



**Health expectancy in the occupied Palestinian territory:
estimates from the Gaza Strip and the West Bank - based on
surveys from 2006 and 2010**

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Health expectancy in the occupied Palestinian territory: estimates from the Gaza Strip and the West Bank – based on surveys from 2006 and 2010

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Abstract

Objectives The purpose of the study was to estimate health expectancy for the Palestinian population.

Design Mortality data and population-based health surveys.

Setting The Israeli-occupied Palestinian territory of the Gaza Strip and the West Bank.

Participants 17 034 and 38 071 adults aged 20 or over participating the Palestinian Family Health Surveys of 2006 and 2010. Mortality rates for 2007 and 2010 covered the entire population.

Outcome measures Life expectancy and expected lifetime with and without chronic disease were estimated using the Sullivan method on the basis of mortality data and data on the prevalence of chronic disease.

Results Life expectancy at the age of 20 increased from 52.8 years in 2006 to 53.3 years in 2010 for men and from 55.1 years to 55.7 years for women. In 2006, expected lifetime without a chronic disease was 37.7 (95% CI: 37.0 to 38.3) years and 32.5 (95% CI: 31.9 to 33.2) years for 20-year-old men and women respectively. By 2010, this had decreased by 1.6 years for men and increased by 1.3 years for women. The health status of men has worsened. In particular, lifetime with hypertension and diabetes has increased. For women, the gain in life expectancy consisted partly of years with and partly of years without the most prevalent diseases.

Conclusions Health expectancy for men and women diverged, which could to some extent be due to gender-specific exposures related to lifestyle factors and the impact of military occupation.

Keywords health expectancy, life expectancy, occupied Palestinian territory

Introduction

The number of Palestinians worldwide recently reached 11 million. Fewer than half (4.2 million) live in the occupied Palestinian territory. Of these, two million are refugees, the majority living in camps.¹ As only 1.3 million Palestinians live in Israel, 5.5 million of the Palestinian population lives abroad. The total area of historical Palestine is 27 000 square kilometres. Six percent of this was controlled by Jewish immigrants prior to the United Nations resolution on the partition of Palestine in 1947. Today, Israel controls 85% of the total area of historical Palestine. The Gaza Strip is one of the most densely populated parts of the World, with about 4300 individuals per square kilometre.^{2,3} Ever since the state of Israel's establishment in 1948, Palestinians have lived under war conditions, under occupation, or under displacement from their native homes. More than half of the population lives in exile outside of Palestine, and the remaining 4.2 million Palestinians reside in an area of land that has shrunk markedly and is being continuously and systematically eroded by illegal Israeli settlements. Continued land confiscation and intensified tightening of the closure system has increased the prevalence of economic crises, unemployment, and poverty, thereby strengthening dependency on donor financing.⁴ Restrictions on freedom of movement, trading, employment, living a healthy life, access to health care, *etc.* threaten welfare and public health.⁵⁻⁷

In 2010, the share of the population under the age of 20 in the occupied Palestinian territory was 53.3%, with 4.4% of the population being aged 60 years or older.⁸ According to WHO EMRO, the crude birth rate was 29.6 births per 1000 persons in 2009, and the crude death rate was 3.0 deaths per 1000 persons.⁹ Life expectancy at birth was 70.5 years for men and 73.2 for women.⁹ The neonatal mortality rate (deaths per 1000 live births during the first 28 days of life) was 9.4, the infant mortality rate was 25.0 deaths per 1000 live births, and the total

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3 fertility rate was 4.6 births per woman.⁹ The maternal mortality rate was 38 per 10 000 live
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5 births.⁹ There have been only very modest improvements in infant and child mortality rates
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7 since the 1990s.¹⁰ The three leading causes of death are heart disease (21.0% of all deaths),
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9 cerebrovascular disease (11.0%), and cancer (10.3%).¹¹
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14 Health expectancy represents the average lifetime a person can expect to live in a specific
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16 state of health (*e.g.* with or without chronic disease). As a summary measure of population
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18 health that combines health status and mortality, health expectancy has the strength of
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20 offering a more nuanced contribution to the monitoring of population health than do
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22 measurements of life expectancy. Health expectancy can be measured in various ways and for
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24 different population groups, *i.e.* based on a geographical area, a social group, or a group with
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26 other characteristics. The purpose of this study was to estimate expected lifetime with or
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28 without chronic disease among Palestinians living in the Gaza Strip and the West Bank and to
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30 evaluate changes that have taken place over the past five years.
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36 **Methods**

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39 Health prevalence data was derived from the Palestinian Family Health Surveys carried out in
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41 2006 and 2010.^{8 12} The surveys were designed to be representative of the entire Palestinian
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43 population of the occupied Palestinian territory (*i.e.* the Gaza Strip and the West Bank,
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45 including East Jerusalem). The half million Israelis living in illegal settlements on the West
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47 Bank and the more than five million exiled Palestinians were not represented in this study.
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53 For each survey, a stratified two-stage random sample was drawn from lists of all Palestinian
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55 households. First, enumeration areas were selected from the Palestinian territories, then a
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57 random sample of households was drawn from each enumeration area in the West Bank and
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3 the Gaza Strip. The surveys consisted of 13 238 households in 2006 and 15 355 households in
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5 2010. The household response rates were 88.0% in 2006 and 89.4% in 2010. The present
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7 study included adults aged 20 or above from the two surveys: 17 034 and 38 071 participants
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9 respectively. Information on household members' socio-economic and demographic
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11 characteristics was provided by the head of household or another mature person. Data for all
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13 members was collected by self-reported responses or by proxy. Age was assessed by asking
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15 for the exact date of birth or any document with this information. Further details are available
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17 in the survey reports.^{8 12}
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23 Chronic disease was measured by answers to the question 'Does (name) have any disease
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25 according to a medical diagnosis and receive treatment continuously?' Whenever disease was
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27 reported, its nature was determined by choosing among 20 diseases. According to data from
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29 the Palestinian Family Survey of 2010,⁸ the four most frequently reported diseases were
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31 hypertension, diabetes, rheumatic condition, and heart disease. The crude prevalence
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33 proportions among adults (aged 20 and above) were 8.5%, 6.5%, 4.9%, and 2.7% respectively
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35 in 2010.
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40 Child and infant mortality rates at the age of 0–4 years were estimated on the basis of data
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42 from the Palestinian Family Health Surveys, and abridged life tables were constructed using
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44 MortPak, the UN demographic measurement software package.¹³
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49 Health expectancy at the age of 20 was estimated using the Sullivan method^{14 15} in which the
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51 expected number of years lived in the age intervals of 20–24, 25–29, ..., 70–74, >75 years
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53 were calculated on the basis of the life table figures and multiplied by age-specific
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55 proportions of healthy people taken from the health survey data. Health expectancy for 20-
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3 year-olds was then calculated by adding these years for all age groups and dividing the sum
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5 by the number of survivors at the age of 20. A measure of the portion of lifetime spent in
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7 good health was obtained by dividing lifetime in a healthy state with life expectancy.
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9 Furthermore, estimations were made of partial life expectancy, *i.e.* expected lifetime between
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11 the ages of 20 and 60. Statistical tests were carried out using a Z-test.¹⁵
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16 A technique for decomposing health expectancies based on the Sullivan method enables
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18 comparisons over time of contributions to mortality differences and health differences.¹⁶ A
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20 change in age-specific mortality will change life expectancy because a greater or lesser
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22 number of years lived affects not only the specific age group but also the years lived in future
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24 older age groups. This change (the mortality effect) will increase or reduce expected lifetime
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26 in different health states. A change in the proportion of healthy people represents the
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28 decomposition's other component (the health effect).
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34 **Results**

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36 Life expectancy at the age of 20 was about half a year longer among men living in the West
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38 Bank than it was in the Gaza Strip and increased by half a year from 2006 to 2010 (table 1).
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40 For women, life expectancy increased by a little more than half a year, and the difference
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42 between the West Bank and the Gaza Strip remained nearly one year (table 2). For 60 year
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44 olds, life expectancy increased by 0.2 years in the West Bank and by 0.3 years in the Gaza
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46 Strip.
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52 During this period, expected lifetime without chronic disease at the age of 20 decreased
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54 statistically significantly by 1.6 years for men in the West Bank ($p=0.02$) and statistically
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56 insignificantly by 1.3 years in the Gaza Strip ($p=0.17$) (table 1). Simultaneously, expected
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lifetime with chronic disease among male Palestinians increased significantly by approximately 2 years ($p < 0.001$). Partial life expectancy between the ages of 20 and 60 with chronic disease increased from 7.0 years in 2006 to 7.4 years in 2010 (table 1). Among 60-year-old men, expected lifetime with chronic disease increased by 1.7 years. The proportion of expected lifetime without chronic disease between the ages of 20 and 60 declined from 81.8% to 80.7% and from 43.9% to 34.7% for 60 years olds (table 1).

