Female life expectancy at birth 11
Figure 6 - Infant mortality per 1000 live births 12
Figure 7 - SDR from all causes, all ages, per 100,000 13
Figure 8 - SDR from cardiovascular diseases, all ages per 100,000 15
Figure 9 - SDR from ischaemic heart disease, all ages per 100,000 16
Figure 10 - SDR from cerebrovascular diseases, all ages per 100,000 17
Figure 11 - SDR from malignant neoplasms, all ages per 100,000 18
Figure 12 - Cancer incidence per 100,000 18
Figure 13 - SDR from malignant neoplasm of trachea, bronchus and lung, males, per 100,000 19

Figure 14 - SDR from malignant neoplasm of trachea, bronchus and lung, females, per 100,000 20
Figure 15 - SDR from malignant neoplasm of colon, rectum and anus, males, per 100,000 21
Figure 16 - SDR from malignant neoplasm of colon, rectum and anus, females, per 100,000 ... 21
Figure 17 - SDR from Malignant neoplasm of breast, females, per 100,000 22
Figure 18 - SDR from malignant neoplasm of prostate, per 100,000 23
Figure 19 - SDR from external causes, all ages per 100,000 24
Figure 20 - SDR from accidental falls, per 100,000 24
Figure 21 - SDR from suicide and self-inflicted injury, all ages per 100,000 25
Figure 22 - SDR from motor vehicle traffic accidents, all ages per 100,000 26
Figure 23 - SDR from homicide and intentional injury, per 100,000 27
Figure 24 - SDR from diabetes, all ages, per 100,000 28
Figure 25 - Hospital discharges per 100,000, latest data 31
Figure 26 - Smoking prevalence in adults (%) 33
Figure 27 - Percentage of regular daily smokers in the population, age 15+ 33
Figure 28 - Smoking prevalence in young people (%) 34
Figure 29 - Pure alcohol consumption, liters per capita 35
Figure 30 - Road traffic accidents involving alcohol per 100,000 35
Figure 31 - Distribution of overweight in the adult Israeli and Czech population 36
Figure 32 - Hospital beds per 100,000 38
Figure 33 - Acute care hospital beds per 100,000 39
Figure 34 - Psychiatric hospital beds per 100,000 40
Figure 35 - Nursing and elderly home beds per 100,000 41
Figure 36 - Physicians per 100,000 42
Figure 37 - Nurses per 100,000 43
Figure 38 - Outpatient contacts per person per year 44
Figure 39 - In-patient care admissions per 100 44
Figure 40 - Average length of stay, all hospitals 45
Figure 41 - Average length of stay, acute care hospitals only 45
Figure 42 - Bed occupancy rate in %, acute care hospitals only 46
Figure 43 - Health expenditure as percentage of GDP (2005) 49
Figure 44 - Health expenditure in PPP$ per capita (2005) 50

Tables

Table 1 - Selected mortality in the Czech Republic and Israel compared with EU-15 averages 14
Table 2 - Ten leading disability groups as precentages of total DALYs for both sexes in the Czech Republic and Israel 29
Table 3 - Vaccination schedule, percentage of target population vaccinated and incidence of vaccine-preventable diseases 47

1. Summary

The aim of this research is to compare the health status and overall level of health care between the Czech Republic and Israel, and to compare both countries to a standard reference group in the form of the EU-15. To this end, we present and compare demographic indices, life expectancy, age standardized death rates (SDR) by categories, infant mortality rates, burden of disease, hospital discharges, lifestyle factors (smoking, alcohol consumption and overweight), hospital beds, health care personnel and utilization, and finally, health expenditure. The data is organized in tables and time trend graphs. Values are compared and time trends are elaborated. When relevant, the data is presented for the two genders separately.

The major findings of this work are: demographically, the population structure of the two countries differs; Israel has a younger population with a high fertility rate while the Czech population is older with a low fertility rate. Life expectancy, while improving, is still 4 years lower in the Czech Republic than in Israel. Further, population standardized death rate (SDR) from all causes is more than 45% higher in the Czech Republic. This constitutes a 17 year lag of the Czech Republic behind Israel in life expectancy and SDR. The excess mortality in the Czech Republic compared to Israel and the EU-15 is concentrated mainly in cardiovascular diseases and cancers. External causes of death and diseases of the digestive system also contribute to the excess mortality, but less profoundly.

I also found that the Czech Republic has higher alcohol consumption, higher smoking prevalence among young people, a lower long-term health care hospital and bed rate, a lower nursing and elderly home bed rate, consequent lower average length of stay in long-term hospitals, and lower expenditure on health, all of which adversely influence health status and health care, and help account for the 17 year lag of the Czech Republic in life expectancy and SDR.

Most Israeli health indices equal that of the EU-15 and are improving in time. While the Czech Republic indices are less favorable than those of Israel they exhibit a faster improving trend that started in the early 1990s.

I conclude that also there is an improving trend in the Czech health status since the early 1990s, the Czech health status lags behind that of Israel and the EU-15, and that the Israeli health status compares favorably with that of the EU-15.

2. Introduction

As an Israeli medical student undertaking my studies in the Czech Republic I decided to compare the health status and overall level of health care in the Czech Republic with that of Israel, in order to see if there are major differences in these areas between the countries, and to possibly identify the causes of those differences.

To accomplish that, I compared selected health indicators from both countries. In order to place the results within a historical trend I included, where possible, data since 1970.

I also included, where possible, the average of the European Union (EU) members before May 2004 (EU-15), in order to have a standard reference group to which both countries can be compared.

By using a wide range of indicators that deal with demographics, mortality, morbidity, lifestyle factors and health care resources, utilization and expenditure; I explore whether there are significant differences in the health status and care between the countries and explain the emerging differences.

3. Survey of literature

This work follows the literature that describes and compares the health status and overall level of health care between Israel and the OECD members as was done by Kaidar N, Bin Nun G in “International comparison of health care systems: Israel and OECD member states 1970-2005”. Also referenced are the “Czech Health Statistics Yearbook 2006” and the “Health in Israel – selected data” publications, which use health indicators in their “international comparison” chapters.

4. Aim of the research

The aim of the research is to compare the health status and overall level of health care between the Czech Republic and Israel, and to compare both countries to a standard reference group in the form of the EU-15.

5. Methods

In order to compare the health status and overall level of health care in the two countries, I examined selected health indicators over time. Health indicators are standardized measures used to compare health status and health system performance and characteristics between different geographical and political areas. By absolute, relative, and time trend comparison between these geographical and political areas we can spot problematic issues in the health status and health care performance. This in turn is used for policy making in order to improve those problematic issues as part of the ongoing process of improvement of the health system.

Because each indicator measures only one aspect of the health status or health care performance there isn't one single indicator that can approximate the true health level of the population. For example: The index of longevity, life expectancy, doesn't account for years "lost" to ill conditions. Or, the number of hospitalization beds per capita and the true expenditure on health, although correlated positively with better care systems, don't take in account demographical and habitual practices that may inflict overall poor health conditions.

Health indicators were chosen to cover different aspects of health status and the health care system and include demographic indicators (fertility rate, age distribution), mortality indicators (life expectancy, infant mortality, rate of death from all causes, rate of death from specific causes), morbidity indicators (disability-adjusted life year data, hospital

discharge data), lifestyle factors (overweight, smoking, alcohol consumption), health care resources indicators (hospitals, beds, physician and nurse rates), utilization indicators (outpatient contacts, admission rate, average length of stay, vaccination) and expenditure indicators (expenditure as a percentage of GDP, expenditure per capita, public and private expenditure distribution).

To make the comparisons as valid as possible, data for each indicator have been taken from one common international source to ensure that they have been harmonized in a reasonably consistent way.

The EU-15 average data was also collected in order to have a standard reference group to assess the comparative strengths and weaknesses of the Czech Republic and Israel. The EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom. The EU-15 was used as a reference group because all those countries are developed and modern countries, like the Czech Republic and Israel, and because they are used frequently for international comparison, for example in the WHO “Highlights on health” reports. However, the EU-15 data was not always available, so is missing in some comparative areas.

The comparison was made usually using the latest data available, the result being that comparisons are not always in the same years. The latest year for which data are available in the databases used is 2006. Some countries provide data with certain delays.

The information is presented mainly in descriptive statistics and graphs. Graphs have usually been used to show time trends from 1970 onwards in order to track the trends of the indicators. These graphs present the trends for both the Czech Republic and Israel and for the EU-15.

Case ascertainment, recording and classification practices (using the ninth and tenth revisions of the International Statistical Classification of Diseases and Related Health Problems: ICD9 and ICD10, respectively), along with culture and language, can influence data and therefore comparability across countries.

6. **Materials**

The data was collected mainly from the WHO Regional Office for Europe on-line databases - “European Health for All database” and “European mortality database”.

In addition, the WHO on-line database - “Global Database on Body Mass Index” and the WHO Regional Office for Europe database – “Tobacco control database” were used.

The “OECD Health Data” database was not used because Israel is not part of the OECD and doesn’t appear in the Database. However, a paper by Kaidar N and Bin Nun G., “International comparison of health care system: Israel and OECD member states 1970-2005”, which compares Israel to the Organisation for Economic Co-operation and Development (OECD) members was used.

Data about burden of disease were taken from the WHO Regional Office for Europe, “Highlights on health” publications.

7. Results

7.1 Demographics

The estimated population of Israel was 7.12 million in 2006[1]. Population density is among the highest of all developed countries (335 people per square kilometer), with over 60% of the population concentrated along the Mediterranean Sea and only 8.4% in rural areas[2].

Israel’s population has been growing in the last 35 years, and in recent years, the annual growth has been 1.8%. As seen in Figure 1, Israel’s population is a relatively young population. It is marked by a combination of a relatively high fertility rate (2.8 children per woman in 2005) and growth in the number of older people. Despite declining since the mid-1980s (although stable in recent years), the percentage of the Israeli population aged 0-14 years in 2005 was higher than in any European country and, as seen in Figure 2, was 28.3%. The percentage of the population which is 65 years and older increased in Israel from 1970 until 1996 by almost 40%; since 1996 the rates have been stable. As seen in Figure 2, in 2005 it was 9.9%, lower than in the Czech Republic and the EU-15. Thus, the growth of the number of people aged 0-14 years and older than 65 years is proportionate to the total growth of the population in Israel in recent years. This situation causes a high dependency ratio in Israel of 62%[2].

The estimated population of the Czech Republic was 10.28 million in 2006[3]. About 74% of the population live in urban areas and the population density is 128.2 people per square kilometer[2].

In 1994, even though crude mortality rate was declining, the number of deaths exceeded the number of births in the Czech Republic for the first time since 1918, with decline in the number of inhabitants[4]; this was due to a sharp decline in the fertility rate since the early-1990s, from 1.89 children per woman in 1990 to 1.44 children per woman in 1994 to 1.13 children per woman in 1999[2]. An increasing fertility rate since 2000 did not arrest the population decline until 2006, when its influence, coupled with increasing immigration and decreasing mortality, brought growth into positive figures, with a resultant increase in population after 13 years of decline[5].

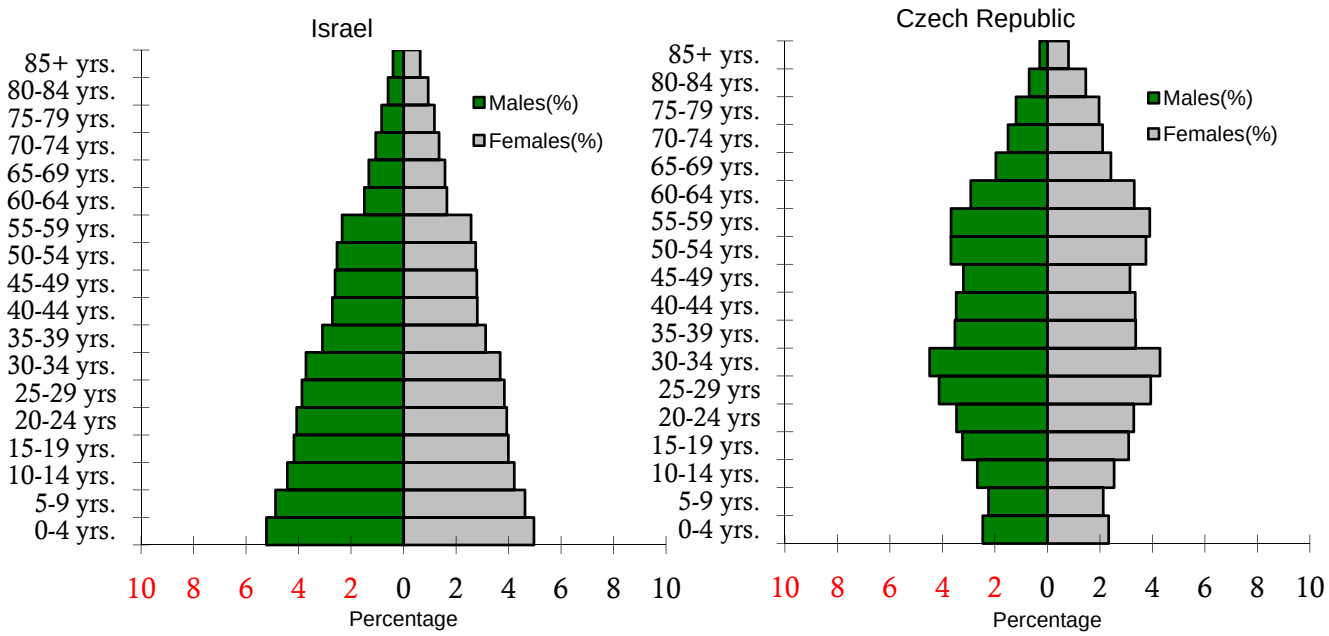
The fertility rate in 2006 was 1.33 children per woman, lower than the EU-15 average, which was 1.56 children per woman in 2005[2]. Particularly important is the fact that the total fertility rate in the Czech Republic is under the fertility replacement level (i.e. 2.1 children per woman).

Since the mid-1980’s, the ratio of people in the youngest age group (0-14 years) to the whole population has been declining due to a decreasing fertility rate and has been under the EU-15 average since 2000; in 2005, as demonstrated in Figure 2, it was

14.8% compared to 16.2% in the EU-15. The share of the oldest age group (65 and over), however, has been increasing since the mid-1980s and was 14.1% in 2005.

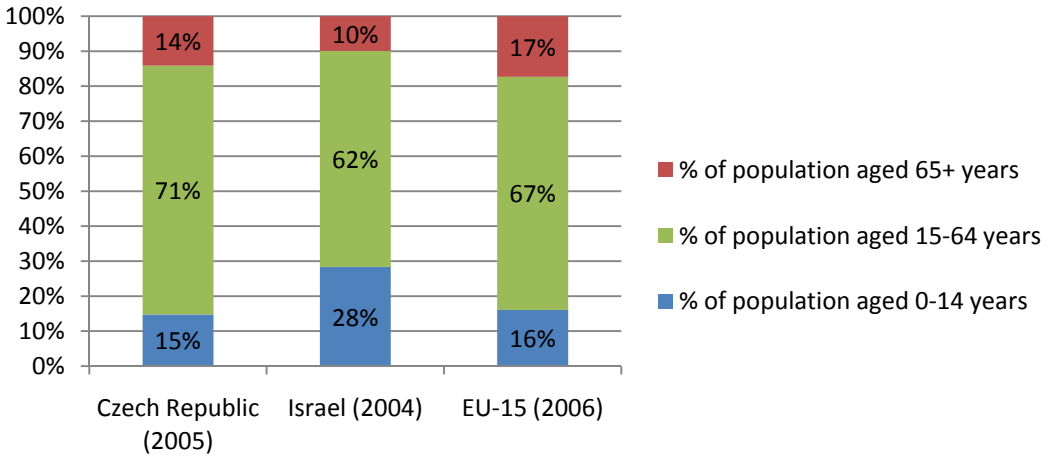
As can be seen in Figure 1, the low fertility rate combined with a decrease in young people and an increasing number of older people are clear signs of the ageing of the Czech population, although the percentage of the oldest age group as part of the whole population is still higher in the EU-15, which was 17.2 in 2005. The dependency ratio in the Czech Republic was 40.8% in 2005[2].

Figure 1 - Age-sex distribution in the Czech Republic and Israel, 2006



Source: Statistical Abstract of Israel 2007; Statistical Yearbook of the Czech Republic 2007

Figure 2 - Age groups distribution of the Czech and Israeli populations



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2 **Mortality**

7.2.1 **Life expectancy**

The life expectancy at birth indicator shows the number of years a person would be expected to live, on the basis of the mortality statistics for a given observation period. It allows for reliable comparisons of the overall state of health of a population over time and among countries[6].

As can be seen in Figure 3, life expectancy has been increasing in both countries, as in all developed countries.

The increase was moderate in the Czech Republic before the 1990s, especially in males and older people. Since the 1990s there has been a sharp increase in life expectancy in the Czech Republic, reaching 76.2 years in 2005, but it is still lower than the EU-15 average, which was 79.9 years in 2006, and lower than the life expectancy in Israel, which was 80.2 years in 2004[2].

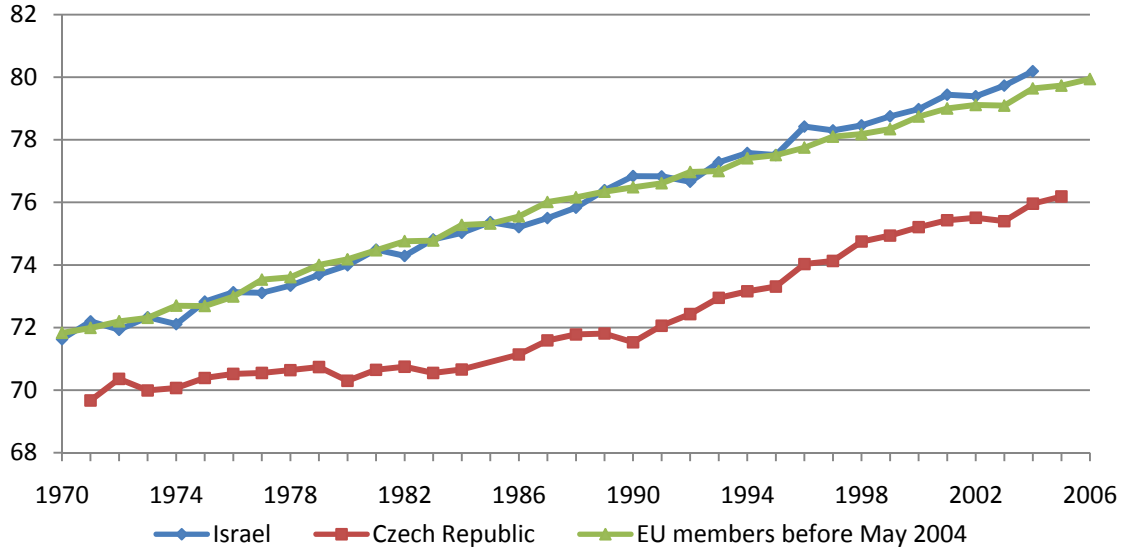
In Israel the increase in life expectancy has been steady since the 1970s, and is similar to the EU-15 average[2].

As can be seen in Figures 4 and 5, life expectancy for Israeli males has been higher than the EU-15 average for males, at least since the 1970s, while female life expectancy in Israel has been lower than the EU-15 average for females, although in recent years the gap in female life expectancy has been decreasing and the figures for Israel and the EU-15 are similar. Because of the high life expectancy for males in Israel, the female-male difference in life expectancy in Israel is among the lowest in Europe, and was 4.2 years in 2004[2].

In the Czech Republic, the female-male difference in life expectancy is higher than for the EU-15, and was 6.4 years in 2005, compared to 5.6 years in 2006 for the EU-15[2].

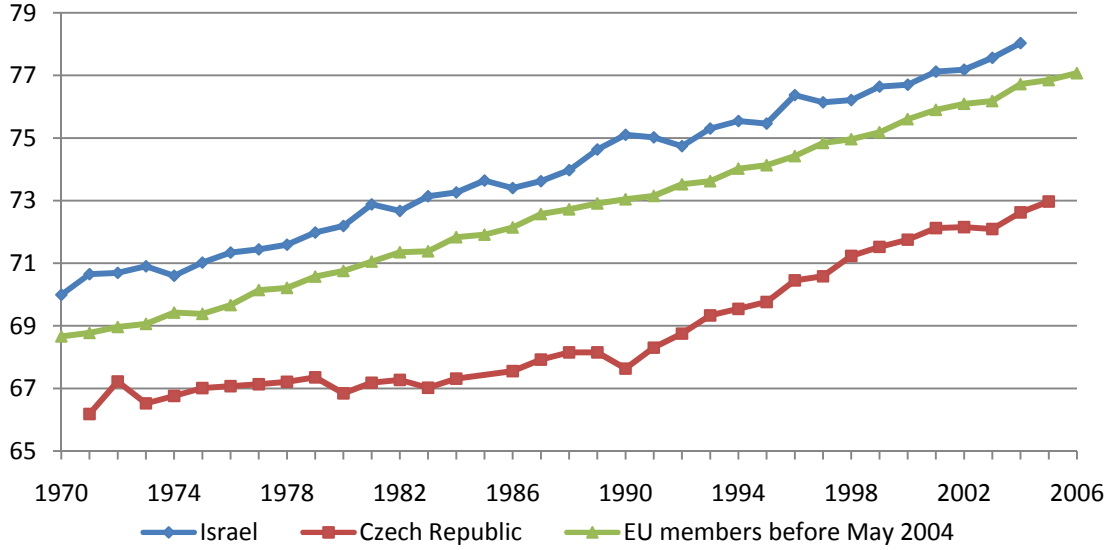
Life expectancy in the Czech Republic in 2005 was similar to the life expectancy in Israel in 1988, so in this way the Czech Republic lags 17 years behind Israel in this indicator. However, the rate of increase in life expectancy since 1990 is about 20% higher than in Israel and about 37% higher than in the EU-15, so if this trend will countine the gap will be closed.

Figure 3 - Life expectancy at birth, all population



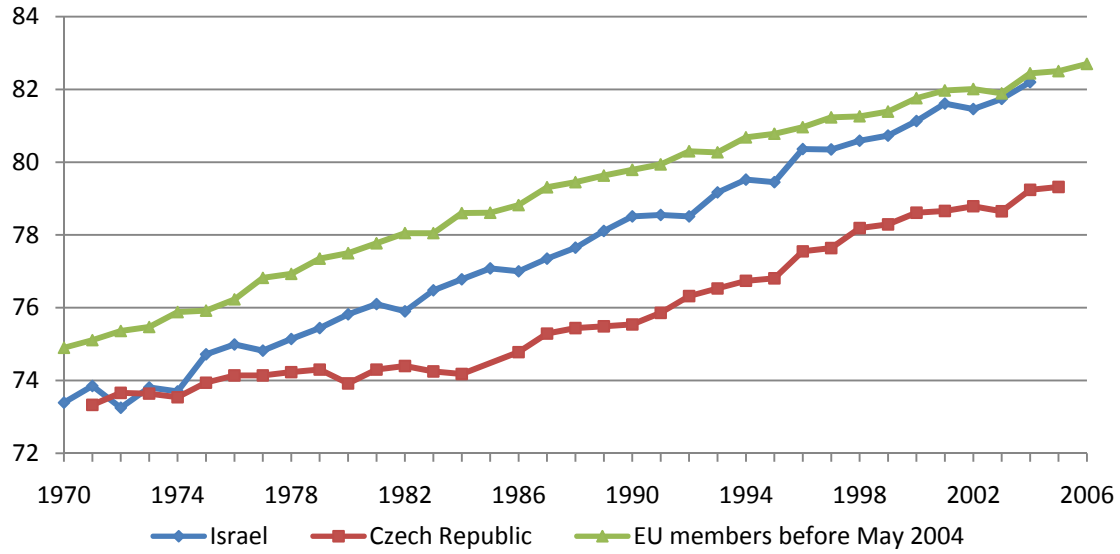
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 4 - Male life expectancy at birth



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 5 - Female life expectancy at birth



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

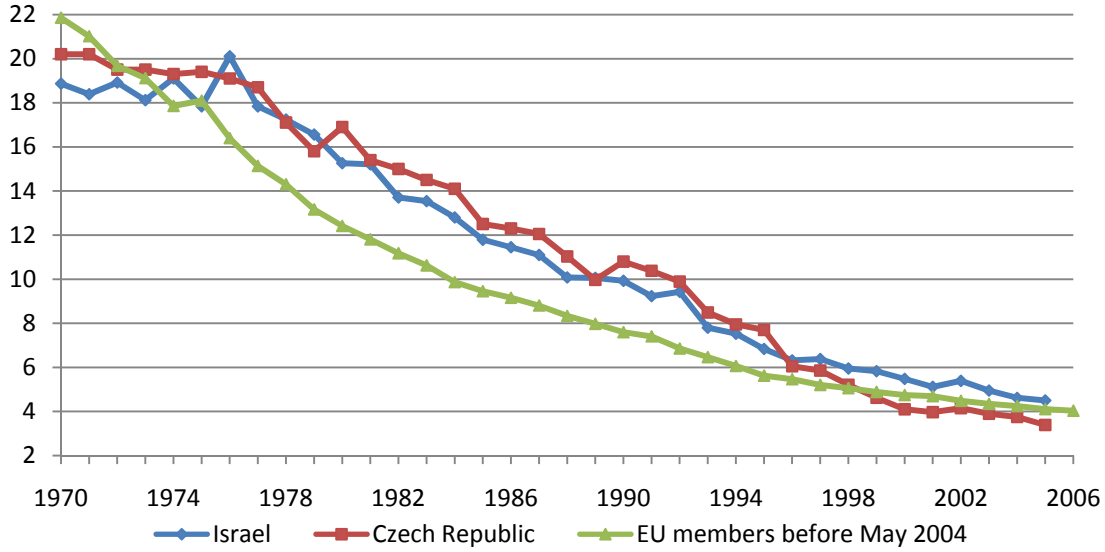
7.2.2 **Infant mortality**

This indicator refers to the number of children younger than one year who die in a given year, per 1,000 live births during that year. Infant mortality is related to fertility rates, the underlying health of the mother, public health practices, socioeconomic conditions, and availability and use of appropriate health care for infants and pregnant women[7].

As illustrated in Figure 6, infant mortality has decreased substantiality since the 1970s in both countries due to advances in medical practices. Rates in 1970 were 20.2 and 18.9 per 1000 live births in the Czech Republic and Israel, respectively. In 2005, rates decreased to 3.4 per 1000 live births in the Czech Republic and 4.5 per 1000 live births in Israel. For comparison, the average rate in the EU-15 in 2005 was 4.1 per 1000 live births. Thus rates in 2005 were more than 30% higher in Israel compared to the Czech Republic, but less than 10% higher than the EU-15 average. In the Czech Republic, infant mortality rates have been lower than the EU-15 average rates since 1999.

The low infant mortality rates in the both countries indicate appropriate health care for infants and pregnant woman. The higher infant mortality rate in Israel can be due to the higher fertility rate in Israel, which has been found to increase infant mortality rate[8].

Figure 6 - Infant mortality per 1000 live births



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.3 **Rate of death**

The age-standardized death rate (SDR) represents what the crude death rate would have been if the population had the same age distribution as the standard European population. In this way, different countries can be compared without errors due to different population age structures.

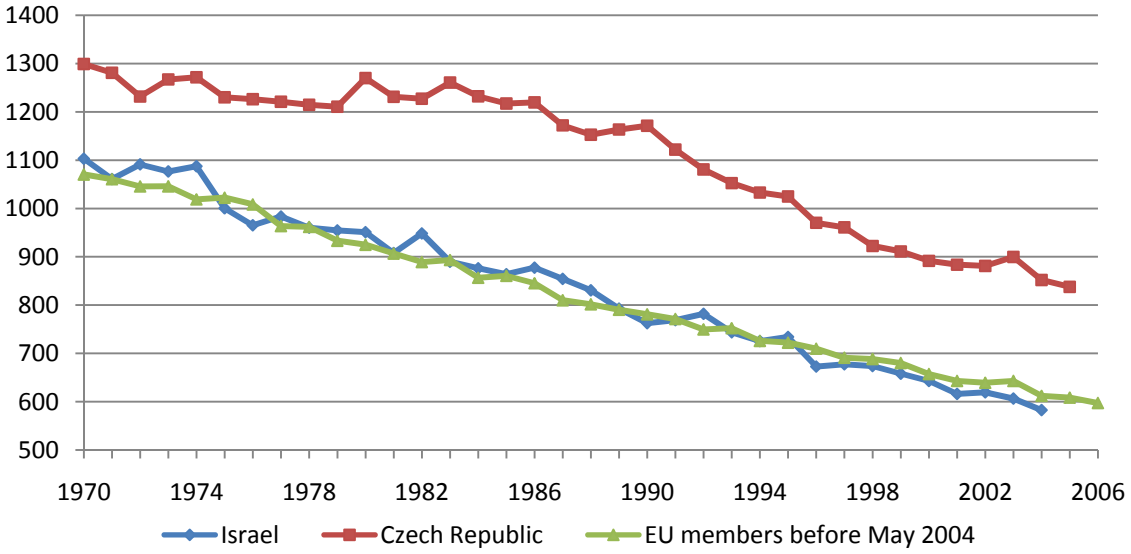
As demonstrated in Figure 7, the SDR from all causes for all ages has been decreasing in the last 35 years in both Israel and in the Czech Republic, as in most modern countries, due to advances in medicine. In the Czech republic, the SDR in 1970 was higher than in Israel and in the EU-15, and has been decreasing primarily only since the early-1990s, so that in 2005 it was still significantly high at 837.6 per 100,000 deaths, almost 40% more than in the EU-15 in the same year, which was 608.2 per 100,000 deaths and 44% more than in Israel. In Israel, the SDR has been similar to the rate in the EU-15 during the last 35 years, and in 2004 was 582.5 per 100,000 deaths.

In both countries, as in most places, the SDR for males is higher than the SDR for females. However, in Israel the difference between males and females (about 40% higher in males in 2004) is smaller than the difference in the Czech Republic (almost 64% higher in males in 2005) and in the EU-15 (62% higher in males in 2006). While the male SDR in Israel is lower than the male SDR in the EU-15, the female SDR in Israel is higher than the female SDR in the EU-15[2]. Thus, the lower SDR difference between males and females in Israel is due to excess mortality among females and lower mortality among males.

The SDR due to all causes in younger people (0-64 years) is also 40% higher in the Czech Republic than in the EU-15, while in Israel rates are lower than the EU-15 rates by 16%[2].

By and large, the death rate in the Czech Republic in 2005 was similar to the death rate in Israel in 1988, so in this regard the Czech Republic is in the same position as Israel 17 years ago. However, the rate of decrease in death rate since 1990 is about 46% higher than in Israel and about 79% higher than in the EU-15, so if this trend countinues, the gap in death rates will be closed.

Figure 7 - SDR from all causes, all ages, per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.4 **Leading causes of death**

Table 1 shows that the main causes of death are similar in both Israel and the Czech Republic and include cardiovascular diseases (28.6% of deaths in Israel and 50% of deaths in the Czech Republic), cancer (26.1% of deaths in Israel and 26% of deaths in the Czech Republic), external causes (5.6% of deaths in Israel and 6.6% of deaths in the Czech Republic) and diabetes (8.1% of deaths in Israel and 1.3% of deaths in the Czech Republic)[2].

Table 1 shows that the 17-year gap in excess mortality between the Czech Republic and Israel is largely due to the higher prevalence of cardiovascular diseases and cancer (lung, colorectal and prostate) in the Czech Republic. Digestive system diseases and external causes also contribute, but less due to the low SDR.

Table 1 - Selected mortality in the Czech Republic and Israel compared with EU-15 averages, latest data

Condition	SDR per 100,000			Total deaths in the Czech Republic (%)	Total deaths in Israel (%)	Total deaths in EU-15 (%)
	Czech Republic (2005)	Israel (2004)	EU-15 average (2006)			
Selected non-communicable conditions	740.3	402.3	487.1	88.4	69.1	81.6
Cardiovascular disease	419	166.3	205.3	50.0	28.6	34.4
Ischaemic heart disease	177.5	72	78.4	21.2	12.4	13.1
Cerebrovascular diseases	109.4	39.7	49.3	13.1	6.8	8.3
Diseases of pulmonary circulation and other heart disease	44.7	36	51.5	5.3	6.2	8.6
Malignant neoplasms	217.5	152	171.8	26.0	26.1	28.8
Trachea/bronchus/Lung Cancer	43.8	25.5	36.5	5.2	4.4	6.1
Female breast cancer	26.2	29.5	24.9	3.1	5.1	4.2
Colon/rectal/anal cancer	32.3	19.2	19	3.9	3.3	3.2
Prostate	27.9	15.4	23	3.3	2.6	3.9
Respiratory diseases	46.3	39.4	48	5.5	6.8	8.0
Chronic lower respiratory Diseases	17.3	16.3	20.2	2.1	2.8	3.4
Pneumonia	23	9.9	14.8	2.7	1.7	2.5
Digestive diseases	38.7	19.8	29.3	4.6	3.4	4.9
Chronic liver disease and Cirrhosis	16.5	3.6	11.4	2.0	0.6	1.9
Neuropsychiatric disorders	18.8	24.8	32.7	2.2	4.3	5.5
Endocrine conditions	11.3	47.4	17.8	1.3	8.1	3.0
Diabetes Mellitus	10.7	38.9	13.6	1.3	6.7	2.3
Communicable conditions	3.2	16	9.3	0.4	2.7	1.6
External causes	55	32.6	35.2	6.6	5.6	5.9
Selected unintentional Causes	36.4	19.9	22.3	4.3	3.4	3.7
Road traffic injuries	9.9	7.8	7.9	1.2	1.3	1.3
Falls	11.4	1.3	4.8	1.4	0.2	0.8
Selected intentional causes	14.7	10.3	10.4	1.8	1.8	1.7
Self-inflicted (suicide)	13.8	6.6	9.6	1.6	1.1	1.6
Violence (homicide)	0.9	3.7	0.8	0.1	0.6	0.1
Ill-defined conditions	7.9	28.5	20.1	0.9	4.9	3.4
All causes	837.6	582.5	597			

Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.4.1 **Cardiovascular diseases**

As can be seen in Figure 8, cardiovascular diseases are the most frequent cause of death in the Czech Republic, with an SDR of 419 per 100,000 deaths in 2005, and in Israel, with an SDR of 166 per 100,000 deaths in 2004, as in other developed countries. For comparison, the average SDR from cardiovascular diseases was 205 per 100,000 deaths in the EU-15 in 2006[2].

In the Czech Republic there has been a continuous improvement since the mid-1980s, with higher rates of improvement since 1990, while in Israel there has been a continuous improvement since the mid-1970s, with a plateau between 1990 and 1995[2].

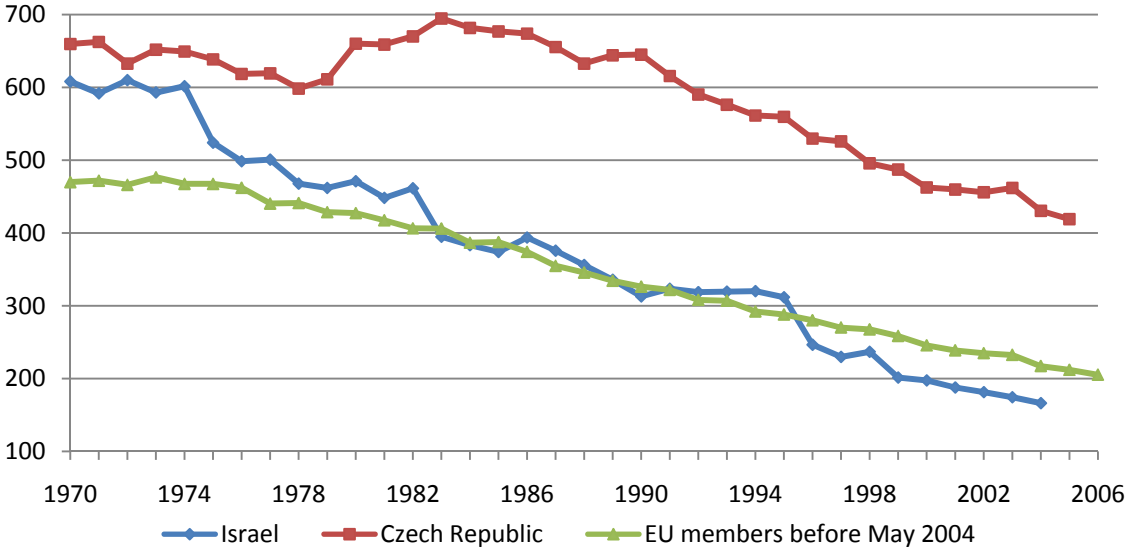
Overall, the improvement in the Czech Republic is attributed to the expansion in the introduction and use of modern diagnostic and therapeutic methods after 1989; this led to more effective cures and the "postponing" of death of a proportion of the sick to higher age groups[9].

The improvement in Israel was largely due to improved treatment (medication and surgical intervention) and greater awareness and prevention[10].

Figure 8 shows that the SDR from cardiovascular diseases is over 250% higher in the Czech Republic than in Israel and 200% higher than in the EU-15, explaining the large difference in mortality rates due to all causes between the Czech Republic and Israel. On the other hand, the rate of decrease in SDR from cardiovascular diseases since 1990 is higher than in Israel and than in the EU-15, so if this trend countines the gap will be closed.

Since 1996 the SDR from cardiovascular diseases in Israel has been lower than the EU-15 average.

Figure 8 - SDR from cardiovascular diseases, all ages per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

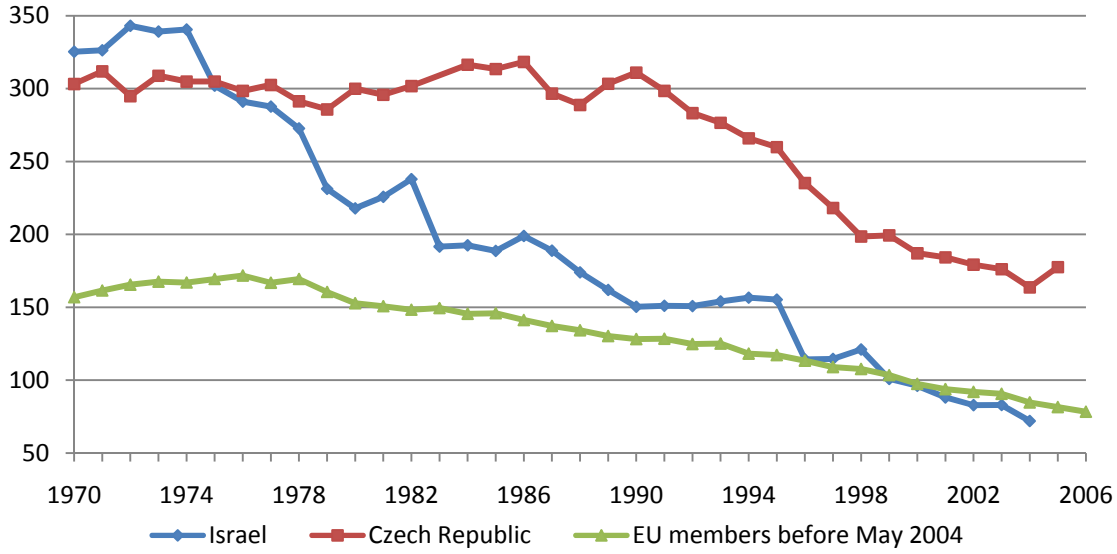
7.2.4.1.1 **Ischaemic heart disease**

An examination of Figure 9 shows that a reduction in ischaemic heart disease mortality in the Czech Republic has been apparent primarily since 1990, when a drop was very marked. Furthermore, reduction in the rate in the 0-64 age group is more significant than in the EU-15 countries[9].