Table 1 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Men, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old men					
Gaza Strip	2006	52.4	37.8 (36.7 to 38.9)	14.6 (13.4 to 15.7)	72.2 (70.0 to 74.4)
	2010	52.9	36.5 (35.7 to 37.2)	16.4 (15.7 to 17.2)	69.0 (67.5 to 70.4)
West Bank	2006	52.9	37.6 (36.8 to 38.4)	15.3 (14.5 to 16.1)	71.0 (69.5 to 72.5)
	2010	53.5	36.0 (35.4 to 36.5)	17.5 (17.0 to 18.0)	67.3 (66.3 to 68.3)
Palestinian Territory	2006	52.8	37.7 (37.0 to 38.3)	15.1 (14.4 to 15.7)	71.4 (70.2 to 72.7)
	2010	53.3	36.1 (35.7 to 36.6)	17.1 (16.7 to 17.6)	67.8 (67.0 to 68.7)
60-year-old men					
Gaza Strip	2006	16.9	7.6 (6.5 to 8.7)	9.4 (8.3 to 10.5)	44.6 (38.1 to 51.2)
	2010	17.2	6.1 (5.3 to 6.8)	11.1 (10.3 to 11.8)	35.4 (31.1 to 39.7)
West Bank	2006	17.2	7.5 (6.7 to 8.2)	9.7 (9.0 to 10.4)	43.5 (39.1 to 47.8)
	2010	17.4	6.0 (5.5 to 6.5)	11.4 (10.9 to 11.9)	34.3 (31.5 to 37.2)
Palestinian Territory	2006	17.1	7.5 (6.9 to 8.1)	9.6 (9.0 to 10.2)	43.9 (40.3 to 47.5)
	2010	17.3	6.0 (5.6 to 6.4)	11.3 (10.9 to 11.7)	34.7 (32.3 to 37.0)
Partial life expectancy between age 20 and 60					
20-year-old men					
Gaza Strip	2006	38.2	31.5 (30.8 to 32.1)	6.7 (6.0 to 7.4)	82.4 (80.7 to 84.2)
	2010	38.3	31.3 (30.9 to 31.8)	7.0 (6.6 to 7.4)	81.7 (80.6 to 82.9)
West Bank	2006	38.3	31.2 (30.8 to 31.7)	7.1 (6.6 to 7.6)	81.5 (80.3 to 82.8)
	2010	38.5	30.8 (30.5 to 31.2)	7.7 (7.3 to 8.0)	80.1 (79.3 to 81.0)
Palestinian Territory	2006	38.3	31.3 (30.9 to 31.7)	7.0 (6.6 to 7.3)	81.8 (80.8 to 82.8)
	2010	38.4	31.0 (30.7 to 31.3)	7.4 (7.2 to 7.7)	80.7 (80.0 to 81.3)

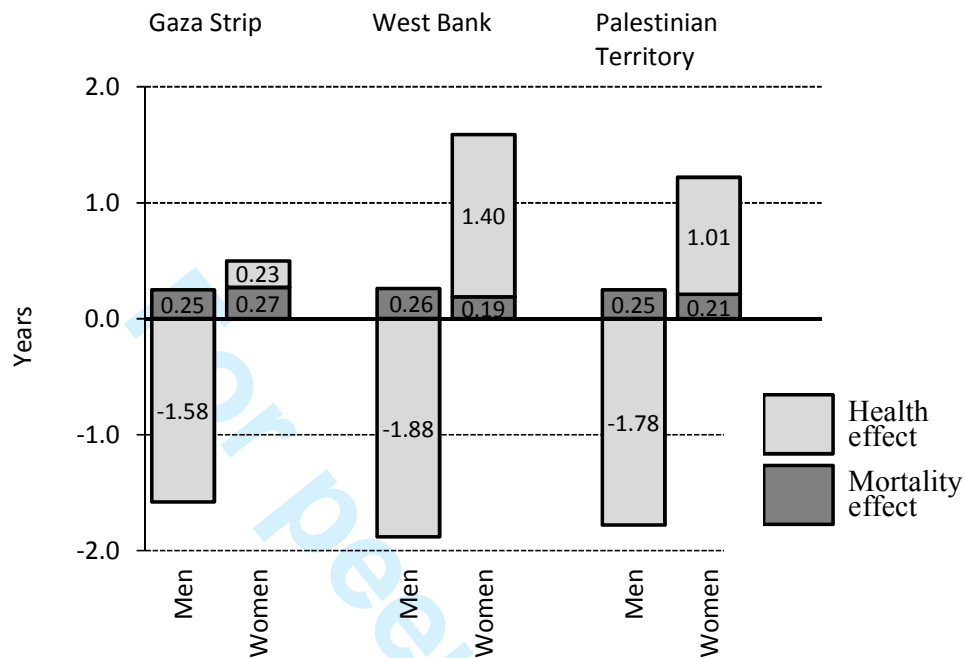
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3 For 20-year-old women living in the West Bank, expected lifetime without chronic disease
4 increased statistically significantly by 1.6 years ($p=0.02$) (table 2). The gain in disease-free
5 life expectancy thus exceeded the increase in life expectancy. In the Gaza Strip, the gain of
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7 0.7 years in life expectancy among 20-year-old women was evenly distributed, with 0.5 years
8 without disease and 0.2 years with disease (table 2). For Palestinian women between ages of
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10 20 and 60, expected years with chronic disease decreased from 10.6 to 9.1 during the period
11 of 2006-2010 (table 2). The general gain in disease-free life expectancy did not, however,
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13 favour elderly Palestinian women. Thus, among 60-year-old women, expected lifetime with
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15 chronic disease increased by 0.8 years (table 2).
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Table 2 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Women, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old women					
Gaza Strip	2006	54.5	34.4 (33.3 to 35.5)	20.1 (19.0 to 21.2)	63.1 (61.1 to 65.2)
	2010	55.2	34.9 (34.2 to 35.7)	20.3 (19.5 to 21.0)	63.2 (61.9 to 64.6)
West Bank	2006	55.4	31.6 (30.8 to 32.4)	23.8 (23.0 to 24.6)	57.1 (55.6 to 58.5)
	2010	56.0	33.2 (32.7 to 33.7)	22.8 (22.2 to 23.3)	59.3 (58.4 to 60.2)
Palestinian Territory	2006	55.1	32.5 (31.9 to 33.2)	22.5 (21.9 to 23.2)	59.1 (57.9 to 60.2)
	2010	55.7	33.8 (33.3 to 34.2)	21.9 (21.5 to 22.4)	60.6 (59.9 to 61.4)
60-year-old women					
Gaza Strip	2006	18.5	5.7 (4.7 to 6.6)	12.8 (11.8 to 13.8)	30.6 (25.3 to 35.9)
	2010	18.8	5.2 (4.6 to 5.9)	13.6 (12.9 to 14.2)	27.9 (24.4 to 31.4)
West Bank	2006	18.9	5.0 (4.3 to 5.6)	13.9 (13.3 to 14.6)	26.3 (22.9 to 29.7)
	2010	19.2	4.4 (4.0 to 4.8)	14.8 (14.3 to 15.2)	22.9 (20.7 to 25.2)
Palestinian Territory	2006	18.8	5.2 (4.6 to 5.7)	13.6 (13.0 to 14.1)	27.6 (24.7 to 30.5)
	2010	19.0	4.7 (4.3 to 5.0)	14.4 (14.0 to 14.7)	24.5 (22.6 to 26.4)
Partial life expectancy between age 20 and 60					
20 year-old women					
Gaza Strip	2006	38.4	29.5 (28.8 to 30.2)	8.9 (8.2 to 9.7)	76.7 (74.9 to 78.6)
	2010	38.6	30.3 (29.8 to 30.8)	8.3 (7.9 to 8.8)	78.4 (77.2 to 79.6)
West Bank	2006	38.7	27.2 (26.7 to 27.7)	11.5 (10.9 to 12.0)	70.4 (69.0 to 71.7)
	2010	38.8	29.3 (28.9 to 29.6)	9.6 (9.2 to 9.9)	75.4 (74.5 to 76.3)
Palestinian Territory	2006	38.6	28.0 (27.6 to 28.4)	10.6 (10.2 to 11.0)	72.5 (71.4 to 73.6)
	2010	38.7	29.6 (29.3 to 29.9)	9.1 (8.9 to 9.4)	76.4 (75.7 to 77.1)

Figure 1 shows the results of decomposing into mortality and health effects the change over time in disease-free life expectancy at the age of 20. The mortality effect of approximately one fourth of a year was nearly equal for men and women and did not differ between the Gaza Strip and the West Bank. The divergent change from 2006 to 2010 between men and women in expected lifetime without chronic disease thus resulted from the health effect (*i.e.* prevalence of disease increased among men and decreased among women).