Ischaemic heart disease mortality in Israel during the early-1970s was higher than in the Czech Republic but declined between 1975 and 1990; thereafter rates remained stable until 1995. Since 1995 there has been further decline, and since 1999 the rate has been similar to the rates of the EU-15.

Although improving, rates in the Czech Republic, at 178 per 100,000 deaths in 2005, are still higher than in Israel, with rates of 72 per 100,000 deaths in 2004, and than in the EU-15 average, which was 78 per 100,000 deaths in 2006.

Figure 9 - SDR from ischaemic heart disease, all ages per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

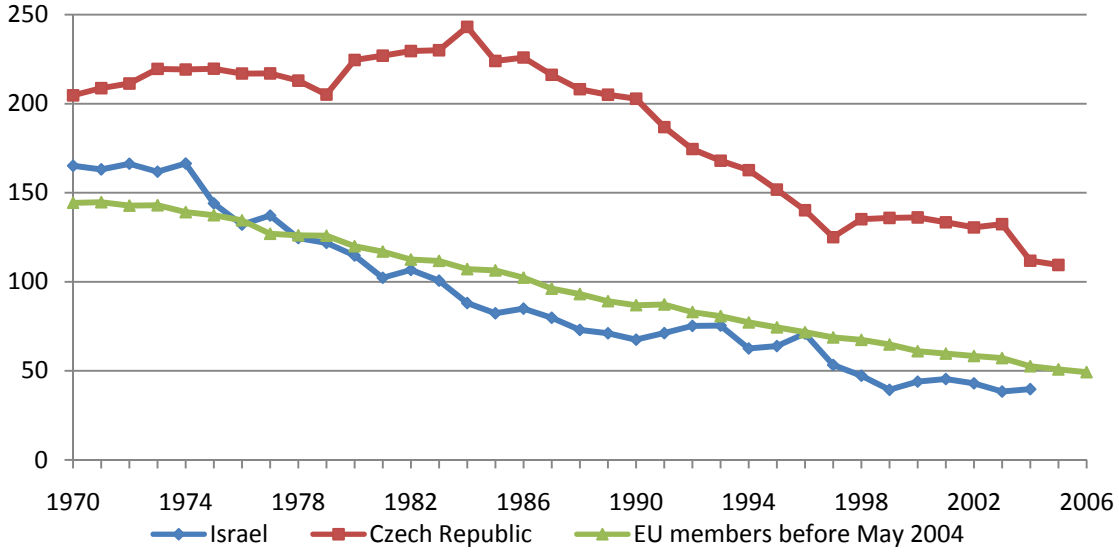
7.2.4.1.2 **Cerebrovascular diseases**

Figure 10 shows that mortality from cerebrovascular diseases in the Czech Republic dropped sharply between 1986 (SDR of 226 per 100,000 deaths) and 1997 (SDR of 125 per 100,000 deaths). Thereafter rates have been stable with a small drop in 2004[2].

In Israel rates has been decreasing since the mid-1970's, with levels lower than the EU-15 since the 1980s.

Although improving, rates in the Czech Republic (109 per 100,000 deaths in 2005) are still higher than in Israel (38 per 100,000 deaths in 2003) and than in the EU-15 (51 per 100,000 deaths in 2005).

Figure 10 - SDR from cerebrovascular diseases, all ages per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.4.2 **Cancer**

As seen in Figure 11, the cancer SDR in the Czech Republic (217 per 100,000 deaths in 2005) is more than 25% higher compared with the EU-15 (172 per 100,000 deaths in 2006) and more than 40% higher than Israel (152 per 100,000 in 2004). The only exception is breast cancer, where mortality rates in the Czech Republic are similar to the rates in the EU-15 and lower than the rates in Israel[2].

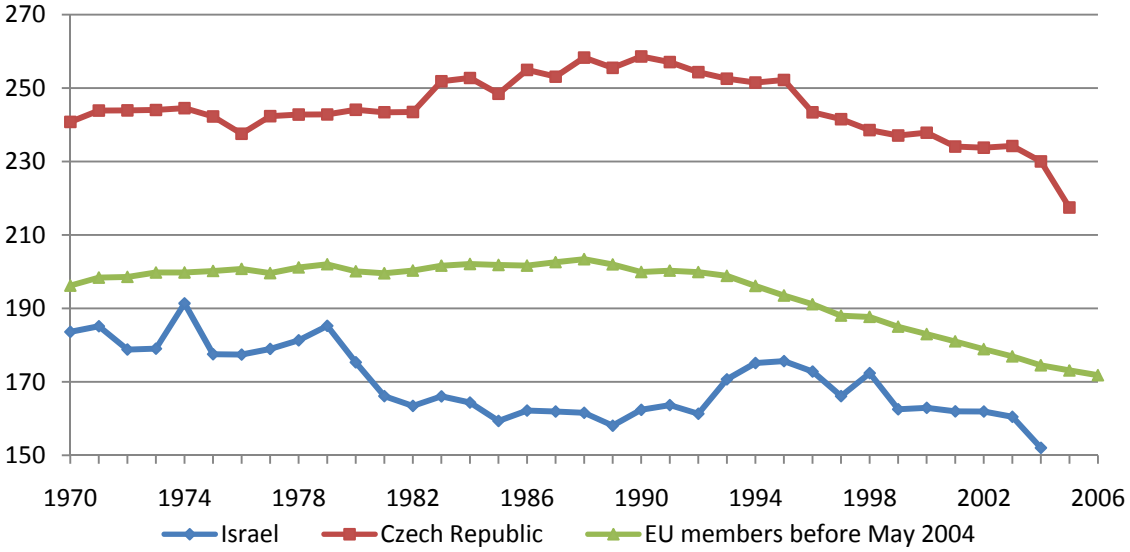
The mortality rate from cancer in the Czech Republic was relatively stable until 1996, when rates started to drop. In Israel, rates of cancer are lower than the rates in the EU-15.

The cancer SDR has been significantly higher in the Czech Republic than in Israel over the last 35 years. This is due to a higher incidence of cancer in the Czech Republic, as demonstrated in Figure 12, and may be also due to a lower standard health care (prevention, early detection, treatment). The large differences in cancer SDR explain, together with cardiovascular SDR, the large difference in mortality rates due to all causes between the Czech Republic and Israel.

The higher incidence of cancer can't be explained solely by the different age distribution because the cancer incidence in the Czech Republic is even higher than in the EU-15, in which the ratio of older people (65 and above) to the whole population is higher than in the Czech Republic. The higher incidence from cancer in the Czech Republic may be due to higher prevalence of cancer risk factors, genetic predispositions and decreased primary prevention.

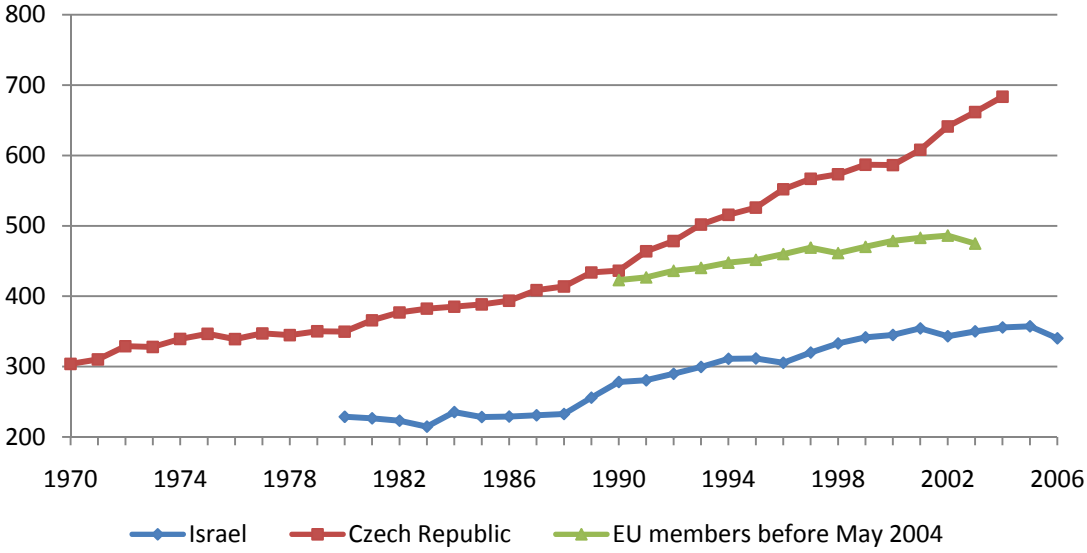
However, the rate of decrease in death rates from cancer since 1990 is higher than in Israel and the EU-15, so if this trend continues the gap will be closed.

Figure 11 - SDR from malignant neoplasms, all ages per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 12 - Cancer incidence per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

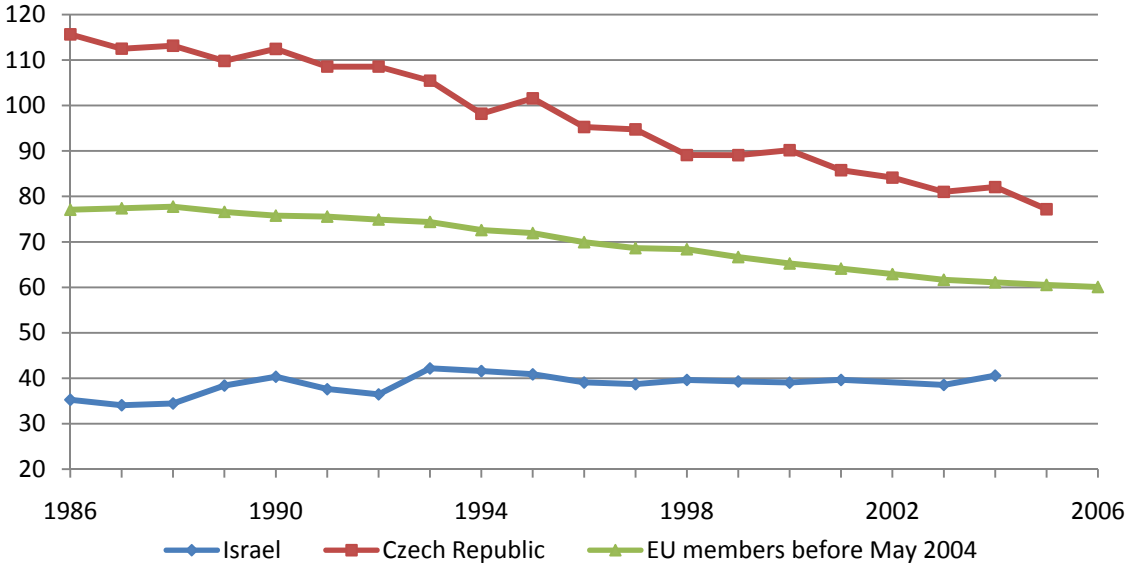
In both countries the highest mortality from cancers in males are caused by lung cancer, colorectal cancer and prostate cancer and in females by breast cancer, colorectal cancer and lung cancer[11].

Lung cancer

Tracheal, bronchial and lung cancer are the first cause of mortality from cancer in males and the third in females in both countries[11].

As demonstrated in Figure 13, mortality rates from tracheal, bronchial and lung cancer among males in the Czech Republic has been decreasing since the early-1990s, probably due to a decrease in smoking among males, but rates in the Czech Republic (SDR of 77 per 100,000 male deaths in 2005) are higher than the rates in Israel (SDR of 41 per 100,000 male deaths in 2004) and in the EU-15 (SDR of 60 per 100,000 male deaths in 2006). In Israel rates are relatively constant with an increased rate during the 1990s compared to the 1980s, but are generally low.

Figure 13 - SDR from malignant neoplasm of trachea, bronchus and lung, males, per 100,000



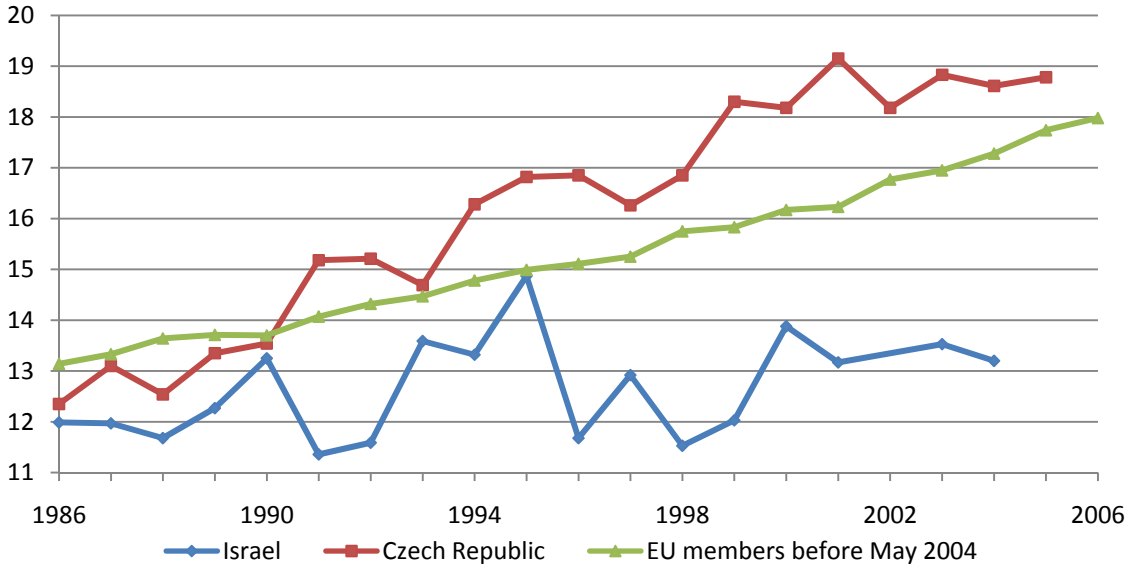
Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 14 compares mortality from tracheal, bronchial and lung cancer among females, and shows an increase in the Czech increasing since the mid-1970s. Before and during the early-1980s mortality rates in the Czech Republic were lower than in Israel and the EU-15, but due to the continuous increase in the SDR from tracheal, bronchial and lung cancer in the Czech Republic, rates have been higher than in Israel since 1984 and higher than the EU-15 average since 1991.

The SDR from tracheal, bronchial and lung cancer among females in the Czech Republic was 19 per 100,000 female deaths in 2005, almost 50% higher than in Israel, which in 2004 was 13 per 100,000 female deaths, and similar to the rate in the EU-15, which was 18 per 100,000 female deaths in 2006. The rate of increase over time in the Czech Republic is also higher than in Israel and the EU-15. This may be attributes to the increase in smoking prevalence among females in the Czech Republic.

In Israel, female mortality from lung cancer during the 1970s was higher than both the Czech Republic and the EU-15, however, the rate of increase was lower and since the mid-1980s mortality from lung cancer is lower than those countries.

Figure 14 - SDR from malignant neoplasm of trachea, bronchus and lung, females, per 100,000



Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Colorectal cancer

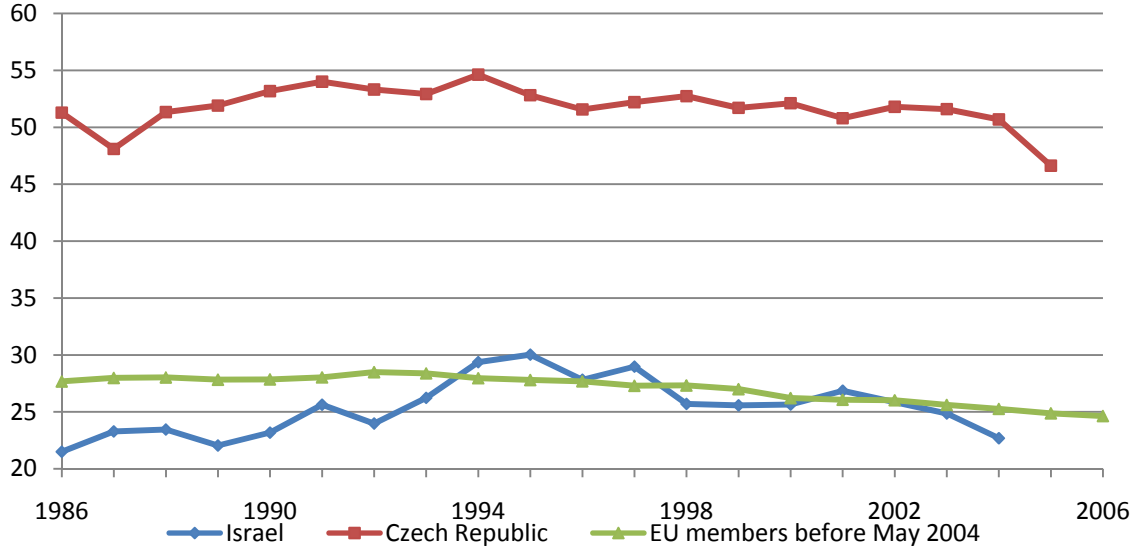
Colorectal cancer is the second most common cause of death from cancer in both males and females in both Israel and the Czech Republic[11].

The Czech Republic holds a sad worldwide primacy, as it is the country with the highest incidence of that disease. Aside from genetic causes, a combination of several factors is suspected as causative, of which nutritional habits, smoking and excessive beer drinking are probably among the most significant[9].

As can be seen in Figures 15 and 16, the mortality of colorectal cancer in the Czech Republic has been decreasing since the mid-1990s, but at a very slow rate. The decrease have been more apparently in females than in males. This may be thanks to earlier diagnosis due to increased screening. The SDR due to colorectal cancer in the Czech Republic among males (SDR of 47 per 100,000 male deaths in 2005) is 200% higher when compared to Israel (23 per 100,000 male deaths in 2004) and almost 190% higher than the EU-15 (25 per 100,000 males in 2006). The SDR due to colorectal cancer in the Czech Republic among females (22 per 100,000 female deaths in 2005) is also higher than in Israel (17 per 100,000 female deaths in 2004) and than in the EU-15 (15 per 100,000 female deaths in 2006), but the difference is not as big as in males.

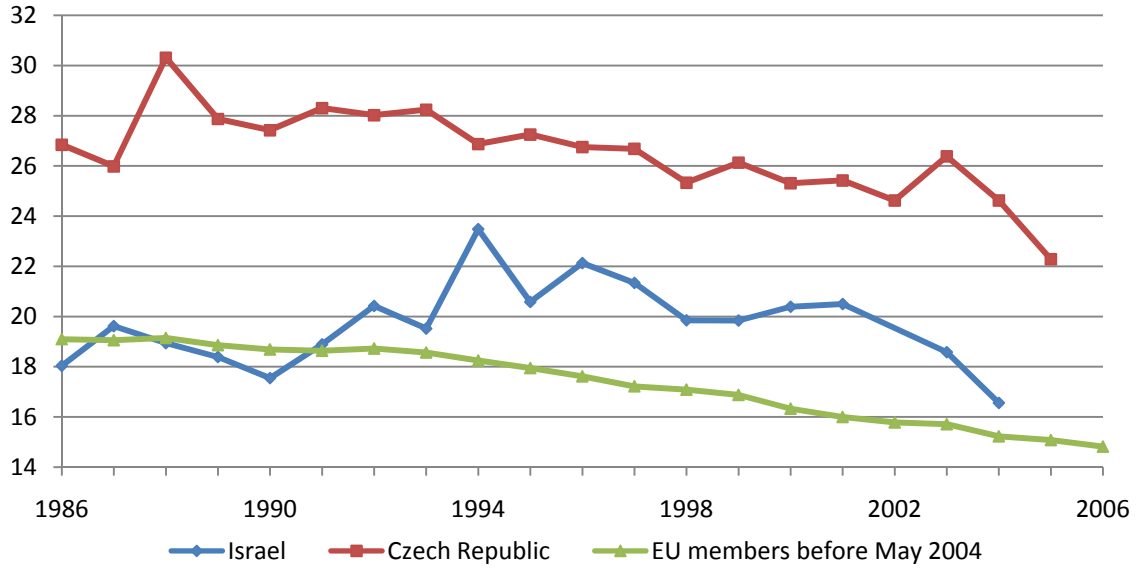
In Israel there has been an increase in mortality due to colorectal cancer since the mid-1980s, more pronounced in males than in females. In males mortality was lower than in the EU-15 until 1994, since then rates have been similar. In females, mortality from colorectal cancer is higher than in the EU-15 since 1991.