Fig 1 Decomposition into the mortality and health effects of changes between 2006 and 2010 in disease-free life expectancy at age 20 in the occupied Palestinian territory

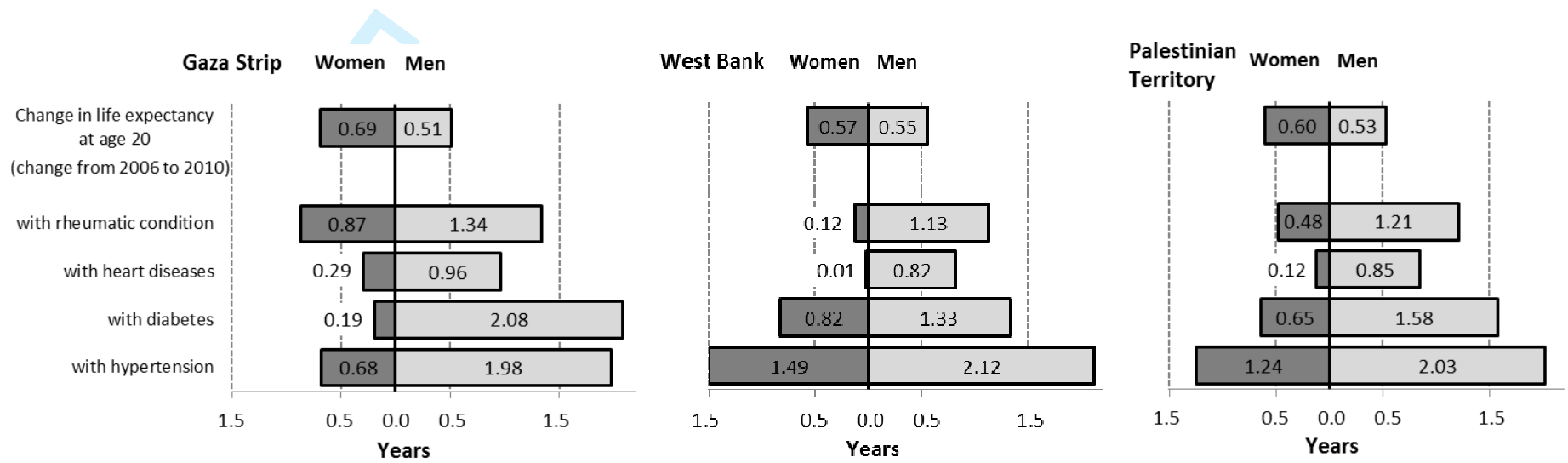


In 2010, 20-year-old men and women could expect 3.6 years (95% CI: 3.3 to 3.9) and 3.2 years (95% CI: 3.0 to 3.5) with heart disease respectively. For the three other most prevalent chronic conditions, women could expect a greater number of years with a disease than could men (12.5 versus 7.7 years with hypertension, 8.3 versus 6.7 years with diabetes, and 6.8 versus 3.6 years with rheumatic conditions) (table 3). No gain in disease-free life expectancy was observed for any of the four diseases, with the exception of heart disease among women. In particular, the health status of men worsened, and the gender gap decreased during the period of 2006 to 2010 (table 3, figure 2).

Table 3 Life expectancy at age 20 and expected lifetime with the four most prevalent diseases – Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime with Hypertension years (95% CI)	Diabetes years (95% CI)	Heart diseases years (95% CI)	Rheumatic conditions years (95% CI)
20-year-old men						
Gaza Strip	2006	52.4	6.0 (5.1 to 6.8)	4.6 (3.9 to 5.4)	2.4 (1.8 to 2.9)	2.1 (1.5 to 2.7)
	2010	52.9	7.9 (7.2 to 8.6)	6.7 (6.0 to 7.4)	3.3 (2.8 to 3.8)	3.4 (2.9 to 4.0)
West Bank	2006	52.9	5.5 (4.9 to 6.1)	5.4 (4.8 to 6.0)	2.9 (2.4 to 3.3)	2.5 (2.1 to 3.0)
	2010	53.5	7.6 (7.2 to 8.1)	6.8 (6.3 to 7.2)	3.7 (3.3 to 4.1)	3.7 (3.3 to 4.0)
Palestinian Territory	2006	52.8	5.7 (5.2 to 6.2)	5.1 (4.7 to 5.6)	2.7 (2.4 to 3.1)	2.4 (2.0 to 2.7)
	2010	53.3	7.7 (7.3 to 8.1)	6.7 (6.3 to 7.1)	3.6 (3.3 to 3.9)	3.6 (3.3 to 3.9)
20-year-old women						
Gaza Strip	2006	54.5	11.8 (10.8 to 12.8)	7.9 (7.0 to 8.8)	2.4 (1.8 to 3.0)	4.1 (3.4 to 4.8)
	2010	55.2	12.5 (11.7 to 13.2)	8.1 (7.4 to 8.7)	2.7 (2.3 to 3.2)	5.0 (4.4 to 5.6)
West Bank	2006	55.4	10.9 (10.2 to 11.7)	7.5 (6.9 to 8.2)	3.5 (3.0 to 4.0)	7.6 (7.0 to 8.3)
	2010	56.0	12.4 (11.9 to 13.0)	8.4 (7.9 to 8.8)	3.5 (3.1 to 3.9)	7.8 (7.3 to 8.2)
Palestinian Territory	2006	55.1	11.2 (10.6 to 11.8)	7.6 (7.1 to 8.1)	3.1 (2.7 to 3.5)	6.4 (5.9 to 6.9)
	2010	55.7	12.5 (12.0 to 12.9)	8.3 (7.9 to 8.7)	3.2 (3.0 to 3.5)	6.8 (6.5 to 7.2)

Fig 2 Change between 2006 and 2010 in life expectancy and expected lifetime at age 20 with the four most frequent chronic diseases in the occupied Palestinian territories



Discussion

As in other populations, Palestinian women live longer than Palestinian men and endure a greater number of years with health problems. Remarkably, the changes in partial life expectancy (age interval 20 to 60) without chronic disease from 2006 to 2010 went in opposite directions for men and women. Health has thus worsened among men, and the gender gap in expected lifetime with chronic disease has narrowed. The changes in health expectancy between 2006 and 2010 were mainly due to the increasing prevalence of chronic disease and not due to increasing life expectancy (figure 1). The gain in life expectancy for men thus consisted not only of additional years with hypertension, diabetes, heart disease, and rheumatic conditions because expected lifetime without these diseases was shorter in 2010 than in 2006. This tendency toward expansion of morbidity was less distinct for women.

The increase in lifetime with hypertension and diabetes among men is particularly worrisome. Hypertension and diabetes are initial stages of cardiovascular disease, and the risk is elevated because of the high prevalence of tobacco smoking among men. The percentage of smoking among men exceeds 40% but is less than 3% among women.^{8 17} Lung cancer is the most frequent cancer type among Palestinian men.¹¹ In general, chronic disease develops gradually, caused by exposure to risk factors such as the effects of psychological stressors or the long-term cumulative effects of tobacco smoking. Poor nutrition or undernourishment, in particular in the Gaza Strip and during childhood, increases the risk of obesity and chronic disease.^{11 18-20} Along with tobacco smoking among men, poor nutrition and physical inactivity are the most important preventable lifestyle-related risk factors for Palestinians. Prevention related to these risk factors requires particular attention in order to reduce the incidence of cardiovascular and metabolic disease.

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3 Men – particularly young men – face greater exposure to violations by the Israeli army and
4 Israeli settlers than do women.^{21–24} Since 1967, over a quarter of the Palestinians have been
5 imprisoned on political grounds and have suffered various health problems following their
6 release.^{25 26} The fluctuations and instability of Palestinians' societal and political life could
7 affect men and women differently. A survey among young Palestinians in Ramallah showed
8 that exposure to political violence affects the mental health of adolescents and that depressive-
9 like symptoms were more prevalent among girls than among boys.²⁷

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21 Health services and access to diagnosis and treatment are complicated in the West Bank and
22 the Gaza Strip due to a variety of factors related to restrictions on movement in the West
23 Bank and the blockade that cuts the Gaza Strip off from the outside world.^{5 28} Some of these
24 deficiencies are, however, partially remedied by humanitarian aid from international bodies.
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As the abnormal living circumstances differ between the West Bank and the Gaza Strip, no
simple interpretation can be applied to differences between the two territories. In spite of the
high number of deaths, attacks on medical personnel and civilians, destruction of hospitals,
*etc.*²⁹ associated with the Israeli assault on the Gaza Strip shortly before the second survey in
2010, we cannot expect that this assault would be directly visible in the health expectancy
estimates. The direct effect of Israeli attacks should be assessed by studies with a more
focused design, such as on the impact of the Israeli attack on the Gaza Strip,^{29–32} the Israeli
military invasions in the spring of 2002,^{27 33} and the army's reaction to the 2000 uprising.²³

In 2009, the *Lancet* published a series of comprehensive studies on the health status of the
population and the health services available in the occupied Palestinian territory, providing
complete information on and evidence of the situation.^{5 6 10 11 28} The unsuccessful attempt to
establish an efficient health-care system under military occupation has also been examined.²⁸

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3 Health status has not improved satisfactorily since the mid-1990s, and the health services
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5 have remained in stasis.
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10 Account has been taken of logistical difficulties related to data collection under military
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12 occupation and how this may influence participation and responses by interviewees. The
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14 quality of the survey data is high due to a thoroughly centralised interview training process,
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16 pilot testing, and the quality-control mechanisms applied to data processing. The Palestinian
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18 Central Bureau of Statistics received technical assistance from international organisations
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20 (UNICEF, UN Population Fund, and the Arab League). Furthermore, the standardisation of
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22 questionnaires and sampling methods enables comparisons over time. Study design,
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24 representativeness, non-participation, *etc.* in the Palestinian Family Health Surveys have been
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26 described previously in reports by the Palestinian Central Bureau of Statistics.^{8 12}
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32 Over half of the Palestinian population is between the ages of 0 and 19, and less than 5% is
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34 over 60 years old. Because the study describes health expectancy at the age of 20, less than
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36 half of the population is presented. Demography in the occupied Palestinian territory requires
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38 great attention to the health and welfare of Palestinian children and adolescents.
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43 The occupied Palestinian territory is well supplied by data from health surveys, which could
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45 help strengthen the health information system. We recommend that health expectancy be
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47 introduced as a summary measure of population health for monitoring the health status in
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49 Palestine. The data necessary for introducing this indicator is available by conducting
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51 successive uniformly designed health surveys. Coordination with and the simultaneity of the
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53 Pan Arab Project for Family Health furthermore enables future comparisons of health
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55 expectancy between populations in the Arab countries.
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Article summary

Article Focus

- Health expectancy divides life expectancy into average lifetime in various states of health
- The concept of health expectancy has attracted increased interest among researchers and policymakers as a summary measure of population health and has been estimated in nearly all European countries as well as in many other countries worldwide but has never been estimated for a Middle Eastern population
- The study presents expected lifetime with and without chronic disease as well as what changes have taken place among Palestinians living in the Israeli-occupied Palestinian territory over the past five years

Key Messages

- Expected lifetime with the four most prevalent chronic diseases (hypertension, diabetes, heart diseases, and rheumatic conditions) has increased for men. For women, the gain in life expectancy was more evenly distributed as years with and without diseases
- The divergent trends for men and women might be due to different exposures to lifestyle-related risk factors (e.g. smoking) and the impact of military occupation

Strengths and Limitations

- The household response rates of the Palestinian Family Health Surveys of 2006 and 2010 were 88.0% and 89.4% and included information on 17 034 and 38 071 adult participants respectively
- In spite of difficulties related to data collection under military occupation representativeness and high quality of the survey data were ensured. International organisations contributed with technical assistance

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**Health expectancy in the occupied Palestinian territory:
estimates from the Gaza Strip and the West Bank - based on
surveys from 2006 and 2010**

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Health expectancy in the occupied Palestinian territory: estimates from the Gaza Strip and the West Bank – based on surveys from 2006 and 2010

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Contributors KQ and HBH initiated the study. KQ and MD provided life tables and health status prevalence tables. HBH undertook the analysis and drafted the manuscript. All authors have contributed to the writing of the manuscript and have seen and approved the final version.

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Results for 2006 were presented at the 23rd Annual Meeting of REVES, International Network on Health Expectancy, 25-27 May 2011, Paris, France. Travelling expenses for KQ were covered by a grant supporting the REVES meeting.

Abstract

Objectives The purpose of the study was to estimate health expectancy for the Palestinian population and to evaluate changes that have taken place over the past five years.

Design Mortality data and population-based health surveys.

Setting The Israeli-occupied Palestinian territory of the Gaza Strip and the West Bank.

Participants 17 034 and 38 071 adults aged 20 or over participating the Palestinian Family Health Surveys of 2006 and 2010. Mortality rates for 2007 and 2010 covered the entire population.

Outcome measures Life expectancy and expected lifetime with and without chronic disease were estimated using the Sullivan method on the basis of mortality data and data on the prevalence of chronic disease.

Results Life expectancy at the age of 20 increased from 52.8 years in 2006 to 53.3 years in 2010 for men and from 55.1 years to 55.7 years for women. In 2006, expected lifetime without a chronic disease was 37.7 (95% CI: 37.0 to 38.3) years and 32.5 (95% CI: 31.9 to 33.2) years for 20-year-old men and women respectively. By 2010, this had decreased by 1.6 years for men and increased by 1.3 years for women. The health status of men has worsened. In particular, lifetime with hypertension and diabetes has increased. For women, the gain in life expectancy consisted partly of years with and partly of years without the most prevalent diseases.

Conclusions Health expectancy for men and women diverged, which could to some extent be due to gender-specific exposures related to lifestyle factors and the impact of military occupation.

Keywords health expectancy, life expectancy, occupied Palestinian territory

Introduction

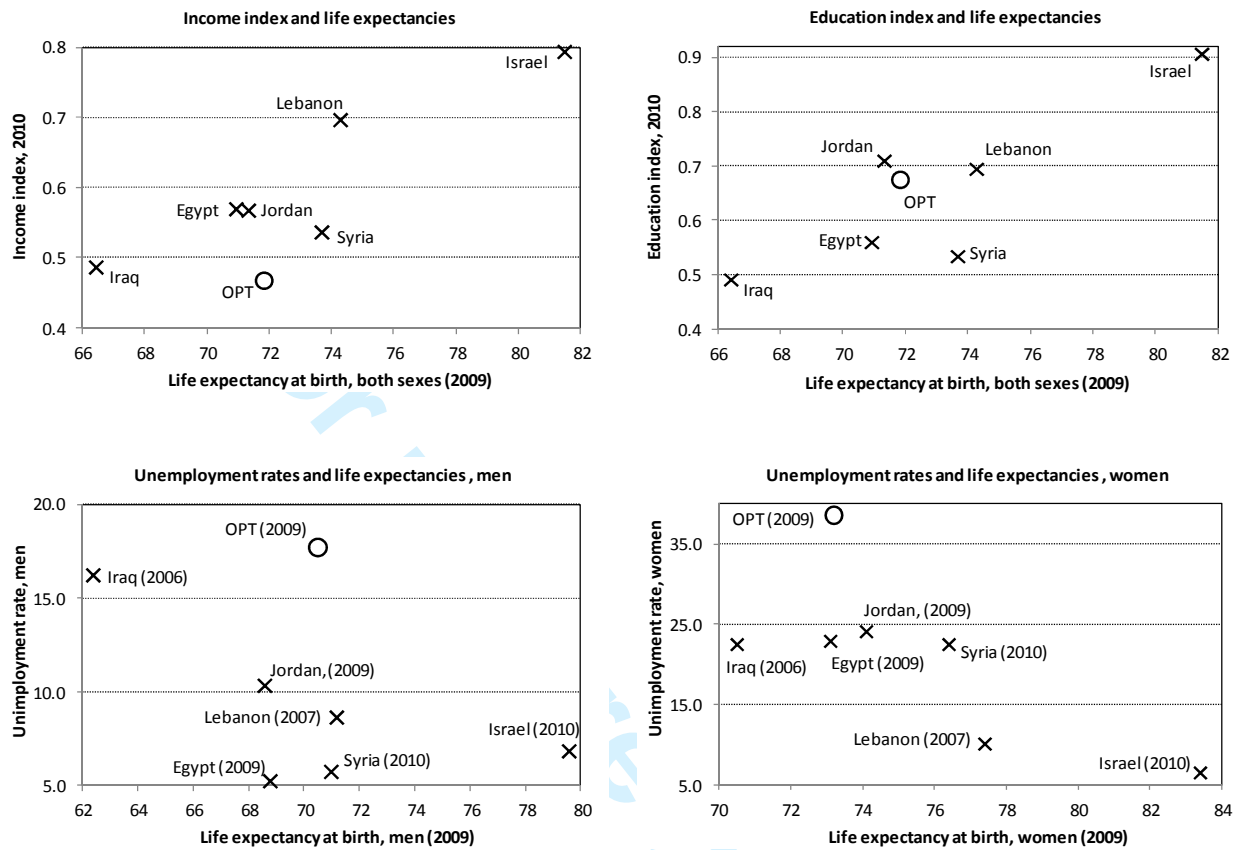
The number of Palestinians worldwide recently reached 11 million. Fewer than half (4.2 million) live in the occupied Palestinian territory. Of these, two million are refugees, the majority living in camps.¹ As only 1.3 million Palestinians live in Israel, 5.5 million of the Palestinian population lives abroad. The total area of historical Palestine is 27 000 square kilometres. Six percent of this was controlled by Jewish immigrants prior to the United Nations resolution on the partition of Palestine in 1947. Today, Israel controls 85% of the total area of historical Palestine. The Gaza Strip is one of the most densely populated parts of the World, with about 4300 individuals per square kilometre.^{2,3} Continued land confiscation and intensified tightening of the closure system has increased the prevalence of economic crises, unemployment, and poverty, thereby strengthening dependency on donor financing.⁴ Restrictions on freedom of movement, trading, employment, living a healthy life, access to health care, *etc.* threaten welfare and public health.⁵⁻⁷

In 2010, the share of the population under the age of 20 in the occupied Palestinian territory was 53.3%, with 4.4% of the population being aged 60 years or older.⁸ According to WHO EMRO, the crude birth rate was 31 births per 1000 persons in 2010, and the crude death rate was 2.7 deaths per 1000 persons.⁹ In 2009 life expectancy at birth was 70.5 years for men and 73.2 for women.¹⁰ The six leading causes of death are heart disease (21.0% of all deaths), cerebrovascular disease (11.0%), cancer (10.3%), conditions in perinatal period (8.6%), respiratory disorders (6.9%), and accidents (5.4%).¹¹

Figure 1 depicts the associations between selected structural indicators (income index, education index and unemployment rate) and life expectancy in some Middle East countries from data assessed by UNDP International Human Development Indicators,¹² UN Statistics

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3 Division – Demographic and Social Statistics¹³ and WHO, Global Health Observatory Data
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5 Repository.¹⁰ Iraq and Israel represent the extremes. Life expectancy for Palestinian men is
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7 close to that of the male populations of Syrian Arab Republic and Lebanon. For Palestinian
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9 women life expectancy is low and close to that of Egyptian women. It appears clearly that in
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11 particular low income level and high prevalence of unemployment retard the development in
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13 the occupied Palestinian territory.
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Fig 1 Income index, education index and unemployment rates by contrast with life expectancy in selected Middle East countries