Figure 15 - SDR from malignant neoplasm of colon, rectum and anus, males, per 100,000



Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 16 - SDR from malignant neoplasm of colon, rectum and anus, females, per 100,000



Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Breast cancer

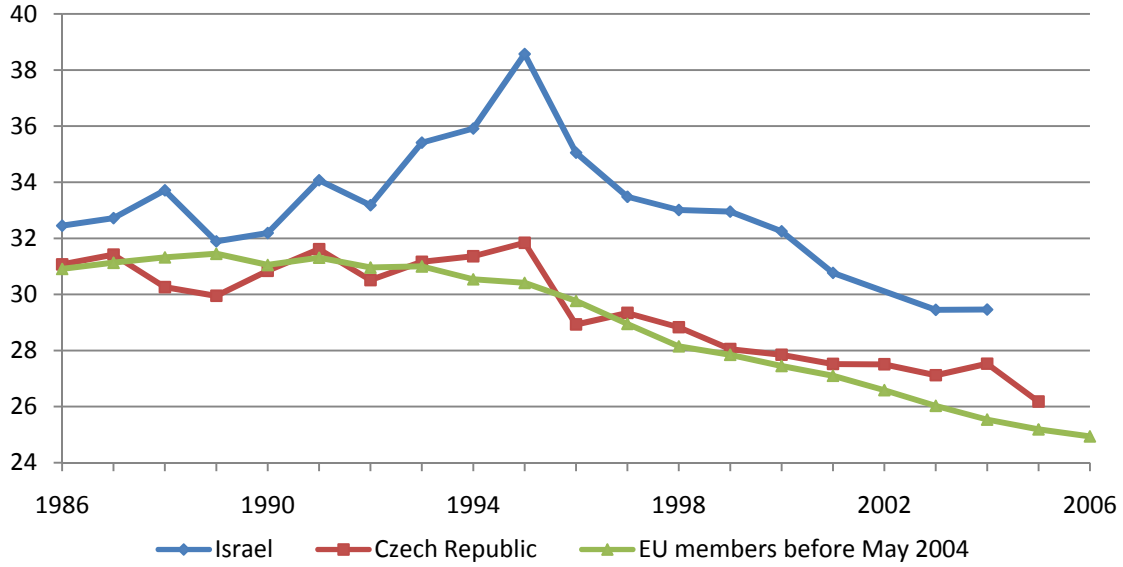
Breast cancer is the primary cause of mortality from cancer in females in both countries.

As illustrated by Figure 17, the SDR was 26 per 100,000 female deaths in 2005 in the Czech Republic and 29 per 100,000 female deaths in 2004 in Israel.

Although the incidence of breast cancer is increasing in both countries, mortality has been decreasing since 1996. The reduction in mortality was achieved due to early diagnosis and better treatment, by women being better informed and by preventive checks and mammography screening[9].

Figure 17 shows that, although improving, mortality rates from breast cancer in Israel are higher than in the Czech Republic and than in the EU-15, in which the rate was 25 per 100,000 female deaths in 2006. Furthermore, incidence of breast cancer in 2004 was similar in both countries[2]. Those findings may reflect lower quality of care (i.e. less effective programs for early detection by mammography, less effective treatment) for those patients in Israel or they may reflect some genetic predisposition.

Figure 17 - SDR from Malignant neoplasm of breast, females, per 100,000



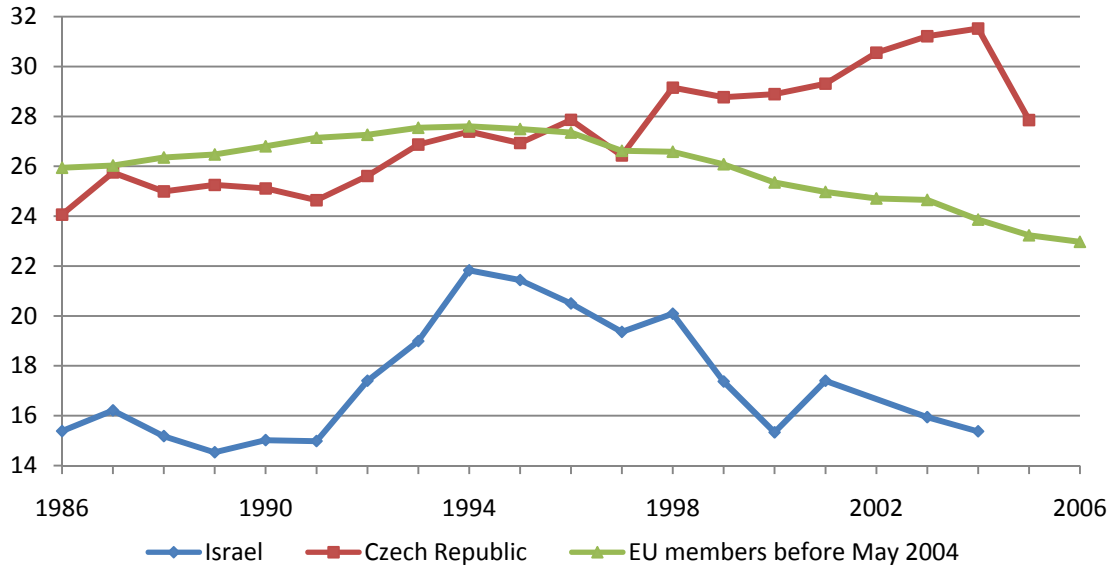
Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Prostate cancer

Prostate cancer is the third leading cause of death from cancer among males both in the Czech Republic and in Israel[11].

As seen in Figure 18, in the Czech Republic, the SDR from prostate cancer until 1998 was below or similar to the EU-15 average, but since 1998 it is higher than the EU-15. In 2005 the SDR from prostate cancer was 28 per 100,000 male deaths in the Czech Republic, almost two times higher than in Israel, in which the rate was 15 per 100,000 male deaths in 2004, but only about 20% higher than in the EU-15, in which the rate was 23 per 100,000 males in 2006. The mortality rate from prostate cancer in Israel is low and is 66% of the EU-15 average.

Figure 18 - SDR from malignant neoplasm of prostate, per 100,000



Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

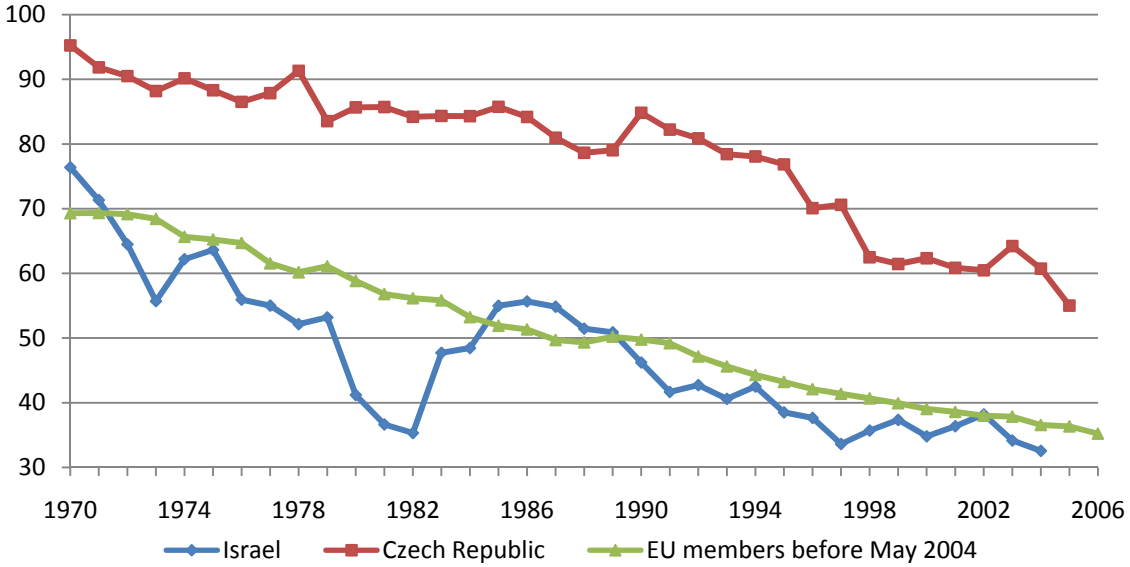
7.2.4.3 External causes

Figure 19 demonstrates that since the 1970s, the mortality rate attributable to external causes has been dropping in the Czech Republic, however it is still high (SDR of 55 per 100,000 in 2005) with excess mortality of almost 70% compared to Israel (SDR of 32.6 per 100,000 in 2004), and with excess mortality of more than 55% compared to the EU-15 average (SDR of 35.2 per 100,000 in 2005). This high rate of mortality from external causes is probably due to the significantly higher consumption of alcohol in the Czech Republic, as alcohol consumption is connected to falls, suicides, homicides and motor vehicle traffic accidents and others.

In Israel mortality rates from external causes has been lower than the EU-15 average since the early-1970s, except between the years 1985-1989, when they were higher. From 1989 until 1997 there was a decrease in mortality rates, but since 1997 rates have been relatively constant.

The difference in SDR from external causes between the Czech Republic and Israel contribute to the large difference in mortality rate due to all causes between the Czech Republic and Israel. However, the rate of decrease in the death rate from external causes since 1990 is higher than in Israel and than in the EU-15, so if this trend continues the gap will be closed.

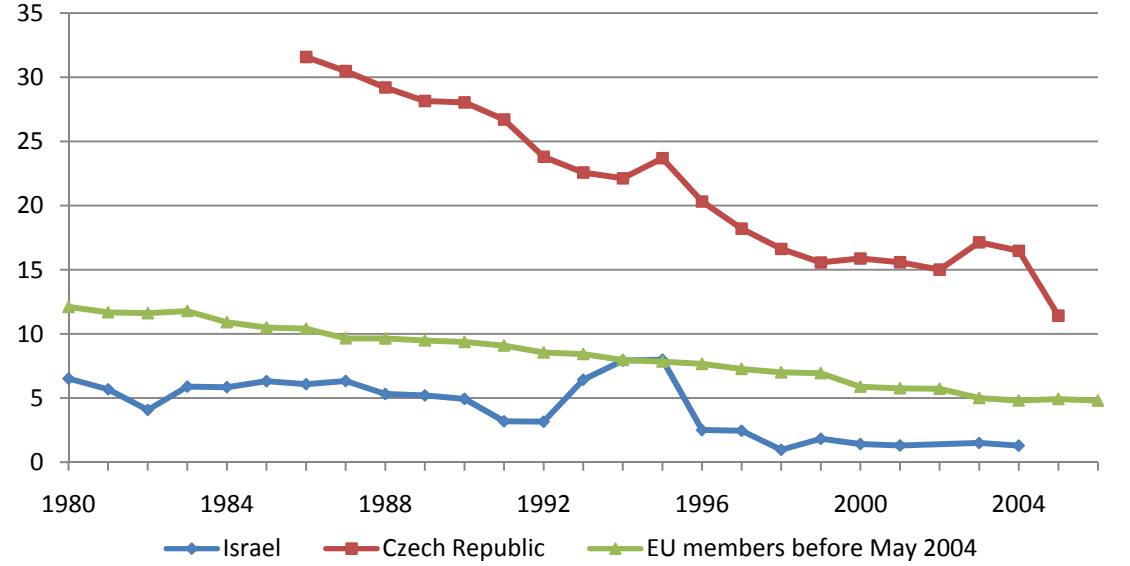
Figure 19 - SDR from external causes, all ages per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

As can be seen in Figures 20 and 21, until 2004, accidental falls were the primary external cause of death in the Czech Republic, despite a consistent decrease since the 1980s. In 2005 however, suicide replaced falls as the primary cause due to a sharp decrease in the mortality from falls in the same year. The SDR rate from accidental falls in 2005 in the Czech Republic of 11.4 per 100,000 is very high compared both to Israel (1.3 per 100,000 deaths in 2004) and to the EU-15 (4.8 per 100,000 deaths in 2006).

Figure 20 - SDR from accidental falls, per 100,000



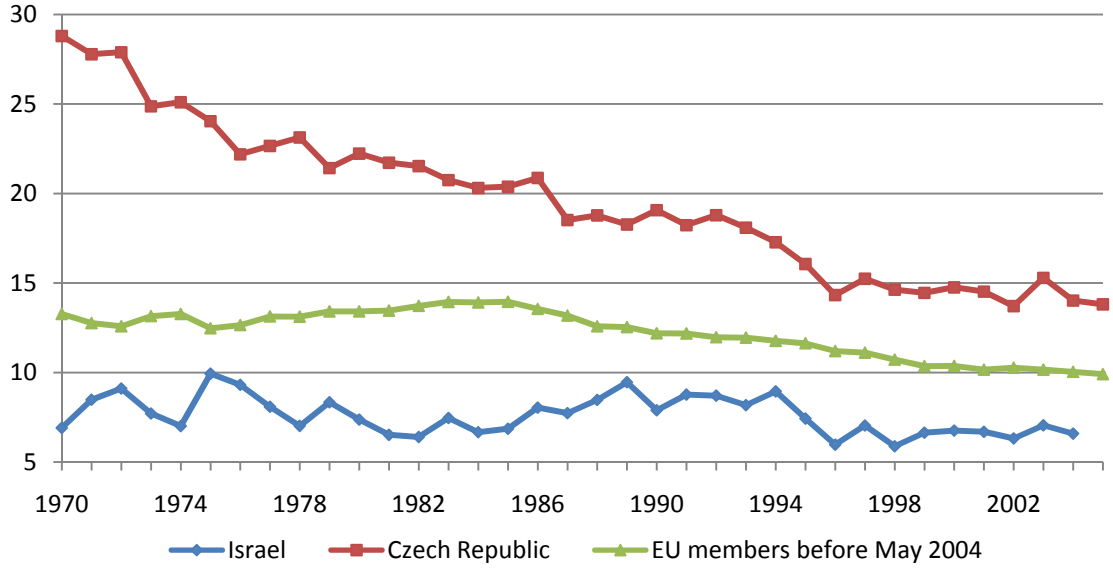
Source: European mortality database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 21 shows that the suicide mortality rate in the Czech Republic was decreasing between the 1970's and mid-1990s, but has been relatively stable since then with only a

small decrease in recent years. Suicide was the second most common cause of external mortality in the Czech Republic until 2004, but became the most common in 2005.

Although the suicide mortality rate in the Czech Republic has been decreasing, at an SDR of 13.8 per 100,000 deaths in 2005 it is still about 100% higher than the mortality rate in Israel (6.6 per 100,000 deaths in 2004) and about 44% higher than the EU-15 average (9.6 per 100,000 deaths in 2006).

Figure 21 - SDR from suicide and self-inflicted injury, all ages per 100,000



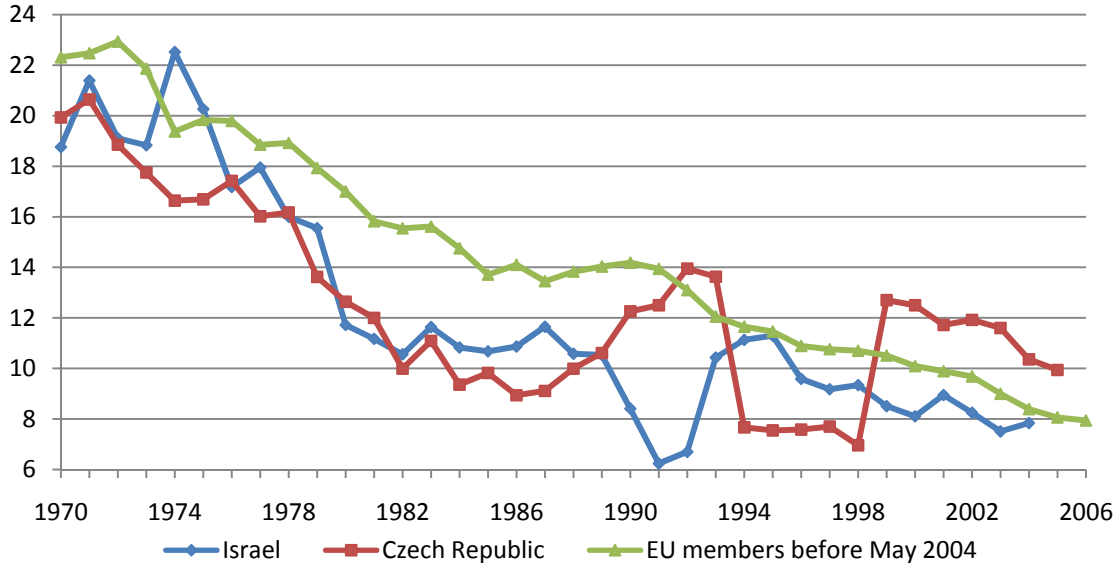
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Road traffic accidents are the third most common external cause of death in the Czech Republic, while in Israel they are the most common external cause of death[11].

As can be seen in Figure 22, in both Israel and the Czech Republic, as well in the EU-15, the road traffic accident mortality rates has declined significantly from the 1970s and has reached a low plateau around which the rate fluctuates randomly, but without statistical significance from year to year.

According to the latest data, the SDR in the Czech Republic for road traffic accidents (9.9 per 100,000 deaths in 2005) is higher than the EU-15 average (7.9 per 100,000 deaths in 2006), and the rate in Israel (7.8 per 100,000 deaths in 2004) is similar to the EU-15 average[2].

Figure 22 - SDR from motor vehicle traffic accidents, all ages per 100,000



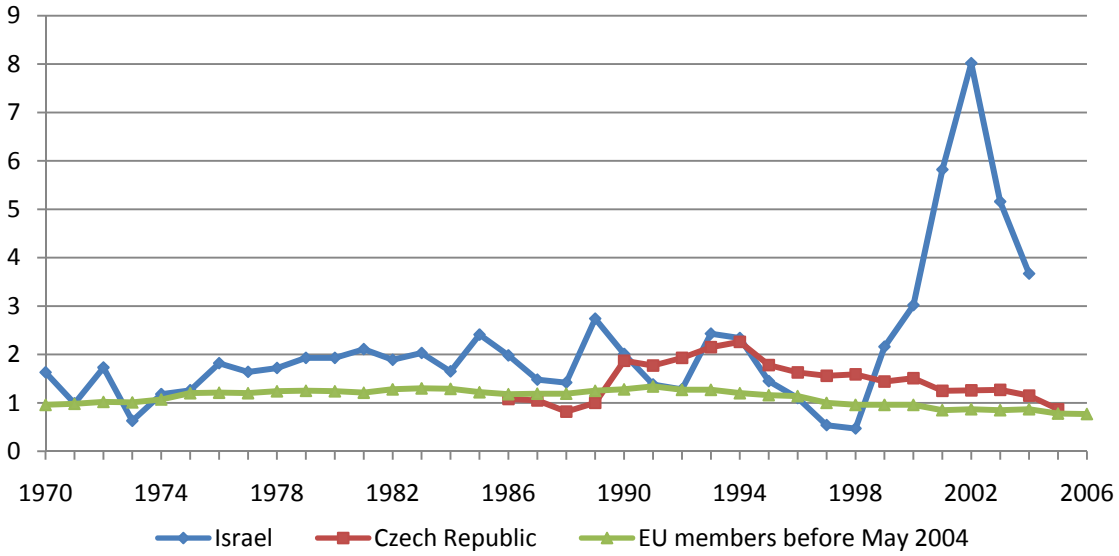
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

In 1999 homicide and assault replaced falls as the third most common external cause of death in Israel[11]. As illustrated in Figure 23, the homicide mortality rates have been fairly equal in Israel, the Czech Republic and the EU-15. The Israeli rates have been slightly higher and since 1999 Israel has experienced an increase in the homicide mortality rates. The homicide mortality rate in Israel was 3.7 per 100,000 deaths in 2004, higher compared to the Czech Republic (with an SDR of 0.9 per 100,000 deaths in 2005) and the EU-15 average (SDR of 0.8 per 100,000 deaths in 2006).