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3 Health expectancy represents the average lifetime a person can expect to live in a specific
4 state of health (*e.g.* with or without chronic disease). As a summary measure of population
5 health that combines health status and mortality, health expectancy has the strength of
6 offering a more nuanced contribution to the monitoring of population health than do
7 measurements of life expectancy. Health expectancy can be measured in various ways and for
8 different population groups, *i.e.* based on a geographical area, a social group, or a group with
9 other characteristics. The purpose of this study was to estimate expected lifetime with or
10 without chronic disease among Palestinians living in the Gaza Strip and the West Bank and to
11 evaluate changes that have taken place over the past five years.
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25 **Methods**

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28 Health prevalence data was derived from the Palestinian Family Health Surveys carried out in
29 2006 and 2010.^{8 14} The surveys were designed to be representative of the entire Palestinian
30 population of the occupied Palestinian territory (*i.e.* the Gaza Strip and the West Bank,
31 including East Jerusalem). The half million Israelis living in illegal settlements on the West
32 Bank and the more than five million exiled Palestinians were not represented in this study.
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42 For each survey, a stratified two-stage random sample was drawn from lists of all Palestinian
43 households. First, enumeration areas were selected from the Palestinian territories, then a
44 random sample of households was drawn from each enumeration area in the West Bank and
45 the Gaza Strip. The surveys consisted of 13 238 households in 2006 and 15 355 households in
46 2010. The household response rates were 88.0% in 2006 and 89.4% in 2010. Only in a
47 subsample (7056 households) of the 2006 survey questions on chronic diseases were asked
48 and the present study included adults aged 20 or above from the two surveys: 17 034 and 38
49 071 participants respectively. Information on household members' socio-economic and
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3 demographic characteristics was provided by the head of household or another mature person.
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5 Data for all members was collected by self-reported responses or by proxy. Age was assessed
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7 by asking for the exact date of birth or any document with this information. Further details are
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9 available in the survey reports.^{8 14}
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14 Chronic disease was measured by answers to the question ‘Does (name) have any disease
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16 according to a medical diagnosis and receive treatment continuously?’ Whenever disease was
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18 reported, its nature was determined by choosing among 20 diseases. According to data from
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20 the Palestinian Family Survey of 2010,⁸ the four most frequently reported diseases were
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22 hypertension, diabetes, rheumatic condition, and heart disease. The crude prevalence
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24 proportions among adults (aged 20 and above) were 8.5%, 6.5%, 4.9%, and 2.7% respectively
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26 in 2010.
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32 In preparation for constructing life tables child and infant mortality rates at the age of 0–4
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34 years were estimated on the basis of data from the Palestinian Family Health Surveys, and
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36 abridged life tables were constructed using MortPak, the UN demographic measurement
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38 software package.¹⁵
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43 Health expectancy at the age of 20 was estimated using the Sullivan method^{16 17} in which the
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45 expected number of years lived in the age intervals of 20–24, 25–29, ..., 70–74, >75 years
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47 were calculated on the basis of the life table figures and multiplied by age-specific
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49 proportions of healthy people taken from the health survey data. Health expectancy for 20-
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51 year-olds was then calculated by adding these years for all age groups and dividing the sum
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53 by the number of survivors at the age of 20. A measure of the portion of lifetime spent in
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55 good health was obtained by dividing lifetime in a healthy state with life expectancy.
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3 Furthermore, estimations were made of partial life expectancy, *i.e.* expected lifetime between
4 the ages of 20 and 60. Statistical tests were carried out using a Z-test.¹⁷
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9 A technique for decomposing health expectancies based on the Sullivan method enables
10 comparisons over time of contributions to mortality differences and health differences.¹⁸ A
11 change in age-specific mortality will change life expectancy because a greater or lesser
12 number of years lived affects not only the specific age group but also the years lived in future
13 older age groups. This change (the mortality effect) will increase or reduce expected lifetime
14 in different health states. A change in the proportion of healthy people represents the
15 decomposition's other component (the health effect).
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27 **Results**

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29 Life expectancy at the age of 20 was about half a year longer among men living in the West
30 Bank than it was in the Gaza Strip and increased by half a year from 2006 to 2010 (table 1).
31 For women, life expectancy increased by a little more than half a year, and the difference
32 between the West Bank and the Gaza Strip remained nearly one year (table 2). For 60 year
33 olds, life expectancy increased by 0.2 years in the West Bank and by 0.3 years in the Gaza
34 Strip.
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45 During this period, expected lifetime without chronic disease at the age of 20 decreased
46 statistically significantly by 1.6 years for men in the West Bank ($p=0.02$) and statistically
47 insignificantly by 1.3 years in the Gaza Strip ($p=0.17$) (table 1). Simultaneously, expected
48 lifetime with chronic disease among male Palestinians increased significantly by
49 approximately 2 years ($p<0.001$). Partial life expectancy between the ages of 20 and 60 with
50 chronic disease increased from 7.0 years in 2006 to 7.4 years in 2010 (table 1). Among 60-
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year-old men, expected lifetime with chronic disease increased by 1.7 years. The proportion of expected lifetime without chronic disease between the ages of 20 and 60 declined from 81.8% to 80.7% and from 43.9% to 34.7% for 60 years olds (table 1). This change does not differ between the West bank and the Gaza Strip.

Table 1 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Men, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old men					
Gaza Strip	2006	52.4	37.8 (36.7 to 38.9)	14.6 (13.4 to 15.7)	72.2 (70.0 to 74.4)
	2010	52.9	36.5 (35.7 to 37.2)	16.4 (15.7 to 17.2)	69.0 (67.5 to 70.4)
West Bank	2006	52.9	37.6 (36.8 to 38.4)	15.3 (14.5 to 16.1)	71.0 (69.5 to 72.5)
	2010	53.5	36.0 (35.4 to 36.5)	17.5 (17.0 to 18.0)	67.3 (66.3 to 68.3)
Palestinian Territory	2006	52.8	37.7 (37.0 to 38.3)	15.1 (14.4 to 15.7)	71.4 (70.2 to 72.7)
	2010	53.3	36.1 (35.7 to 36.6)	17.1 (16.7 to 17.6)	67.8 (67.0 to 68.7)
60-year-old men					
Gaza Strip	2006	16.9	7.6 (6.5 to 8.7)	9.4 (8.3 to 10.5)	44.6 (38.1 to 51.2)
	2010	17.2	6.1 (5.3 to 6.8)	11.1 (10.3 to 11.8)	35.4 (31.1 to 39.7)
West Bank	2006	17.2	7.5 (6.7 to 8.2)	9.7 (9.0 to 10.4)	43.5 (39.1 to 47.8)
	2010	17.4	6.0 (5.5 to 6.5)	11.4 (10.9 to 11.9)	34.3 (31.5 to 37.2)
Palestinian Territory	2006	17.1	7.5 (6.9 to 8.1)	9.6 (9.0 to 10.2)	43.9 (40.3 to 47.5)
	2010	17.3	6.0 (5.6 to 6.4)	11.3 (10.9 to 11.7)	34.7 (32.3 to 37.0)
Partial life expectancy between age 20 and 60					
20-year-old men					
Gaza Strip	2006	38.2	31.5 (30.8 to 32.1)	6.7 (6.0 to 7.4)	82.4 (80.7 to 84.2)
	2010	38.3	31.3 (30.9 to 31.8)	7.0 (6.6 to 7.4)	81.7 (80.6 to 82.9)
West Bank	2006	38.3	31.2 (30.8 to 31.7)	7.1 (6.6 to 7.6)	81.5 (80.3 to 82.8)
	2010	38.5	30.8 (30.5 to 31.2)	7.7 (7.3 to 8.0)	80.1 (79.3 to 81.0)
Palestinian Territory	2006	38.3	31.3 (30.9 to 31.7)	7.0 (6.6 to 7.3)	81.8 (80.8 to 82.8)
	2010	38.4	31.0 (30.7 to 31.3)	7.4 (7.2 to 7.7)	80.7 (80.0 to 81.3)

For 20-year-old women living in the West Bank, expected lifetime without chronic disease increased statistically significantly by 1.6 years ($p=0.02$) (table 2). The gain in disease-free

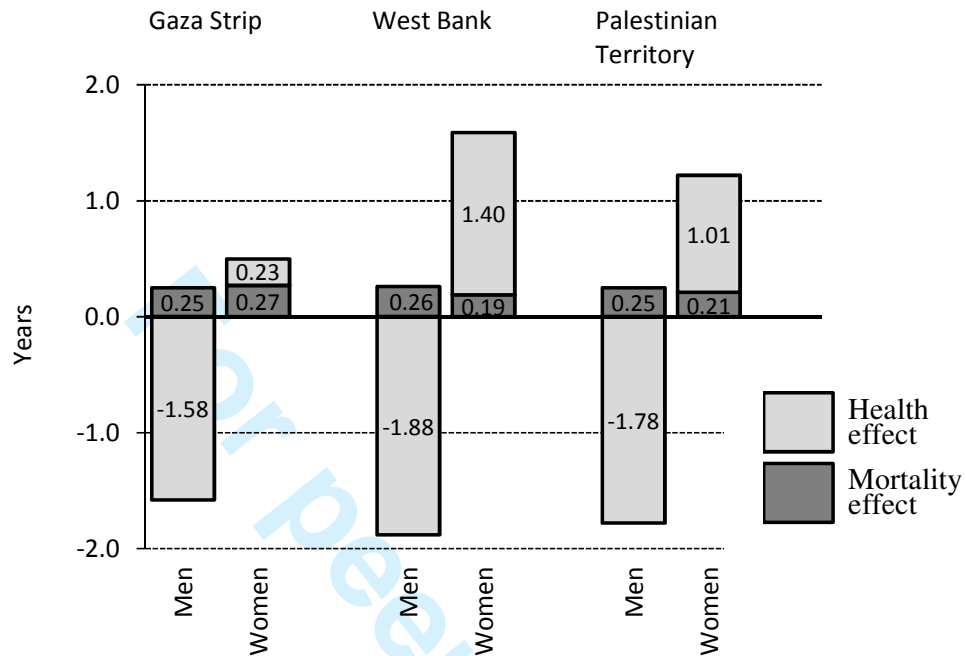
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3 life expectancy thus exceeded the increase in life expectancy. In the Gaza Strip, the gain of
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5 0.7 years in life expectancy among 20-year-old women was evenly distributed, with 0.5 years
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7 without disease and 0.2 years with disease (table 2). For Palestinian women between ages of
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9 20 and 60, expected years with chronic disease decreased from 10.6 to 9.1 during the period
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11 of 2006-2010 (table 2). The general gain in disease-free life expectancy did not, however,
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13 favour elderly Palestinian women. Thus, among 60-year-old women, expected lifetime with
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15 chronic disease increased by 0.8 years (table 2).
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Table 2 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Women, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old women					
Gaza Strip	2006	54.5	34.4 (33.3 to 35.5)	20.1 (19.0 to 21.2)	63.1 (61.1 to 65.2)
	2010	55.2	34.9 (34.2 to 35.7)	20.3 (19.5 to 21.0)	63.2 (61.9 to 64.6)
West Bank	2006	55.4	31.6 (30.8 to 32.4)	23.8 (23.0 to 24.6)	57.1 (55.6 to 58.5)
	2010	56.0	33.2 (32.7 to 33.7)	22.8 (22.2 to 23.3)	59.3 (58.4 to 60.2)
Palestinian Territory	2006	55.1	32.5 (31.9 to 33.2)	22.5 (21.9 to 23.2)	59.1 (57.9 to 60.2)
	2010	55.7	33.8 (33.3 to 34.2)	21.9 (21.5 to 22.4)	60.6 (59.9 to 61.4)
60-year-old women					
Gaza Strip	2006	18.5	5.7 (4.7 to 6.6)	12.8 (11.8 to 13.8)	30.6 (25.3 to 35.9)
	2010	18.8	5.2 (4.6 to 5.9)	13.6 (12.9 to 14.2)	27.9 (24.4 to 31.4)
West Bank	2006	18.9	5.0 (4.3 to 5.6)	13.9 (13.3 to 14.6)	26.3 (22.9 to 29.7)
	2010	19.2	4.4 (4.0 to 4.8)	14.8 (14.3 to 15.2)	22.9 (20.7 to 25.2)
Palestinian Territory	2006	18.8	5.2 (4.6 to 5.7)	13.6 (13.0 to 14.1)	27.6 (24.7 to 30.5)
	2010	19.0	4.7 (4.3 to 5.0)	14.4 (14.0 to 14.7)	24.5 (22.6 to 26.4)
Partial life expectancy between age 20 and 60					
20 year-old women					
Gaza Strip	2006	38.4	29.5 (28.8 to 30.2)	8.9 (8.2 to 9.7)	76.7 (74.9 to 78.6)
	2010	38.6	30.3 (29.8 to 30.8)	8.3 (7.9 to 8.8)	78.4 (77.2 to 79.6)
West Bank	2006	38.7	27.2 (26.7 to 27.7)	11.5 (10.9 to 12.0)	70.4 (69.0 to 71.7)
	2010	38.8	29.3 (28.9 to 29.6)	9.6 (9.2 to 9.9)	75.4 (74.5 to 76.3)
Palestinian Territory	2006	38.6	28.0 (27.6 to 28.4)	10.6 (10.2 to 11.0)	72.5 (71.4 to 73.6)
	2010	38.7	29.6 (29.3 to 29.9)	9.1 (8.9 to 9.4)	76.4 (75.7 to 77.1)

Figure 2 shows the results of decomposing into mortality and health effects the change over time in disease-free life expectancy at the age of 20. The mortality effect of approximately one fourth of a year was nearly equal for men and women and did not differ between the Gaza Strip and the West Bank. The divergent change from 2006 to 2010 between men and women in expected lifetime without chronic disease thus resulted from the health effect (*i.e.* prevalence of disease increased among men and decreased among women).

Fig 2 Decomposition into the mortality and health effects of changes between 2006 and 2010 in disease-free life expectancy at age 20 in the occupied Palestinian territory

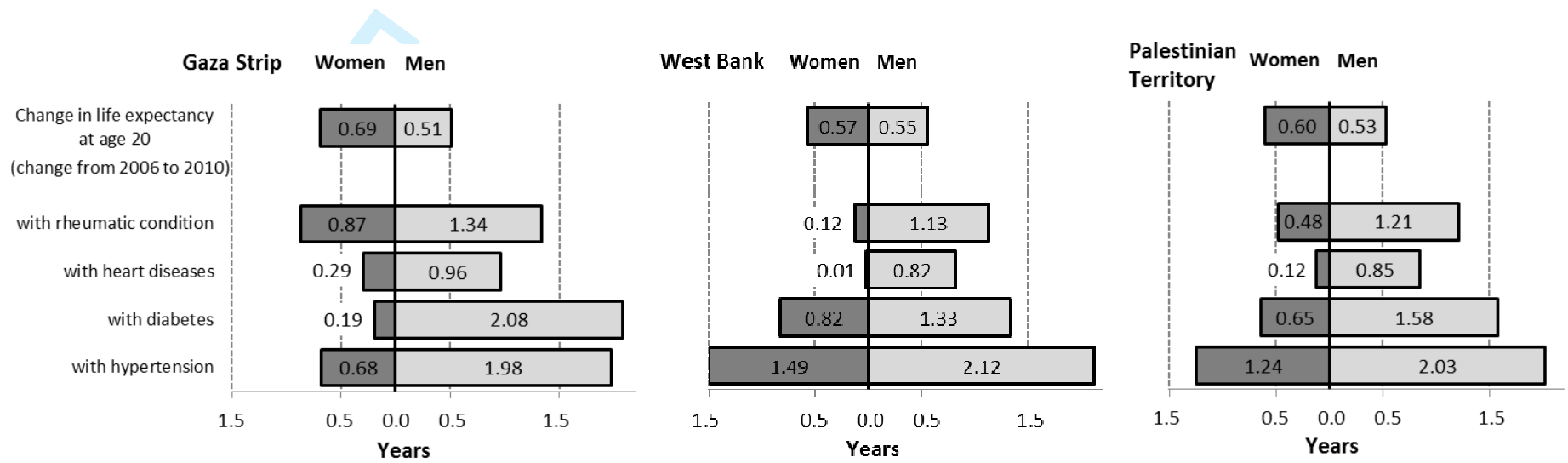


In 2010, 20-year-old men and women could expect 3.6 years (95% CI: 3.3 to 3.9) and 3.2 years (95% CI: 3.0 to 3.5) with heart disease respectively. For the three other most prevalent chronic conditions, women could expect a greater number of years with a disease than could men (12.5 versus 7.7 years with hypertension, 8.3 versus 6.7 years with diabetes, and 6.8 versus 3.6 years with rheumatic conditions) (table 3). No gain in disease-free life expectancy was observed for any of the four diseases, with the exception of heart disease among women. In particular, the health status of men worsened, and the gender gap decreased during the period of 2006 to 2010 (table 3, figure 3).