This increase in homicide and assault mortality rate in Israel may be due to the ongoing conflict that Israel is involved in or maybe due to the higher neuropsychiatric morbidity.

In the Czech Republic, the homicide and assault mortality rate increased after 1989 to levels higher than the EU-15 average, but have been decreasing since 1995, and in 2005 it was similar to the EU-15 average.

Figure 23 - SDR from homicide and intentional injury, per 100,000



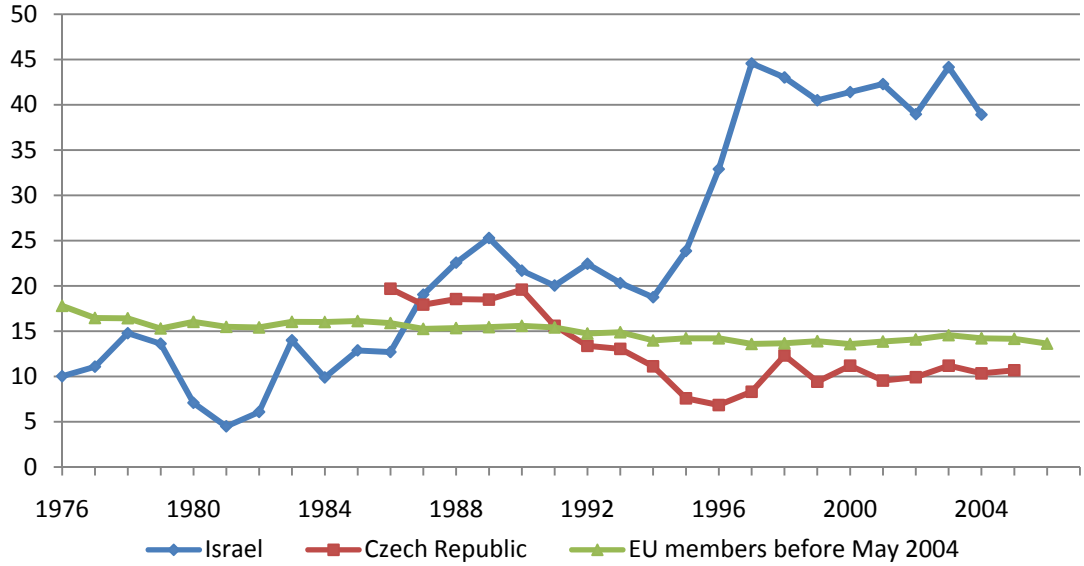
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.4.4 **Diabetes Mellitus**

As can be observed in Figure 24, diabetes mellitus mortality rate increased in Israel from the 1980s until 1997. Since 1998 the rate has been relatively stable, with a slow decreasing tendency. However, rates in Israel, with an SDR of 39 per 100,000 deaths in 2004, are more than 350% higher than the rate in the Czech Republic, at 10.7 per 100,000 deaths in 2005. It is also almost 300% higher than the EU-15 SDR average of 13.6 per 100,000 deaths in 2006. Furthermore, the prevalence of diabetes in 2000 in Israel was twice the prevalence in the Czech Republic (3.2% and 6.4% of the population, respectively)[2]. Thus, it is not only the higher obesity and pre-obesity rates in Israel that are responsible for the higher mortality rate, in which case, one would expect higher prevalence, but it also may be due to lower quality of care.

In the Czech Republic, the diabetes mellitus mortality rate decreased significantly between 1991 and 1996, crossing the EU-15 average in 1992. Thereafter the rate increased somewhat until 1999; and since 1999 the rate has been stable and under the EU-15 average. The favorable change in mortality caused by diabetes mellitus serves as evidence of the quality of care for this group in the Czech Republic[9].

Figure 24 - SDR from diabetes, all ages, per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.2.4.5 Other common causes of death

Excess mortality in Israel compared to the Czech Republic and the EU-15 can be seen from infectious and parasitic diseases, endocrine, nutritional and metabolic diseases, diseases of the genitourinary system and ill-defined conditions. There is also excess mortality in Israel from neuropsychiatric disorders compared to the Czech Republic, but not to the EU, were mortality rate from neuropsychiatric disorders is higher [11].

In the Czech Republic, excess mortality can be seen from diseases of the digestive system compared to the EU-15 and to Israel[11].

The SDR from respiratory disease is relatively similar in the Czech Republic and in Israel and is lower than the EU-15 average in both countries[11].

However, those causes of death are responsible for only small percentage of deaths in those countries, so that the differences do not have a large impact on overall death rate.

7.3 Morbidity and burden of disease

Mortality data, such as life expectancy and death rate, only reflect one outcome of diseases – death, and don't reflect the burden of disease in term of reduction in quality of life. As the goal of health care is not only to prevent death but also to improve quality of life, it is important to also examine this aspect.

The Disability Adjusted Life Year (DALY) is a health gap measure that extends the concept of potential years of life lost due to premature death (PYLL) to include equivalent years of 'healthy' life lost by virtue of being in states of poor health or

disability. The DALY combines in one measure the time lived with disability and the time lost due to premature mortality. One DALY can be thought of as one lost year of 'healthy' life and the burden of disease as a measurement of the gap between current health status and an ideal situation where everyone lives into old age free of disease and disability (definition from the WHO web site).

Table 2 lists the top 10 conditions (disability groups), in descending order, that account for more than 85% of the burden of disease among males and females in Israel and in the Czech Republic in terms of DALY.

Table 2 - Ten leading disability groups as precentages of total DALYs for both sexes in the Czech Republic and Israel, 2002

Rank	Males – Israel		Males – Czech Republic	
	Disability groups	Total DALYs (%)	Disability groups	Total DALYs (%)
1	Neuropsychiatric conditions	27.6	Cardiovascular diseases	24.5
2	Malignant neoplasms	12.9	Neuropsychiatry conditions	19.9
3	Cardiovascular diseases	11.8	Malignant neoplasms	18.0
4	Unintentional injuries	7.5	Unintentional injuries	10.0
5	Respiratory diseases	6.4	Digestive diseases	6.2
6	Intentional injuries	5.8	Respiratory diseases	5.2
7	Sense organ diseases	3.9	Intentional injuries	3.6
8	Diabetes mellitus	3.4	Sense organ diseases	3.4
9	Musculoskeletal diseases	3.1	Musculoskeletal diseases	2.5
10	Perinatal conditions	3.1	Respiratory infections	1.2
Rank	Females – Israel		Females – Czech Republic	
	Disability groups	Total DALYs (%)	Disability groups	Total DALYs (%)
1	Neuropsychiatric conditions	34.6	Neuropsychiatric conditions	25.9
2	Malignant neoplasms	13.2	Cardiovascular diseases	23.2
3	Cardiovascular diseases	9.1	Malignant neoplasms	17.8
4	Respiratory diseases	6.6	Unintentional injuries	5.3
5	Musculoskeletal diseases	4.5	Digestive diseases	5.2
6	Sense organ diseases	4.3	Musculoskeletal diseases	4.7
7	Unintentional injuries	3.6	Sense organ diseases	4.7
8	Diabetes mellitus	3.3	Respiratory diseases	3.8
9	Endocrine disorders	2.8	Diabetes mellitus	1.5
10	Infectious and parasitic diseases	2.5	Intentional injuries	1.1

Source: Highlights on health, the Czech Republic 2005; Highlights on health, Israel 2004, WHO. Copenhagen.

Because mortality from Neuropsychiatric conditions is minor compared with that from other diseases, disability in daily living comprises the bulk of their burden on the health of the population. Neuropsychiatric conditions have the highest burden of disease in

Israel among both males and females and the highest among females and second highest among males in the Czech Republic. However, the estimated burden for both men and women in Israel is much higher than the estimates for these conditions for people in the Czech Republic and other European counties[12, 13].

As seen in Table 2, the estimated burden of cardiovascular disease is higher in the Czech Republic than in Israel and is the primary cause of burden of disease among Czech males and the second cause among Czech females, while in Israel it represents the third cause of burden of disease among both males and females.

The estimated burden of malignant neoplasms is also higher in the Czech Republic than in Israel. However, while in Israel malignant neoplasms are the second cause of burden in both males and females, in the Czech Republic they represent the third most common cause of burden.

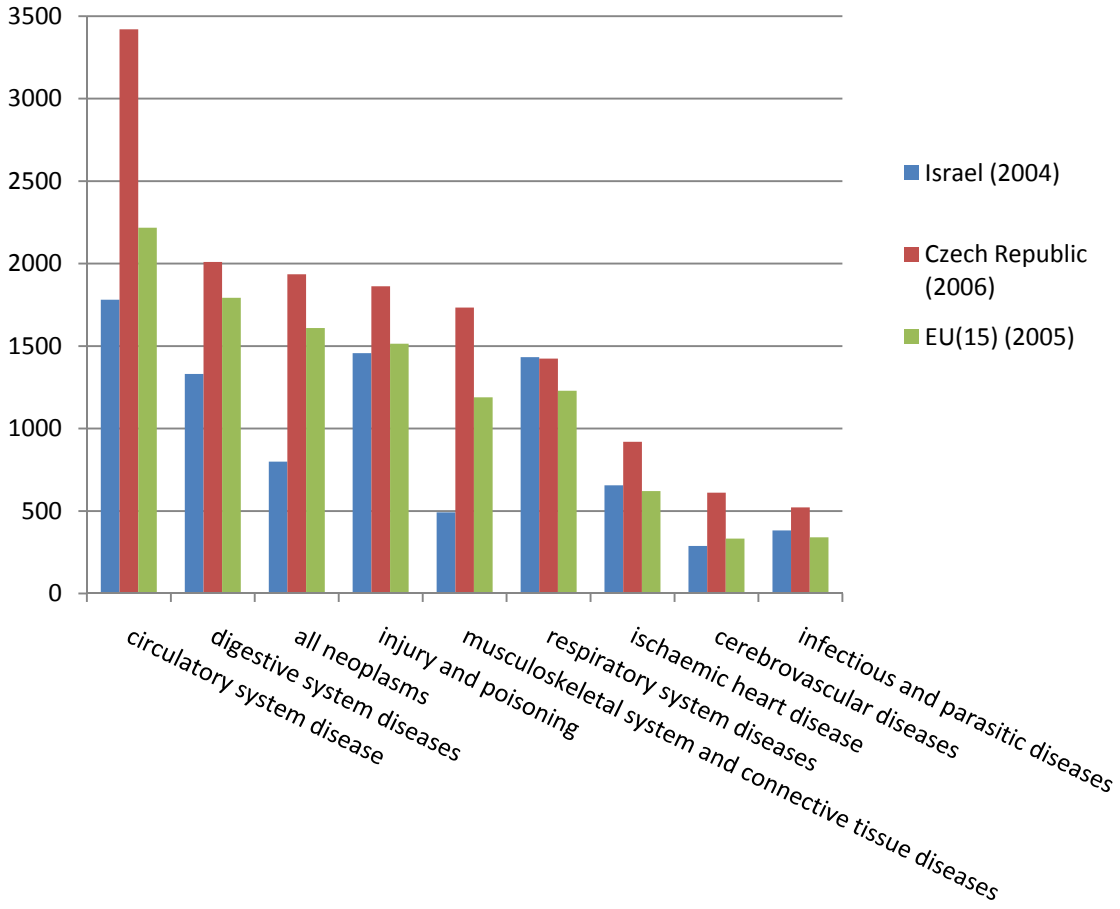
Unintentional injuries represent the fourth cause of burden of disease in all groups except in Israeli females were they are in seventh place. The burden of unintentional injuries is higher in the Czech Republic than in Israel among both males and females.

Burden from respiratory disease is higher in Israel than in the Czech Republic among both males and females, while burden from digestive disease is higher in the Czech Republic.

The diabetes mellitus burden in Israel is higher than in the Czech Republic.

The burden of disease can also be estimated by hospital discharge rate. The hospital discharge rate is the ratio of patients discharged with a particular diagnosis to the total number of patients discharged during the given calendar year. However, the different age structure between the countries is not corrected in hospital discharges, making comparison more difficult. Figure 25 presents hospital discharge rates of common disease categories in Israel, the Czech Republic and the EU-15.

Figure 25 - Hospital discharges per 100,000, latest data



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

When comparing absenteeism from work due to illness, rates are five times higher in the Czech Republic compared to Israel with 21.2 days per employee per year in 2006 in the former and 4.2 days per employee per year in 2006 in the latter[2].

In the Czech Republic in 2006 there were 484 new invalidity/disability cases per 100,000, about 45% higher than in Israel, in which there were 332 new invalidity/disability cases per 100,000 in 2006[2].

In 2002, 75.6% of the Israeli population self-assessed their health as good while only 55% of the Czech population self-assessed their health as good[2].

All those indicators reflect higher morbidity in the Czech Republic, mainly due to cardiovascular diseases, neoplasms, digestive system diseases, musculoskeletal system and connective tissue diseases and injury and poisoning.

7.4 Lifestyle factors

Lifestyle factors, like smoking, alcohol consumption and overweight, are considered risk factors for a host of diseases, including cardiovascular diseases and cancers. Major differences among lifestyle factors may explain differences in mortality and morbidity between the countries.

7.4.1 Smoking

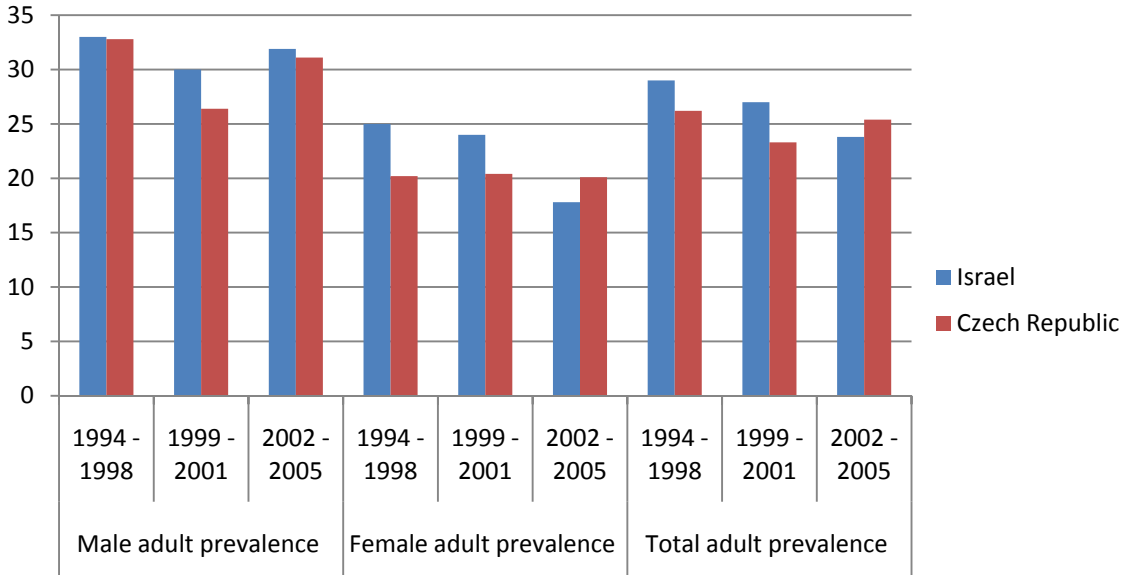
As demonstrated in Figure 26, during the years 1994-1998, smoking prevalence among adult males, (defined as daily smokers aged more than 15 years), was similar in Israel and in the Czech Republic, at 33% and 32.8% respectively. During the same years, smoking prevalence among adult females in Israel (25%) was 4.8% higher than in the Czech Republic (20.2%) leading to 2.8% higher total adult smoking prevalence in Israel, at 29%, than in the Czech Republic at 26.2%.

Between 1999 and 2001, smoking prevalence among males decreased both in Israel, to 30%, and in the Czech Republic, to 26.4%. The decrease of 6.4% in the Czech Republic was more significant than the 3% decrease in Israel. Among females, smoking prevalence decreased by 1% in Israel (24%) and remained almost unchanged in the Czech Republic (20.4%). Total adult smoking prevalence during those years was again higher in Israel (27%) than in the Czech Republic (23.3) by 3.7% due to the larger decrease in smoking prevalence among males in the Czech Republic.

During the years 2002-2005, smoking prevalence among males increased both in Israel (31.9%) and in the Czech Republic (31.1%), but the increase in the Czech Republic of 4.7% was higher than the increase of 1.9% in Israel, leading to similar prevalences. Among Israeli females, prevalence dropped by 6.2% between 1999-2001 and 2002-2005 to 17.8% and among Czech females, prevalence decreased only slightly to 20.1%. Due to the large decrease in smoking prevalence among females in Israel, total adult smoking prevalence in Israel during those years decreased to 23.8%, 1.6% lower than the total smoking prevalence in the Czech republic, which increased to 25.4% due to the large increase among males.

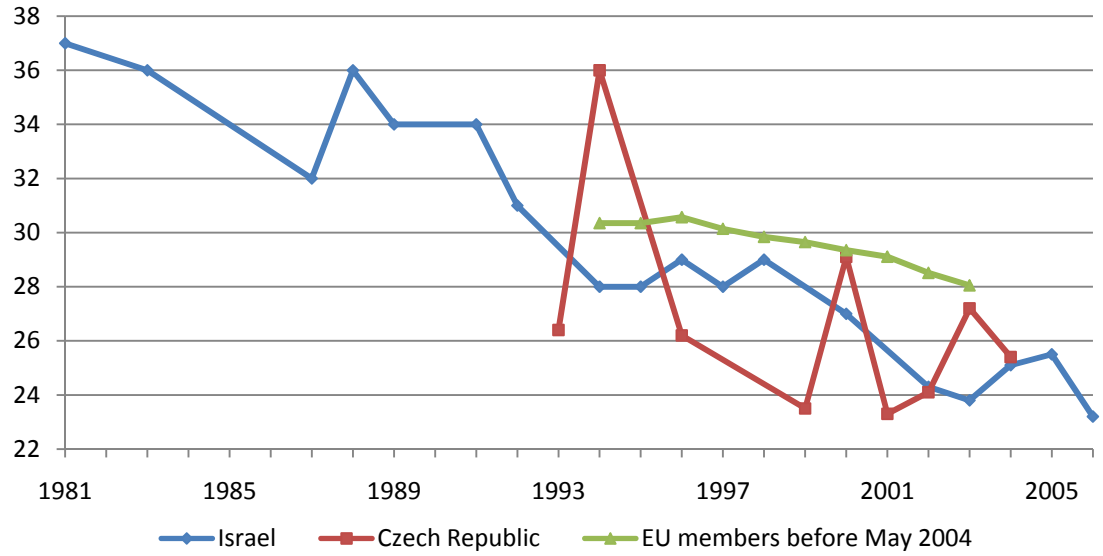
Smoking prevalence among adults in both countries is generally similar and, as seen in Figure 27, is lower than the EU-15 average since the mid-1990s. Thus, smoking differences can’t explain the large difference in life expectancy and mortality between the countries.