Table 3 Life expectancy at age 20 and expected lifetime with the four most prevalent diseases – Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime with Hypertension years (95% CI)	Diabetes years (95% CI)	Heart diseases years (95% CI)	Rheumatic conditions years (95% CI)
20-year-old men						
Gaza Strip	2006	52.4	6.0 (5.1 to 6.8)	4.6 (3.9 to 5.4)	2.4 (1.8 to 2.9)	2.1 (1.5 to 2.7)
	2010	52.9	7.9 (7.2 to 8.6)	6.7 (6.0 to 7.4)	3.3 (2.8 to 3.8)	3.4 (2.9 to 4.0)
West Bank	2006	52.9	5.5 (4.9 to 6.1)	5.4 (4.8 to 6.0)	2.9 (2.4 to 3.3)	2.5 (2.1 to 3.0)
	2010	53.5	7.6 (7.2 to 8.1)	6.8 (6.3 to 7.2)	3.7 (3.3 to 4.1)	3.7 (3.3 to 4.0)
Palestinian Territory	2006	52.8	5.7 (5.2 to 6.2)	5.1 (4.7 to 5.6)	2.7 (2.4 to 3.1)	2.4 (2.0 to 2.7)
	2010	53.3	7.7 (7.3 to 8.1)	6.7 (6.3 to 7.1)	3.6 (3.3 to 3.9)	3.6 (3.3 to 3.9)
20-year-old women						
Gaza Strip	2006	54.5	11.8 (10.8 to 12.8)	7.9 (7.0 to 8.8)	2.4 (1.8 to 3.0)	4.1 (3.4 to 4.8)
	2010	55.2	12.5 (11.7 to 13.2)	8.1 (7.4 to 8.7)	2.7 (2.3 to 3.2)	5.0 (4.4 to 5.6)
West Bank	2006	55.4	10.9 (10.2 to 11.7)	7.5 (6.9 to 8.2)	3.5 (3.0 to 4.0)	7.6 (7.0 to 8.3)
	2010	56.0	12.4 (11.9 to 13.0)	8.4 (7.9 to 8.8)	3.5 (3.1 to 3.9)	7.8 (7.3 to 8.2)
Palestinian Territory	2006	55.1	11.2 (10.6 to 11.8)	7.6 (7.1 to 8.1)	3.1 (2.7 to 3.5)	6.4 (5.9 to 6.9)
	2010	55.7	12.5 (12.0 to 12.9)	8.3 (7.9 to 8.7)	3.2 (3.0 to 3.5)	6.8 (6.5 to 7.2)

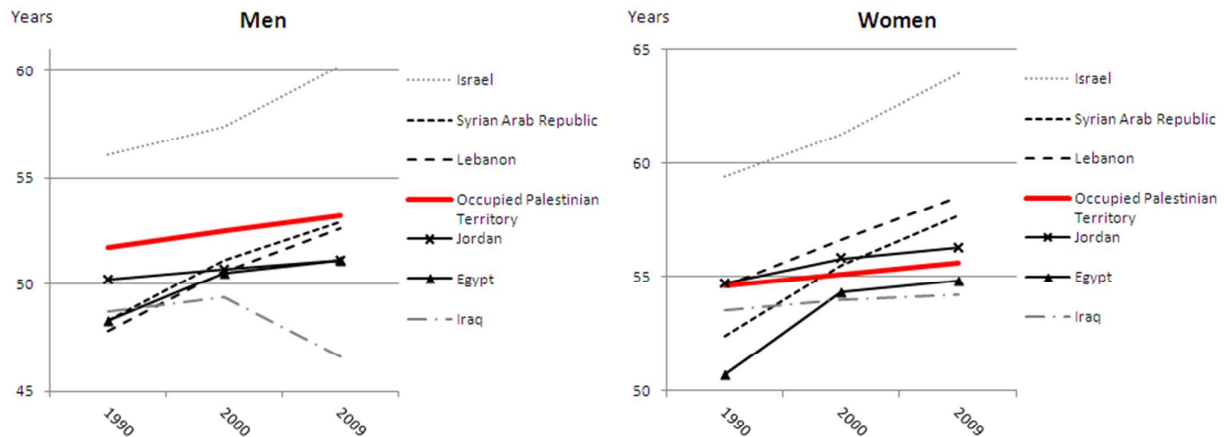
Fig 3 Change between 2006 and 2010 in life expectancy and expected lifetime at age 20 with the four most frequent chronic diseases in the occupied Palestinian territories



Discussion

As in other populations, Palestinian women live longer than Palestinian men and endure a greater number of years with health problems. But Palestinian women's advantage of 2.7 more years of expected lifetime in 2009 is much less than the gender difference in the neighbouring populations. During the last 20 years life expectancy has increased more for Palestinian men than women, but for both genders the increase has generally been slower for Palestinians than for the neighbouring populations (figure 4).

Fig 4 Life expectancy at age 20 in the occupied Palestinian territory and other Middle East countries



Sources: World Health Organisation, Global Health Observatory Data Repository and Palestinian Central Bureau of Statistics

Remarkably, the changes in partial life expectancy (age interval 20 to 60) without chronic disease from 2006 to 2010 went in opposite directions for men and women. At age 60 lifetime without chronic disease decreased for both sexes, but more among men than women. Health has thus worsened among men, and the gender gap in expected lifetime with chronic disease has thus worsened among men, and the gender gap in expected lifetime with chronic disease has narrowed. The changes in health expectancy between 2006 and 2010 were mainly due to the increasing prevalence of chronic disease and not due to increasing life expectancy (figure 2). The gain in life expectancy for men thus consisted not only of additional years with