Figure 26 - Smoking prevalence in adults (%)



Source: Tobacco Control Database. WHO Regional Office for Europe.

Figure 27 - Percentage of regular daily smokers in the population, age 15+



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

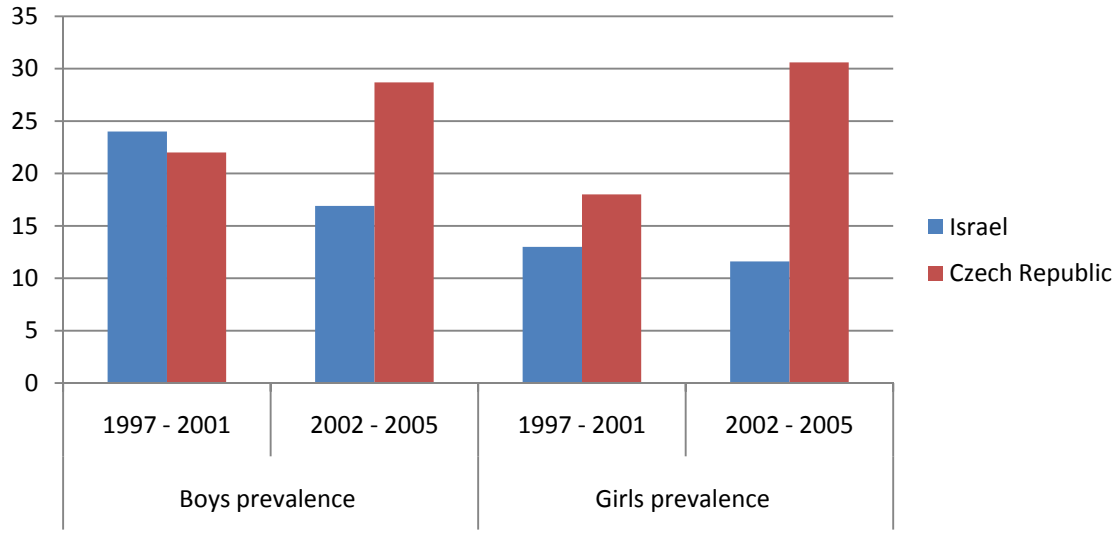
As can be seen in Figure 28, smoking prevalence in young people (defined as those smoking tobacco at least once a week, aged 15 years) has decreased in Israel and increased in the Czech Republic between the 1997-2001 and 2002-2005 periods in both males and females.

In Israel during the years 1997-2001, smoking prevalence in young males was at 24%, higher than the prevalence in the Czech Republic, which was at 22%. In the years

2002-2005, smoking prevalence in young males in Israel decreased by 7.1% compared with the previous record period of 1997-2001, to reach 16.9%. In the same period, prevalence increased by 6.7% in the Czech Republic, to reach 28.7%.

Smoking prevalence in young females in the years 1997-2001 was higher in the Czech Republic (18%) than in Israel (13%). In the years 2002-2005, the difference between the countries increased even more compared to 1997-2001, with sharp increase of 12.6% among young Czech females to reach 30.6% and a small decrease among young Israeli females to fall to 11.6%.

Figure 28 - Smoking prevalence in young people (%)



Source: Tobacco Control Database. WHO Regional Office for Europe.

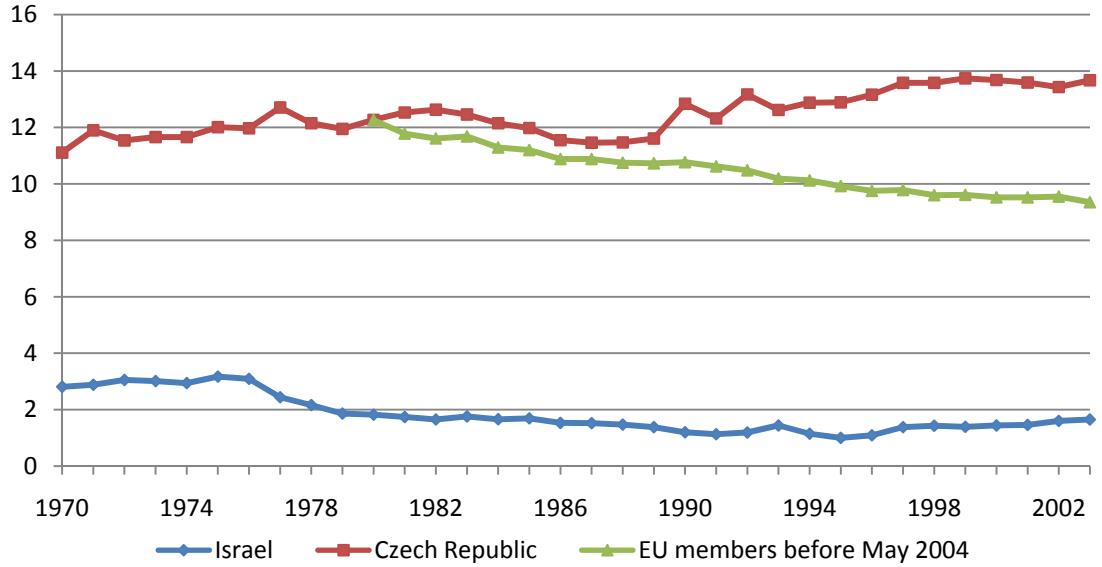
7.4.2 **Alcohol**

Figure 29 shows that alcohol consumption in the Czech Republic is more than eight times higher than in Israel. In 2003, the Czechs consumed on average 13.7 liters of pure alcohol per capita compared to 1.7 liters per capita in Israel. This is also more than 45% higher than the EU-15 average. Alcohol consumption in the Czech Republic increased by 17% between the late-1980s from 11.6 liters per capita in 1989 to 13.6 liters per capita in 1997, perhaps due to a large increase in incoming tourism. Since 1997 alcohol consumption in the Czech Republic has been relatively constant. In Israel, consumption has been increasing since the mid-1990s, resulting in an increase of over 50%[2].

As a result of the higher consumption of alcohol in the Czech Republic compared to Israel, the death rate from alcohol-associated causes is higher in the former. This can be exemplified in the higher death rate from chronic liver disease and cirrhosis (4.5 times higher in the Czech Republic compared to Israel), external causes and poisoning (1.7 times higher in the Czech Republic compared to Israel), and rate of road traffic fatalities involving alcohol, as can be seen in Figure 30, which is more than 5.5 times higher in the Czech Republic compared to Israel.

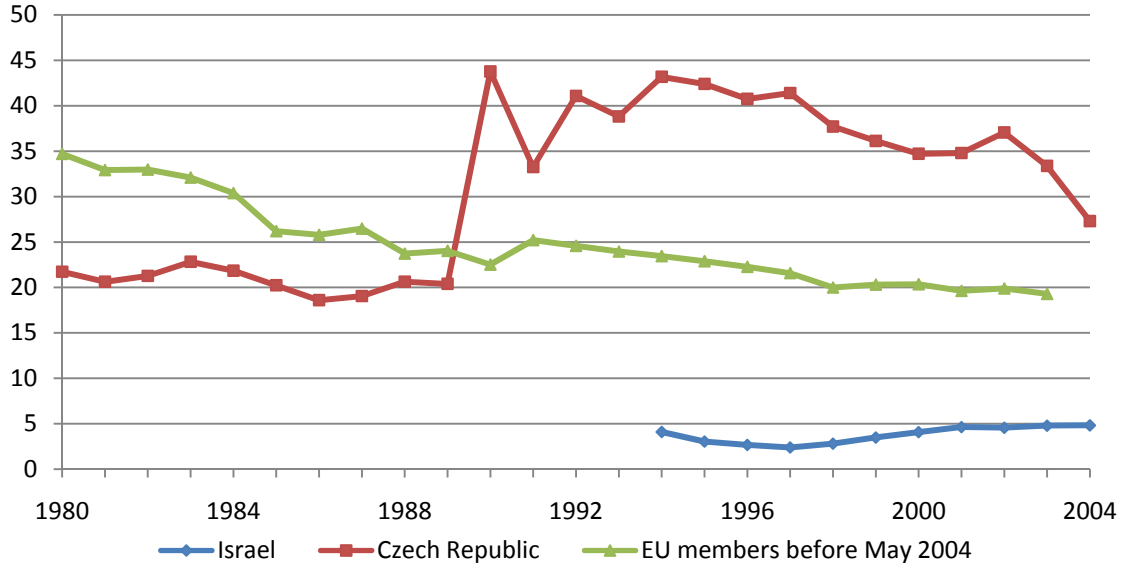
In addition, alcohol consumption may be responsible, at least partly, for the higher rate of mortality and morbidity and lower life expectancy in the Czech Republic compared to Israel.

Figure 29 - Pure alcohol consumption, liters per capita



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 30 - Road traffic accidents involving alcohol per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.4.3 **Overweight**

The average daily kilocalorie intake per person in 2003 was relatively similar in both countries, the intake in Israel (3,475 kcal) being 5% higher that the intake in The Czech Republic (3,308 kcal) [14].

As seen in Figure 31, in Israel in 2001, 62% of the adult population was overweight (BMI >=25), 10% higher than in the Czech Republic in 2002, where 52% of the adult population was overweight.

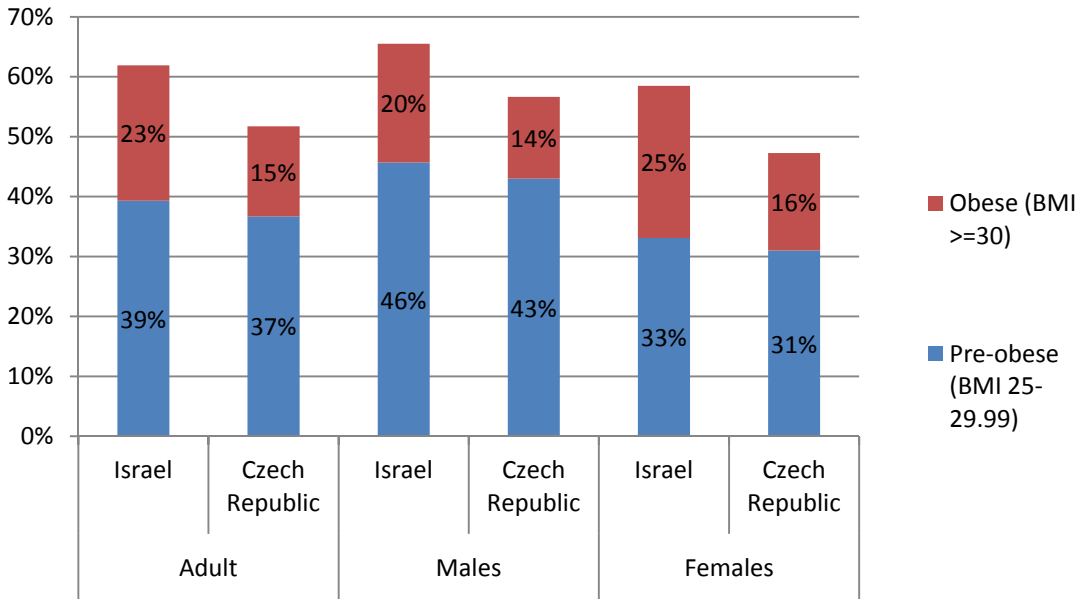
Among the overweight adult population, pre-obesity (BMI 25-29.99) has a similar proportion in both countries, with a 39% pre-obesity rate in Israel and a 37% rate in the Czech Republic.

In both countries the percentage of pre-obesity among males is higher than among females; in Israel 46% of males are pre-obese compared to 33% of females and in the Czech Republic 43% of males are pre-obese compared to 31% of females.

Full-blown obesity (BMI >=30) rates are on the other hand significantly higher in Israel compared to the Czech Republic, with 23% adult obesity in the former and 15% adult obesity in the latter. In Israel, obesity among females is higher relative to males, 25% compared to 20%. In the Czech Republic the difference between female and male obesity is smaller, with a rate of 16% among females and 14% among males.

The differences in the rate of overweight in the populations can't explain the large difference in mortality, life expectancy and morbidity between the countries as this rate is higher in Israel. It may partly explain, however, the higher death rate from diabetes in Israel.

Figure 31 - Distribution of overweight in the adult Israeli and Czech population



Source: Global Database on Body Mass Index, WHO, August 2008

7.5 Health Care Resources

Health care resources indicators, like the rate of available hospitals, beds, and health care personnel reflect the health care system's ability to care for patients in terms capacity.

7.5.1 Hospitals

Although the gross number of hospitals in Israel is higher than in the Czech Republic (5.3 hospitals per 100,000 in the former and 3.5 hospitals per 100,000 in the latter), the proportion of acute (short stay) hospitals is much smaller in Israel than the Czech Republic. Therefore the proportion of long-term hospitals is much higher in Israel than in the Czech Republic[2].

In the Czech Republic 54% of all hospitals are acute hospitals, equating to 1.9 acute hospitals per 100,000, and 46% are long-term hospitals. In Israel only 12% of the hospitals are acute hospitals, equating to 0.65 acute hospitals per 100,000, and 88% are long-term hospitals[2].

Those findings may indicate that Israel has a deficiency in acute hospitals while the Czech Republic has a deficiency in long term hospitals. The deficiency in long term hospitals in the Czech Republic may be partially responsible for the higher mortality rate and lower life expectancy in the Czech Republic.

7.5.2 Health care beds

Hospital beds are all hospital beds which are regularly maintained and staffed and immediately available for the care of admitted patients. They are used as a measure of hospital capacity.

As demonstrated in Figure 32, in the Czech Republic, the rate of hospital beds decreased between 1990 and 1999 by almost 30%; since then the rate of hospital beds has been stable and in 2006 was at 838 beds per 100,000. This is 40% higher than in Israel, in which 597 beds were available per 100,000 in 2006, and almost 50% higher than the EU-15 average, in which 564 beds per 100,000 were available in 2005.

In Israel, the rate of hospital beds decreased during the 1980s and became stable from the early 1990s. Since the year 2000 the rate of hospital beds in Israel has been higher than the EU-15 average, due to a decrease in the rate of hospital beds in the EU-15.

However, when considering only beds in acute care hospitals (beds in which the average length of stay is 18 days or less), as shown in Figure 33, Israel has very low rate, with only 35% of all beds being acute beds, which in 2006 was 207 beds per 100,000, almost half of the rate in the EU-15 and about third of the rate in the Czech republic.

The rate of acute care hospital beds in Israel was lower than the Czech Republic and the EU-15 average also in 1980 at about the same ratio as at 2006.

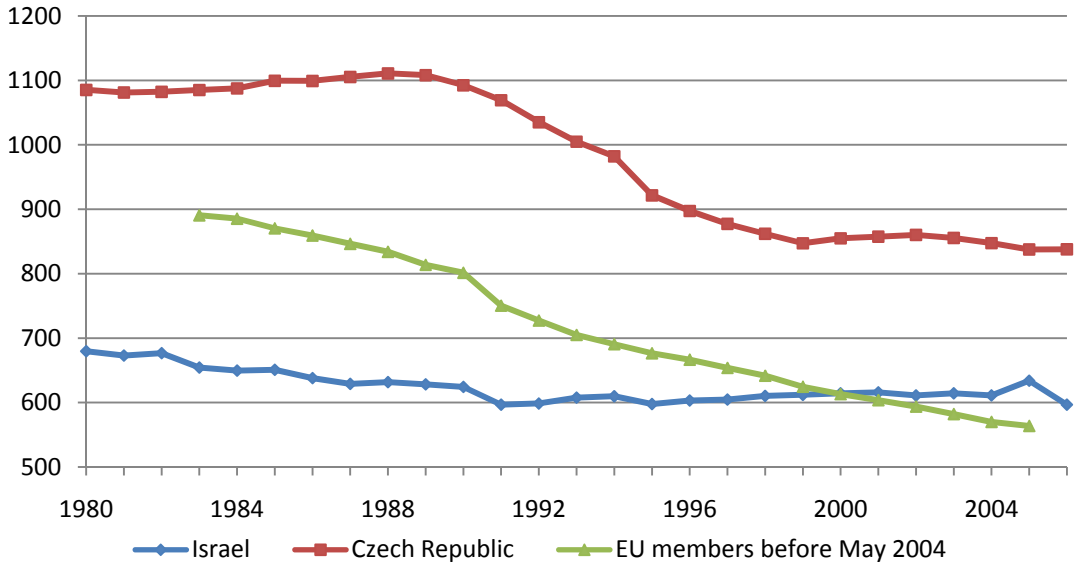
Figure 33 also shows that in the Czech Republic, the acute care hospital beds rate in 2006 was 613 per 100,000, representing 73% of all beds and being more than 50% higher than the EU-15 average rate, which was 391 per 100,000 in 2005. Rates in the Czech Republic have been falling mainly since the early-1990s, but in recent years the rate of decline has decreased.

When considering long-term beds only, Israel has a 70% higher rate than the Czech Republic because in the Czech Republic, only 27% of beds are long term beds (226.3 long term beds per 100,000), while in Israel 65% of beds are long term beds (388 long term beds per 100,000).

Thus, acute hospital capacity, which is higher in the Czech Republic, can't explain the large difference in mortality and life expectancy between the countries. However the deficiency of long-term beds may partly explain this difference.

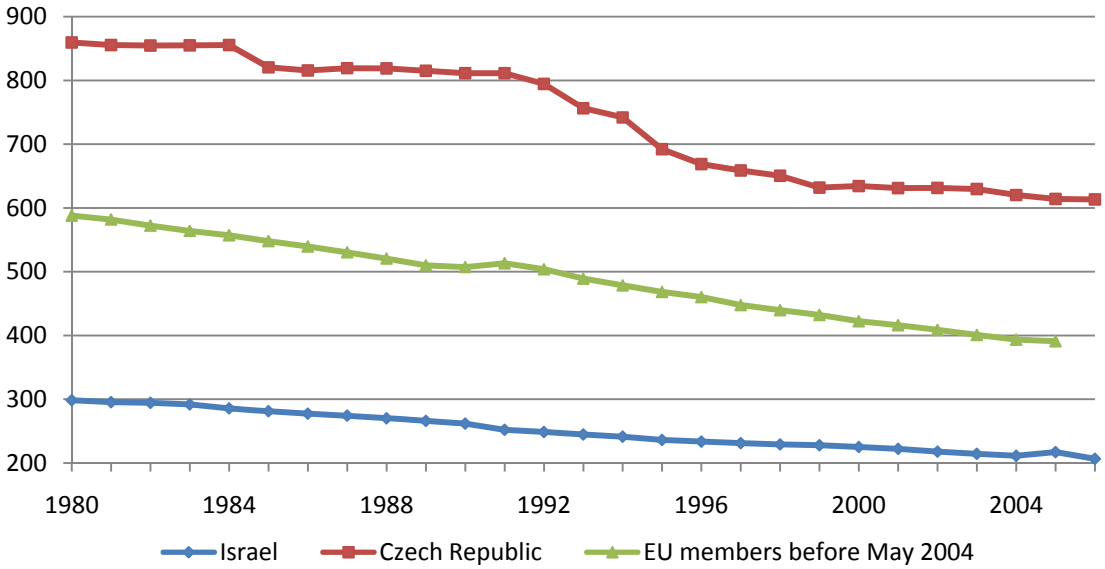
Hospital capacity in Israel is low, which can also be seen by the high acute care bed occupancy and turnover in Israel. This can lead to crowdedness in hospitals, and potentially in patients being turned away.

Figure 32 - Hospital beds per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 33 - Acute care hospital beds per 100,000



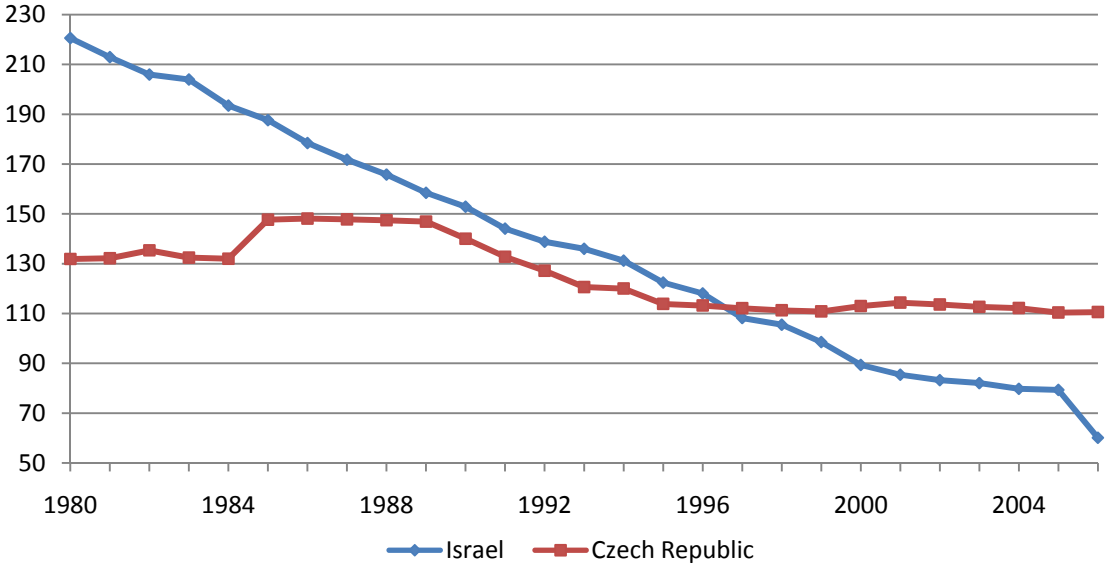
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Psychiatric care hospital beds are hospital beds accommodating patients with mental health problems.

As illustrated in Figure 34, the rate of psychiatric care hospital beds in the Czech Republic decreased between 1990 and 1999 by more than 30%; and since then the rate of psychiatric care hospital beds has been stable. In 2006 111 beds were available per 100,000, 85% higher than in Israel, in which 60 beds were available per 100,000.

Before 1997, the rate of psychiatric care hospital beds in Israel was higher than in the Czech Republic, but due to the continuous decrease in beds of this category in Israel this situation changed and the gap has been steadily increasing since 1997.

Figure 34 - Psychiatric hospital beds per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

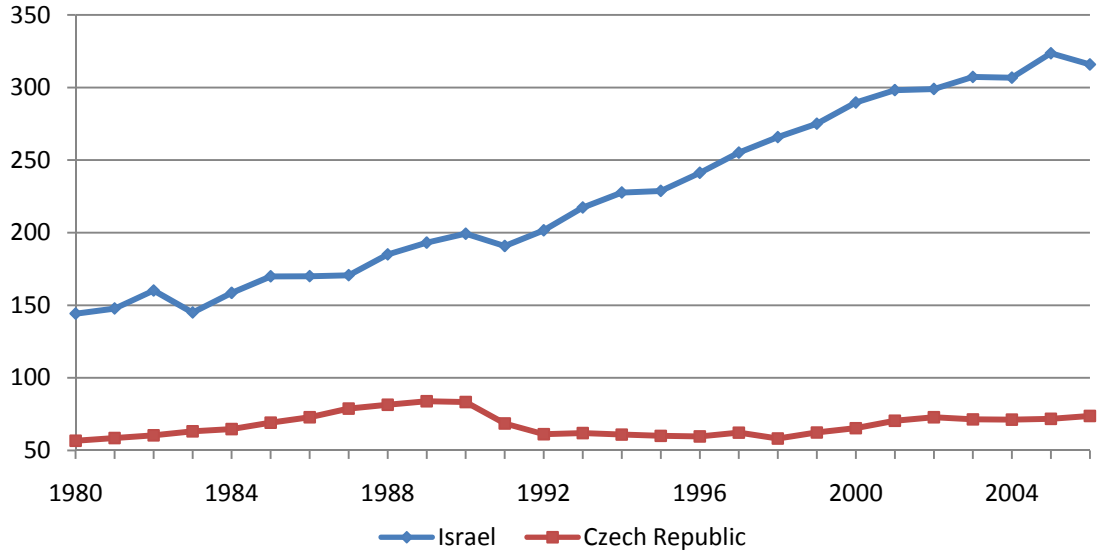
Nursing and elderly home beds are defined as beds in nursing homes for the physically and mentally disabled who need assistance in daily living activities on a continuing basis; and beds in homes for the elderly, i.e. establishments providing principal custodial care.

Figure 35 shows the rate of nursing and elderly home beds in the Czech Republic increasing slowly between 1975 and 1989, after a tenfold decrease in 1975 (from 433 per 100,000 in 1974 to 41 per 100,000 in 1975) to be 84 per 100,000 in 1989. Between 1989 and 1992 the rate of nursing and elderly home beds decreased again to 61 per 100,000. Since 1992 the rate of nursing and elderly home beds is increasing slowly and was 74 per 100,000 in 2006.

In Israel, the rate of nursing and elderly home beds has increased more than twofold since 1980, from 144 per 100,000 to 316 per 100,000 in 2006, four times higher than in the Czech Republic in the same year.

As a result, the rate of nursing and elderly home beds in the Czech Republic is lower than in Israel, although the population in the Czech Republic is older. This may indicate insufficient nursing and elderly home beds in the Czech Republic, hampering improvement in elderly care, which in turn can contribute to the higher mortality rate and morbidity and lower life expectancy in the Czech Republic. It could also indicate that in the Czech Republic there is more involvement in the care of the elderly by family members, or more independence among the elderly, reducing the need for nursing and elderly home beds. However, given the higher mortality rates, it is more likely that these numbers represent a significant gap in resources required to properly long term care for the elderly.

Figure 35 - Nursing and elderly home beds per 100,000



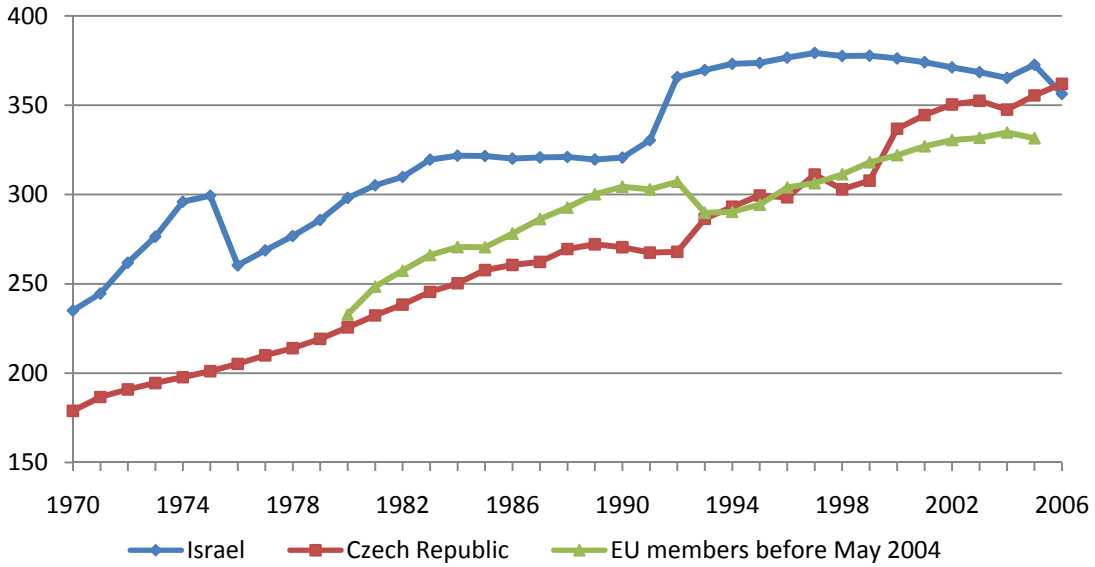
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

7.5.3 **Health care personnel**

As can be seen in Figure 36, the number of physicians per 100,000 in both countries is similar. In the Czech Republic, the number of physicians per 100,000 has doubled since 1970 and since 1997 it has been higher than the EU-15 average. In 2006 there were 362 physicians per 100,000 in the Czech Republic, which is slightly higher than in Israel, which had 356 physicians per 100,000 in the same year. Both countries have more physicians per 100,000 than the EU-15 average, which was 332 physicians per 100,000 in 2005.

In Israel the number of physicians per 100,000 increased by 60% between 1970 and 1997, from 235 physicians per 100,000 to 379 physicians per 100,000. Since 1997 there has been a slow trend of decline in the number of physicians per 100,000 in Israel which may indicate an insufficient number of physicians in the future.

Figure 36 - Physicians per 100,000



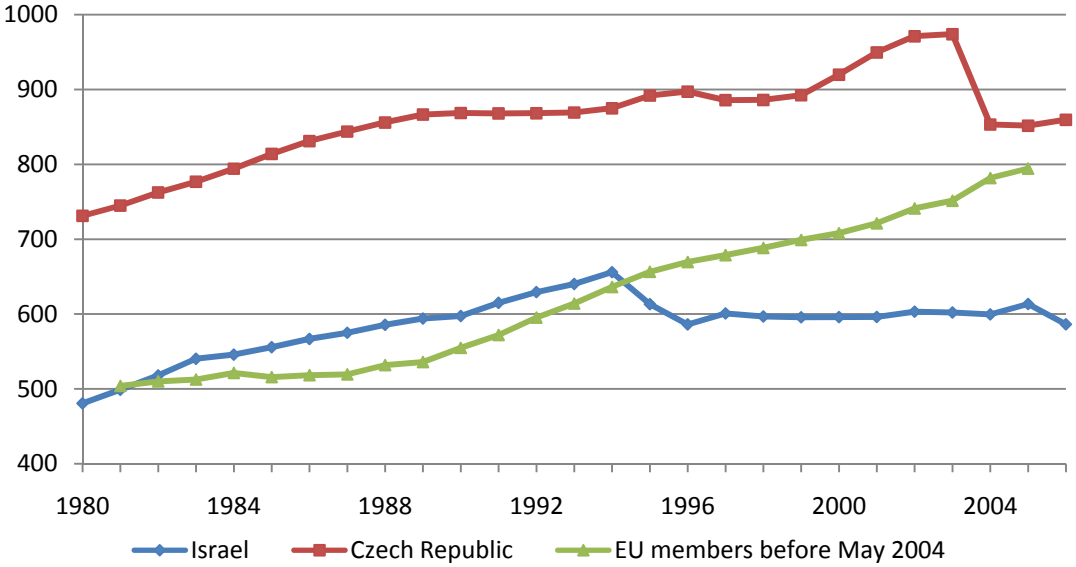
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

In Figure 37 we can see that in 2006 there were 860 nurses per 100,000 in the Czech Republic, more than 45% higher than in Israel, in which there were 586 nurses per 100,000. This is even after a sharp decrease in the number of Czech nurses in 2004. Before 2004, the number of Czech nurses per 100,000 had been increasing gradualy since 1980. Since 2004 the number of nurses has been stable. The number of nurses per 100,000 in the Czech Republic is 8% higher than the EU-15 average, which was 794 nurses per 100,000 in 2005.

In Israel, the rate of nurses increased gradually between 1980 and 1994 by about 36% and then decreased in the following two years by almost 12%. Since 1996 the number of nurses per 100,000 has been stable. Since 1995, Israel has had less nurses per 100,000 than in the EU-15 due to a decreasing number of nurses in Israel during the 1995-1996 period compared to a corresponding increase in the number of nurses in the EU-15. This may indicate an insufficiency of nurses in Israel.

As the comparison of the rate of physicians and nurses between the Czech Republic and Israel would suggest that the Czech Republic is better resourced to address health issues, this rate therefore doesn't explain the higher mortality and morbidity and lower life expectancy in the Czech Republic compared to Israel.

Figure 37 - Nurses per 100,000



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

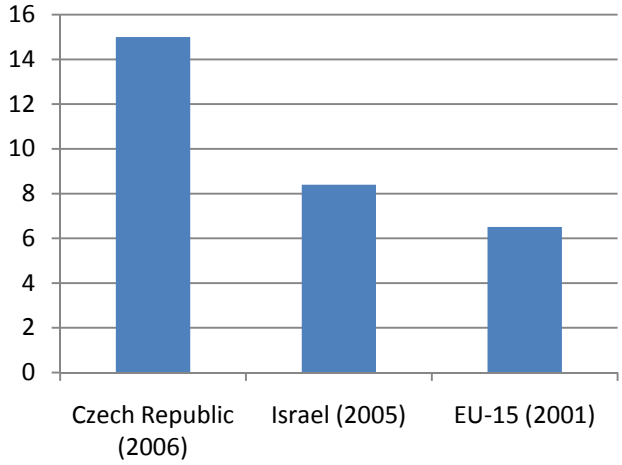
7.6 Health care utilization

Health care utilization indicators reflect the availability and usage of the health care system.

As demonstrated in Figure 38, in the outpatient setting, the average Czech person visits the physician 80% more often than the average Israeli person. In 2006 in the Czech Republic there were 15 outpatient contacts per person per year while in Israel there were 8.4 outpatient contacts per person per year. The EU-15 average in 2001 was 6.5 outpatient contacts per person per year, lower than both the Czech Republic and Israel[2].

The higher outpatient contacts in the Czech Republic may be due to the older population structure, higher incidence of disease or injury and higher availability of primary health care.

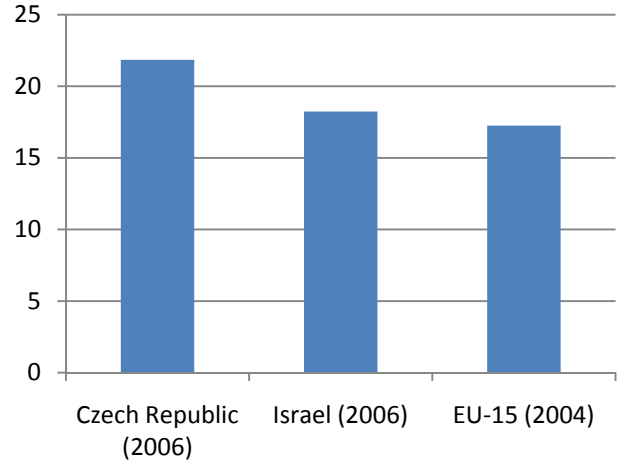
Figure 38 - Outpatient contacts per person per year



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

In the inpatient setting, the admission rate is 20% higher in the Czech Republic than in Israel, as demonstrated in Figure 39. In 2006 in the Czech Republic there were 21.9 admissions per 100 while in Israel admission rate was 18.2 per 100. The admission rate in both countries is higher than the EU-15 average which was 17.3 per 100 in 2004[2].

Figure 39 - In-patient care admissions per 100



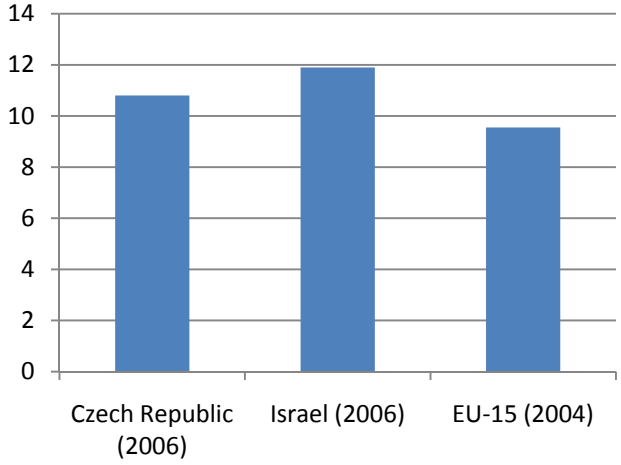
Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

As seen in Figure 40, average length of stay in 2006, if all hospitals are included, was 1.1 days longer in Israel than in the Czech Republic with length of stay of 11.9 days in the former and 10.8 days in the latter. Both countries had a higher average length of stay than the EU-15 average, which was 9.6 days in 2004. If only acute care hospitals are included, as seen in
Figure 41, average stay in the Czech Republic was almost twice that in Israel in 2006, with 8 days in the former and 4.1 days in the latter. Comparing to the EU-15 average, in which average stay in acute care hospitals was 6.7 days in 2004, the average stay in

acute care hospitals in the Czech Republic is longer by 1.3 days and in Israel is shorter by 2.6 days.

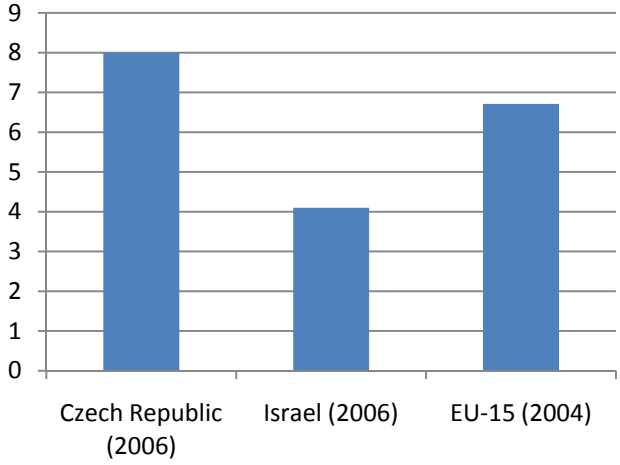
Thus, the average length of stay in all hospitals in Israel is longer than in the Czech Republic due to the longer stays in long-term hospitals in Israel. In consequence, the average stay in acute care hospitals is shorter in Israel than in the Czech Republic, but longer in long-term care.

Figure 40 - Average length of stay, all hospitals



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 41 - Average length of stay, acute care hospitals only

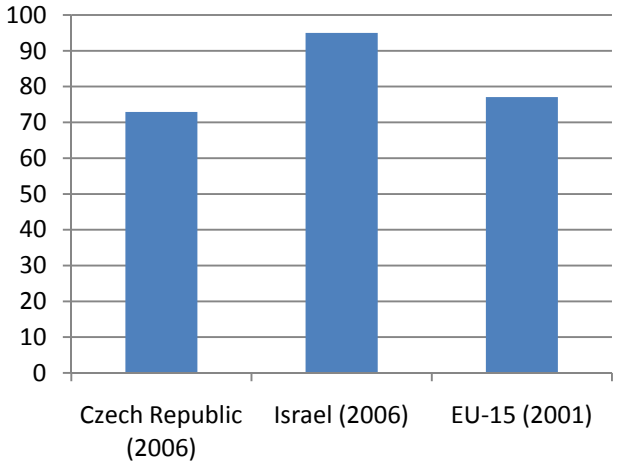


Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

The average length of stay in acute care hospitals decreased during the 1980s-1990s in Israel and in the Czech Republic as in all modern countries, due to improvements in medicine. The decreasing trend in the Czech Republic was sharper than in Israel and is still continuing, however compared to Israel, the starting point was much higher. In Israel the average length of stay in acute care hospitals has been stable since 2001[2].

The acute care bed occupancy rate, which describes the percentage of time during a year a bed is occupied in acute care hospitals, was very high in Israel in recent years (more than any OECD country and European country) and was 95% in 2006, as seen in Figure 42. In the same year, the occupancy rate in the Czech Republic was 73% and the average of the EU-15 was 77% in 2001. This very high acute care bed occupancy rate in Israel is due to the very low number of acute care beds.

Figure 42 - Bed occupancy rate in %, acute care hospitals only



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

The acute care bed turnover rate, which describes the number of patients using one acute care bed during a year, is also very high in Israel (more than any OECD country), and was 86 in 2005, compared to the Czech Republic in which it was 36[14]. This very high acute care bed turnover rate in Israel is due to the very low number of acute care beds and very short average length of stay in acute care hospitals.

Table 3 presents the vaccination schedule employed in each country, percentage of target population vaccinated and incidence of vaccine-preventable diseases. As seen in Table 3, both countries employ comprehensive routine vaccination programs for infants and children that include vaccines against diphtheria, tetanus, pertussis, measles, mumps, rubella, Haemophilus Influenza B, Hepatitis B and Poliomyelitis. The Bacille Calmette-Guérin vaccine is used routinely in the Czech Republic but not in Israel and a Hepatitis A vaccine is used routinely in Israel but not in the Czech Republic.

In both countries a high percentage of the target population is vaccinated, although coverage is slightly lower in Israel.

Among vaccine-preventable diseases, incidence of pertussis was more than nine times higher in Israel compared to the Czech Republic in 2006, while incidence of mumps was much higher in the Czech Republic than in Israel in 2003. Hepatitis B incidence is also higher in the Czech Republic.

Table 3 - Vaccination schedule, percentage of target population vaccinated and incidence of vaccine-preventable diseases

	Czech Republic			Israel		
	Vaccination schedule	% of target population vaccinated	Incidence per 100,000 (2006)	Vaccination schedule	% of target population vaccinated	Incidence per 100,000 (2006)
Diphtheria	13, 17, 21 weeks; 18 months; 5 years	98% (2006)	0	2, 4, 6, 12 months; 7 years; 13 years	96% (2006)	0
Tetanus	13, 17, 21 weeks; 18 months; 5 years	98% (2006)	0	2, 4, 6, 12 months; 7 years; 13 years	96% (2006)	0.0142
Pertussis	13, 17, 21 weeks; 18 months; 5 years	98% (2006)	2.31	2, 4, 6, 12 months; 7 years	96% (2006)	21.19
Measles	15, 21 months	96.9% (2004)	0.07	12 months; 6 years	96% (2006)	0.13
Mumps	15, 21 months	96.7% (2003)	51.16	13 months; 6 years	95% (2003)	0.0992
Rubella	15, 21 months	97% (2006)	0.0791	14 months; 6 years	96% (2006)	0.0567
Haemophilus Influenza B	13, 17, 21 weeks; 18 months	97% (2006)	0.1563 [a]	2, 4, 6, 12 months	96% (2006)	0.1487 [a]
Hepatitis A	no routine vaccination		1.28	18, 24 months		1.08
Hepatitis B	13, 17, 21 weeks; 18 months; 12 years (x3)	98% (2006)	3.53	birth; 1, 6 months	98% (2006)	1.56
Poliomyelitis	13, 17, 21 weeks; 18 months; 1, 2, 10 years	98% (2006)	0	2, 4, 6, 12 months; 7 years	96% (2006)	0
Bacille Calmette-Guérin vaccine	4 days; 11 years	99% (2006)	9.31	no routine vaccination	68% (1982)	5.44

Source: WHO Vaccine Preventable Diseases Monitoring System**,** 2008 global summary
Note: [a] Data from 2005

Overall, utilization of health care is higher in the Czech Republic, except the length of stay in long-term hospitals, which may contribute to the differences in mortality rate and life expectancy between the countries.

7.7 **Health care expenditure**

As seen in Figures 43 and 44, total expenditure on health care in 2005 in Israel was estimated to be 7.8% of GDP and 2143 Purchasing Power Parity Dollars (PPP$) per capita. In the Czech Republic, total expenditure on health care in the same year was estimated to be 7.1% of GDP and 1447 PPP$ per capita. Although the difference between the countries' total expenditure on health care as part of GDP is not big (10%), this translates to almost 50% more money going to the health care system in Israel relative to the Czech Republic due to the higher GDP in Israel; GDP per capita was 26,051 PPP$ in Israel and 20,633 PPP$ in the Czech Republic in 2005[2]. Total expenditure on health in both countries is lower than the EU-15 average, which was 9.6% of GDP and 2883 PPP$ per capita in 2005.

While total expenditure on health care in PPP$ per capita has been increasing in both Israel and the Czech Republic and also in the EU-15, total expenditure on health care as a percentage of GDP has been decreasing in Israel since 2002 and in the Czech Republic since 2003. This may be due to a stronger increase in GDP than the increase in health expenditure. In the EU-15 total expenditure on health care as percentage of GDP is continually increasing[2].

Figures 43 and 44 also demonstrate that public expenditure on health in 2005 in Israel was 66.5% of total expenditure on health, while in the Czech Republic public expenditure on health care was 88.6% of total expenditure on health. Therefore, public funding of the health care system in the Czech Republic was 33% higher than public funding in Israel, leading to higher private expenditure on health in Israel.

Public expenditure on health in both countries is declining, but the decline in Israel is more significant: while public expenditure on health decreased by 2% between 1998 and 2005 in the Czech Republic, it decreased by 7.9% between the same years in Israel[2].

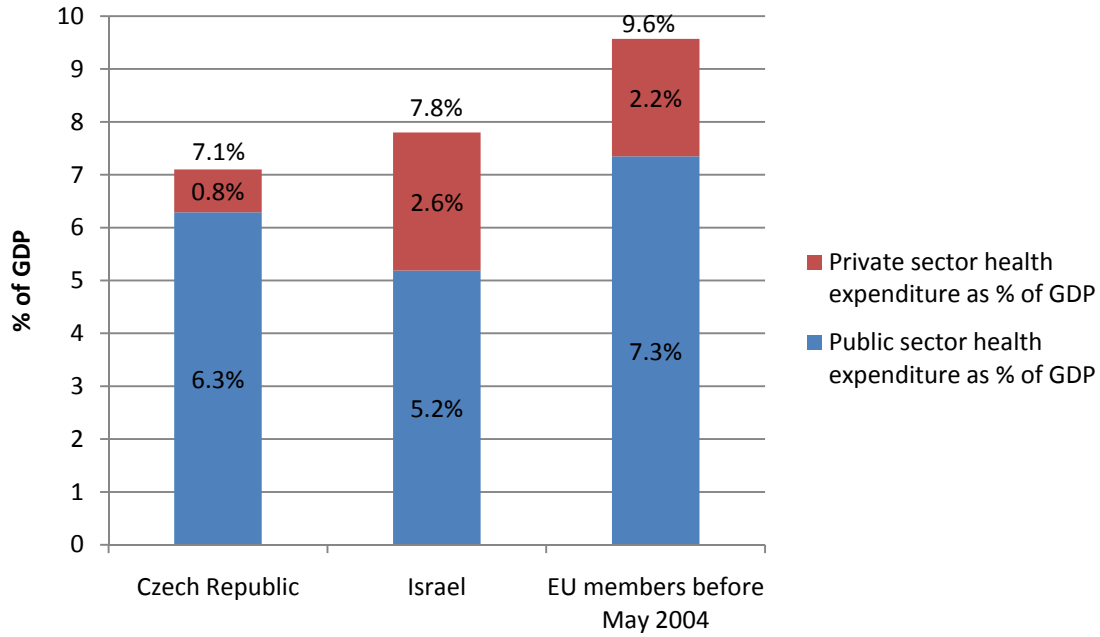
In 2005, private expenditure on health accounted for 33.5% of total expenditure on health in Israel and for 11.4% of total expenditure on health in the Czech Republic. Private households' out-of-pocket payments in 2005 accounted for 69.5% and 95.3% of the private expenditure on health in Israel and in the Czech Republic, respectively. This translates to out-of-pocket expenditure on health of 23.3% of total health expenditure in Israel and 10.9% of total health expenditure in the Czech Republic. In Israel, the remaining private expenditure on health went to private health insurance, which accounted for 8.5% of total expenditure for health. Private health insurance expenditure in the Czech Republic in 2005 was very low, accounting for only 0.2% of total expenditure for health[2,14].

Accordingly, private expenditure on health is almost three times higher in Israel than in the Czech Republic. The high private expenditure on health in Israel may cause inequality in health care provisioning among different socioeconomic groups and reduce health care quality among low socioeconomic groups.

While in the Czech Republic almost all private expenditure on health are out-of-pocket payments with almost no expenditure on private health insurance, in Israel, about 30% of private expenditure on health goes to private health insurance[14]. The higher rate of expenditure on private health insurance may indicate inadequacy in the coverage of publicly provided health care, and a greater willingness/capacity on the part of private citizens to invest in a higher standard of health care.

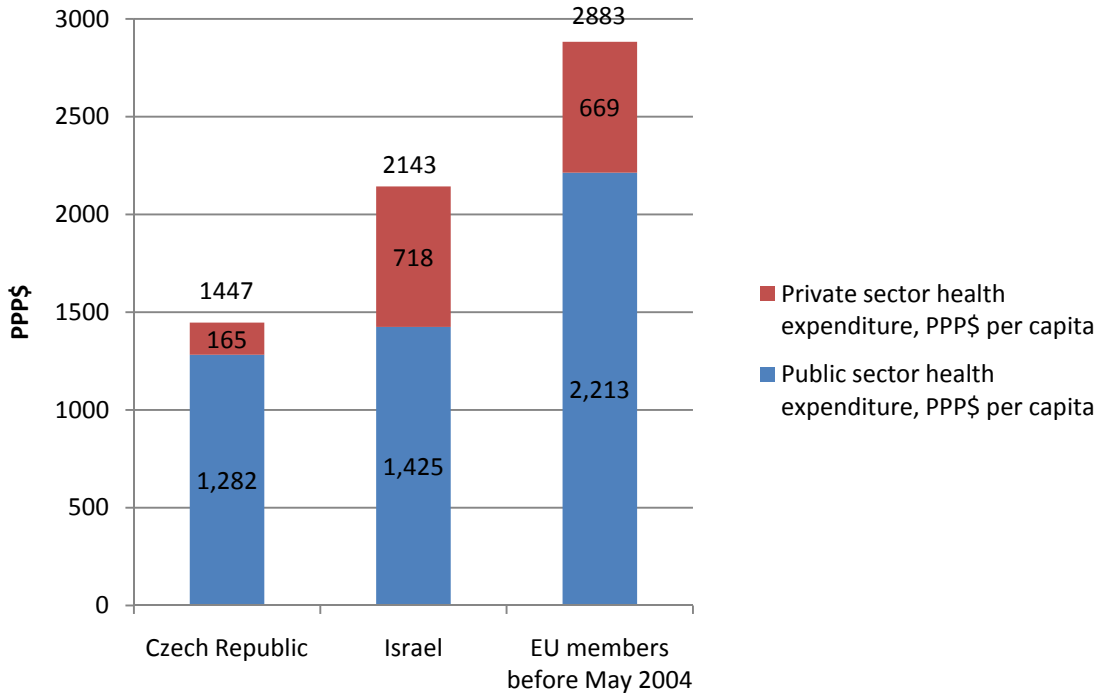
The lower expenditure on health in the Czech Republic relative to Israel may be partly responsible to the higher mortality and morbidity and lower life expectancy in the Czech Republic.

Figure 43 - Health expenditure as percentage of GDP (2005)



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

Figure 44 - Health expenditure in PPP$ per capita (2005)



Source: Health for All database, Copenhagen, WHO Regional Office for Europe, August 2008

8. Discussion

A variety of standard indicators have been used in this thesis to compare the overall health status and health care of the inhabitants of the Czech Republic and Israel. In order to properly situate these results in a framework of countries which represent an acceptable standard, they have also been compared against the indicators of the EU-15.

Demographically, the population structure of the two countries is different: Israel has a young population with a high fertility rate while the Czech population is older with a low fertility rate. Accordingly, incidence of age-related diseases (e.g. cardiovascular diseases, cancer, falls) and long term care capacity are expected to be higher in the Czech Republic. However, long term care capacity is lower than in Israel, reflecting a deficiency in this area.

Life expectancy, while improving, is still 4 years lower in the Czech Republic than in Israel and age-standardized death rate from all causes is more than 45% higher in the Czech Republic. Both of those finding are significant and indicate a 17-year lag of the Czech Republic behind Israel in life expectancy and age-standardized death rate.

The excess mortality in the Czech Republic compared to Israel and the EU-15 which causes this 17-year lag is concentrated mainly in cardiovascular diseases and cancers because those two causes are responsible for a high percentage of deaths compared to

other disorders. External causes of death and diseases of the digestive system also contribute to the excess mortality, but less profoundly.

An examination of the data found that the Czech Republic has higher smoking prevalence among young people, a lower long-term health care hospital and bed rate, a lower nursing and elderly home bed rate, the consequent lower average length of stay in long-term hospitals, and the lower expenditure on health, all of which adversely influence health status and health care, and account for the 17 year lag of Czech Republic.

The prevalence of obesity and pre-obesity, smoking prevalence among adults, the availability of acute health care hospitals and beds, the rate of available physicians and nurses, the number of outpatient visits to the physician and admission rates, the average length of stay in acute care hospitals and the vaccination schedule and percentage of target population vaccinated can't be held responsible for this gap, as the data suggests that the situation in the Czech republic is similar to or even more favourable than in Israel.

Other possible determinants, which were not covered in the data, may include other risk factors (e.g hypertension prevalence, nutritional habits, hyperlipidemia prevalence, exercise) and different preventive and early detection measures (e.g. hypertension and hyperlipidemia treatment, occult blood testing and colonoscopy for high risk patient for colorectal cancer). Quality of care, which is difficult to measure, may also exert an influence.

Those differences may be due to the slow progression in health status and care during the Communist era before 1989 which caused a "slow start", holding the Czechs back prior to 1989.

However, the rate of increase in life expectancy since 1990 is about 20% higher than in Israel and about 37% higher than in the EU-15 and the rate of decrease in the death rate from all causes since 1990 is about 46% higher than in Israel and about 79% higher than in the EU-15, so the gap is quickly closing.

In Israel, excess mortality can be seen from breast cancer, which may be attributable to lower quality of care (i.e. less effective programs for early detection by mammography, less effective treatment) for those patients, higher risk factors or possibly to some genetic predisposition. It can also been seen from homicide, which may be attributable to the conflicts in Israel; diabetes, which may be attributable to the higher prevalence of obesity and pre-obesity and possibly to insufficient care for this population; infectious and parasitic diseases; endocrine, nutritional and metabolic disease and disease of the genitourinary system. However, the death rate from those disorders is generally low, exerting little influence on the total excess mortality.

Infant mortality is 30% higher in Israel than in the Czech Republic, a finding that may be explained by the higher fertility rate in Israel.

Occupancy of acute hospital beds in Israel is higher than in the Czech Republic, indicating that hospitals in Israel are more crowded with a faster bed turnover. This is due to a shortage of acute care beds. However, the surplus of acute care beds in the Czech Republic may not be beneficiary and in fact may indicate inefficiently, as this doesn't seem to improve health status and care.

The rate of nurses in Israel is significantly lower than in the Czech Republic.

The larger proportion of private expenditure on health (compared to public expenditure) in Israel can cause inequalities among socioeconomic levels. The Czech Republic does not seem to have created inequalities in quality of health care provision among socioeconomic groups as there is minimal private expenditure on health.

9. **Conclusions and recommendations**

I conclude that the Czech Republic health status as of 2006 is behind that of Israel; that the Israeli health status compares favorably with that of EU-15; and that although both Israeli and the Czech health status are improving with time, the Czech Republic's health status has improved more rapidly since the early 1990s.

My main recommendations are: for the Czech Republic's health care system, effort should be made to decrease alcohol consumption, decrease smoking among young people, increase long term care hospitals and beds and nursing and elderly home beds, increase the average length of stay in long-term hospitals and increase expenditure on health in order to increase the health status and health care quality.

For the Israeli health care system, effort should be made to decrease mortality from breast cancer and diabetes, increase the rate of acute care hospitals and beds, and to increase the public share of health expenditure in order to promote equal access to quality healthcare.

10. **References**

1. *Statistical abstract of Israel 2007, No. 58.* Central Bureau of Statistics of Israel (2007), Jerusalem.
2. *European Health for All database.* WHO Regional Office for Europe (2008), Copenhagen.
3. Statistical Yearbook of the Czech Republic 2007. Czech Statistical Office (2008), Prague.
4. Rokosová M, Háva P, Schreyögg J, Busse R. *Health Care Systems in Transition, HiT summary: Czech Republic, 2005*. WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies (2005), Copenhagen.
5. *Czech Health Statistics Yearbook 2006*. Institute of Health Information and Statistics of the Czech Republic (2007), Prague.
6. Statistics Canada. Health Indicators. Ottawa, Statistics Canada, 2007 (Cat. No. 82-221-XIE)

7. *Kleinman, J.C., and Kiely, J.L. (1991). Infant Mortality.* Healthy People 2000 Statistical Notes, 1 (2). Hyattsville, MD: National Center for Health Statistics
8. *M Zakir, P.V. Wunnava*, *Factors affecting infant mortality rates: evidence from cross-sectional data*, Applied Economics Letters, 1999, 6, 271–273
9. Rokosová M, Háva P, Schreyögg J, Busse R. *Health care systems in transition: Czech Republic*. WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies 7(1) (2005), Copenhagen.
10. Rosen, B. in Thomson, S. and Mossialos, E. (ed.) *Health care systems in transition: Israel.* WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies 5(1) (2003), Copenhagen.
11. *European mortality database.* WHO Regional Office for Europe (2008), Copenhagen.
12. *Highlights on health in Israel 2004*. Highlights on health, WHO Regional Office for Europe (2006), Copenhagen.
13. *Highlights on health in the Czech Republic 2005*. Highlights on health, WHO Regional Office for Europe (2006), Copenhagen.
14. Kaidar N, Bin Nun G. *International comparison of health care system: Israel and OECD member states 1970-2005*. State of Israel, Ministry of Health, Department of Health economics (2007), Jerusalem.

11. **Bibliography**

Czech Health Statistics Yearbook 2006. Institute of Health Information and Statistics of the Czech Republic (2007), Prague.

European Health for All database. WHO Regional Office for Europe (2008), Copenhagen (http://www.euro.who.int/hfadb, accessed 1 August 2008).

European mortality database. WHO Regional Office for Europe (2008), Copenhagen (http://data.euro.who.int/dmdb/, accessed 1 August 2008).

Global Database on Body Mass Index. WHO (2008), Geneva (http://www.who.int/bmi/index.jsp, accessed 1 August 2008).

Highlights on health in Israel 2004. Highlights on health, WHO Regional Office for Europe (2006), Copenhagen.

Highlights on health in the Czech Republic 2005. Highlights on health, WHO Regional Office for Europe (2006), Copenhagen.

Kaidar N, Bin Nun G. *International comparison of health care system: Israel and OECD member states 1970-2005*. State of Israel, Ministry of Health, Department of Health economics (2007), Jerusalem.

Kleinman, J.C., and Kiely, J.L. (1991). Infant Mortality. Healthy People 2000 Statistical Notes, 1 (2). Hyattsville, MD: National Center for Health Statistics

Rokosová M, Háva P, Schreyögg J, Busse R. *Health Care Systems in Transition, HiT summary: Czech Republic, 2005*. WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies (2005), Copenhagen.

Rokosová M, Háva P, Schreyögg J, Busse R. *Health care systems in transition: Czech Republic*. WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies 7(1) (2005), Copenhagen.

Rosen, B. in Thomson, S. and Mossialos, E. (ed.) *Health care systems in transition: Israel.* WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies 5(1) (2003), Copenhagen.

Statistical abstract of Israel 2007, No. 58. Central Bureau of Statistics of Israel (2007), Jerusalem (http://www1.cbs.gov.il/reader, accessed 1 August 2008).

Statistical Yearbook of the Czech Republic 2007. Czech Statistical Office (2008), Prague.

Tobacco control database. WHO Regional Office for Europe (2007), Copenhagen (http://data.euro.who.int/tobacco, accessed 1 August 2008).

WHO Vaccine-Preventable Diseases: Monitoring System - 2007 global summary. Immunization, Vaccines and Biologicals, WHO (2007), Geneva.