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3 hypertension, diabetes, heart disease, and rheumatic conditions because expected lifetime
4 without these diseases was shorter in 2010 than in 2006. This tendency toward expansion of
5 morbidity was less distinct for women.
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11 The increase in lifetime with hypertension and diabetes among men is particularly worrisome,
12 although it might partly reflect trends in ascertainment. Hypertension and diabetes are initial
13 stages of cardiovascular disease, and the risk is elevated because of the high prevalence of
14 tobacco smoking among men. The percentage of smoking among men exceeds 40% but is
15 less than 3% among women.^{8 19} The prevalence of smoking is significantly higher in the
16 West Bank than the Gaza Strip. The percentage of smokers aged 18 and over has declined
17 from 29.2% in 2000 to 26.9% in 2010 in the West Bank and from 24.1% to 14.6 in the Gaza
18 Strip.⁸ Lung cancer is the most frequent cancer type among Palestinian men.¹¹ In general,
19 chronic disease develops gradually, caused by exposure to risk factors such as the effects of
20 psychological stressors or the long-term cumulative effects of tobacco smoking. Poor
21 nutrition or undernourishment, in particular in the Gaza Strip and during childhood, increases
22 the risk of obesity and chronic disease.^{11 20-22} Along with tobacco smoking among men, poor
23 nutrition and physical inactivity are the most important preventable lifestyle-related risk
24 factors for Palestinians. Prevention related to these risk factors requires particular attention in
25 order to reduce the incidence of cardiovascular and metabolic disease.
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47 Men – particularly young men – face greater exposure to violations by the Israeli army and
48 Israeli settlers than do women.²³⁻²⁶ Since 1967, an unknown number of Palestinians, mostly
49 young men, have been imprisoned on political grounds and have suffered various health
50 problems following their release.^{27 28} The fluctuations and instability of Palestinians' societal
51 and political life could affect men and women differently. A survey among young Palestinians
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3 in Ramallah showed that exposure to political violence affects the mental health of
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5 adolescents and that depressive-like symptoms were more prevalent among girls than among
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7 boys.²⁹
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11 Health services and access to diagnosis and treatment are complicated in the West Bank and
12
13 the Gaza Strip due to a variety of factors related to restrictions on movement in the West
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15 Bank and the blockade that cuts the Gaza Strip off from the outside world.^{5 30} Some of these
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17 deficiencies are, however, partially remedied by humanitarian aid from international bodies.
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19 As the character of the abnormal living circumstances differ between the West Bank and the
20
21 Gaza Strip, no simple interpretation can be applied to differences between the two territories.
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23 The economic hardship can be illustrated by the high unemployment rates. According to the
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25 Palestinian National Authority the unemployment rates in 2011 were 15.9% and 22.6 % for
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27 men and women in the West Bank and 25.8% and 44.0% in the Gaza Strip.³¹
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34 In spite of the high number of deaths, attacks on medical personnel and civilians, destruction
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36 of hospitals, *etc.*³² associated with the Israeli assault on the Gaza Strip shortly before the
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38 second survey in 2010, we cannot expect that this assault would be directly visible in the
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40 health expectancy estimates. The direct effect of Israeli attacks should be assessed by studies
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42 with a more focused design, such as on the impact of the Israeli attack on the Gaza Strip,³²⁻³⁶
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44 the Israeli military invasions in the spring of 2002,^{29 37} and the army's reaction to the 2000
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46 uprising.²⁵
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52 In 2009, the *Lancet* published a series of comprehensive studies on the health status of the
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54 population and the health services available in the occupied Palestinian territory, providing
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56 complete information on and evidence of the situation.^{5 6 11 30 38} The unsuccessful attempt to
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3 establish an efficient health-care system under military occupation has also been examined.³⁰
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5 Health status has not improved satisfactorily since the mid-1990s, and the health services
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7 have remained in stasis.³⁰
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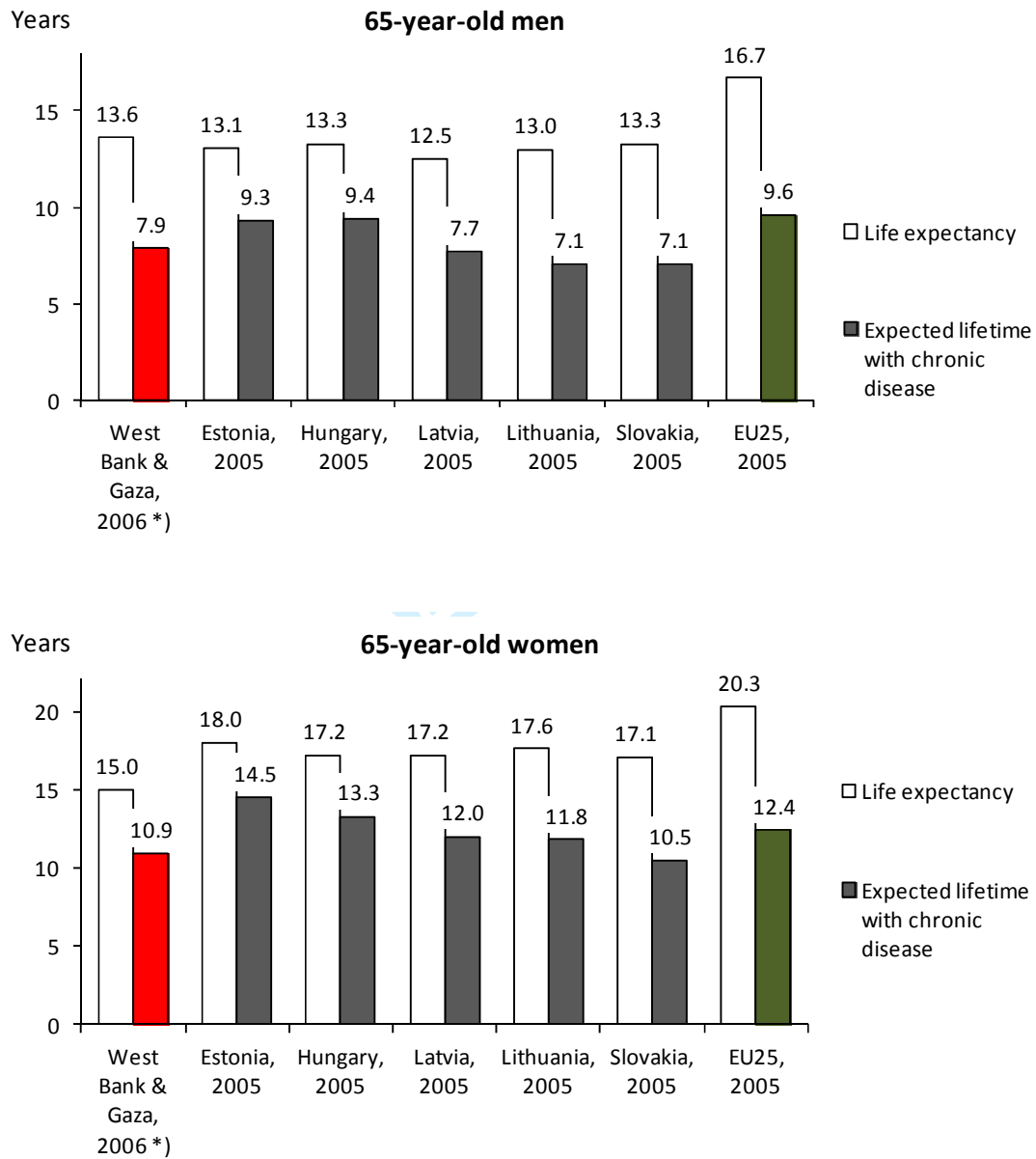
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11 Account has been taken of logistical difficulties related to data collection under military
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13 occupation and how this may influence participation and responses by interviewees. The
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15 quality of the survey data is high due to a thoroughly centralised interview training process,
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17 pilot testing, and the quality-control mechanisms applied to data processing. The Palestinian
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19 Central Bureau of Statistics received technical assistance from international organisations
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21 (UNICEF, UN Population Fund, and the Arab League). Furthermore, the standardisation of
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23 questionnaires and sampling methods enables comparisons over time. Study design,
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25 representativeness, non-participation, *etc.* in the Palestinian Family Health Surveys have been
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27 described previously in reports by the Palestinian Central Bureau of Statistics.^{8 14}
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34 Over half of the Palestinian population is between the ages of 0 and 19, and less than 5% is
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36 over 60 years old. Thus, we did not estimate the widely used disability-free life expectancy
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38 indicator that is typically based on questions related to ageing such as functional disability in
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40 activities of daily living (ADLs) or instrumental activities of daily living (IADLs). The
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42 Minimum European Health Module includes a question on chronic conditions: 'Do you suffer
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44 from any long-standing illness or condition (health problem)?'³⁹ Health expectancy estimates
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46 based on this question are available for European countries.⁴⁰ Among the 25 EU member
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48 states in 2005 life expectancy at age 65 varied from 12.5 years to 17.7 years for men and from
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50 17.1 years to 22.0 years for women. The average expected lifetime without chronic morbidity
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52 was estimated at 9.6 years for 65-year-old men and 12.4 years for 65-year-old women.⁴⁰ In
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54 general life expectancy was lowest in East European countries. While uniformly constructed
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3 life tables make international comparisons of life expectancy possible it is a challenge to
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5 compare health expectancies. Due to the lack of international harmonised questionnaires
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7 including chronic disease questions we still need comparable data on health expectancy.
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9 However, figure 5 presents expected lifetime with chronic disease for 65-year-old Estonians,
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11 Hungarians, Latvians, Lithuanians, Slovaks and the whole Europe (EU25) in 2005 ⁴⁰ and
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13 Palestinians in 2006. Because the wording of the questions on chronic diseases in the
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15 Minimum European Health Module and in the Palestinian Family Health Survey 2006 differs
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17 it is unwise to attribute much weight to the comparison of expected lifetime with chronic
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19 disease between the European countries and the occupied Palestinian territory.
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25 There was a striking different gender gap in life expectancy between Europeans and
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27 Palestinians (figure 5). Among 65-year-old Palestinians the women's life expectancy was
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29 only 10% longer than men's whereas the gap in the East European countries varied between
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31 28% and 35%. The average gap in EU25 was 22%. The different gender gap in life
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33 expectancy and health expectancy between the more established EU countries and the newer
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35 EU countries has been discussed previously. ^{41 42}
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Fig 5 Life expectancy and expected lifetime with chronic disease*) at age 65 in selected European countries, the whole EU, and the occupied Palestinian territory



*) Different questions on chronic diseases in the Minimum European Health Module and the Palestinian Family Health Survey (see text)

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3 Because the study describes health expectancy after the age of 20, less than half of the
4 population is presented. Demography in the occupied Palestinian territory requires great
5 attention to the health and welfare of Palestinian children and adolescents.
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11 The occupied Palestinian territory is well supplied by data from health surveys, which could
12 help strengthen the health information system. We recommend that health expectancy be
13 introduced as a summary measure of population health for monitoring the health status in
14 Palestine. The data necessary for introducing this indicator is available by conducting
15 successive uniformly designed health surveys. Coordination with and the simultaneity of the
16 Pan Arab Project for Family Health furthermore enables future comparisons of health
17 expectancy between populations in the Arab countries.
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Article summary**Article Focus**

- Health expectancy divides life expectancy into average lifetime in various states of health
- The concept of health expectancy has attracted increased interest among researchers and policymakers as a summary measure of population health and has been estimated in nearly all European countries as well as in many other countries worldwide but has never been estimated for a Middle Eastern population
- The study presents expected lifetime with and without chronic disease as well as what changes have taken place among Palestinians living in the Israeli-occupied Palestinian territory over the past five years

Key Messages

- Expected lifetime with the four most prevalent chronic diseases (hypertension, diabetes, heart diseases, and rheumatic conditions) has increased for men. For women, the gain in life expectancy was more evenly distributed as years with and without diseases
- The divergent trends for men and women might be due to different exposures to lifestyle-related risk factors (e.g. smoking) and the impact of military occupation

Strengths and Limitations

- The household response rates of the Palestinian Family Health Surveys of 2006 and 2010 were 88.0% and 89.4% and included information on 17 034 and 38 071 adult participants respectively
- In spite of difficulties related to data collection under military occupation representativeness and high quality of the survey data were ensured. International organizations contributed with technical assistance

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Health expectancy in the occupied Palestinian territory: estimates from the Gaza Strip and the West Bank – based on surveys from 2006 and 2010

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Contributors KQ and HBH initiated the study. KQ and MD provided life tables and health status prevalence tables. HBH undertook the analysis and drafted the manuscript. All authors have contributed to the writing of the manuscript and have seen and approved the final version.

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Abstract

Objectives The purpose of the study was to estimate health expectancy for the Palestinian population- and to evaluate changes that have taken place over the past five years.

Design Mortality data and population-based health surveys.

Setting The Israeli-occupied Palestinian territory of the Gaza Strip and the West Bank.

Participants 17 034 and 38 071 adults aged 20 or over participating the Palestinian Family Health Surveys of 2006 and 2010. Mortality rates for 2007 and 2010 covered the entire population.

Outcome measures Life expectancy and expected lifetime with and without chronic disease were estimated using the Sullivan method on the basis of mortality data and data on the prevalence of chronic disease.

Results Life expectancy at the age of 20 increased from 52.8 years in 2006 to 53.3 years in 2010 for men and from 55.1 years to 55.7 years for women. In 2006, expected lifetime without a chronic disease was 37.7 (95% CI: 37.0 to 38.3) years and 32.5 (95% CI: 31.9 to 33.2) years for 20-year-old men and women respectively. By 2010, this had decreased by 1.6 years for men and increased by 1.3 years for women. The health status of men has worsened. In particular, lifetime with hypertension and diabetes has increased. For women, the gain in life expectancy consisted partly of years with and partly of years without the most prevalent diseases.

Conclusions Health expectancy for men and women diverged, which could to some extent be due to gender-specific exposures related to lifestyle factors and the impact of military occupation.

Keywords health expectancy, life expectancy, occupied Palestinian territory

Introduction

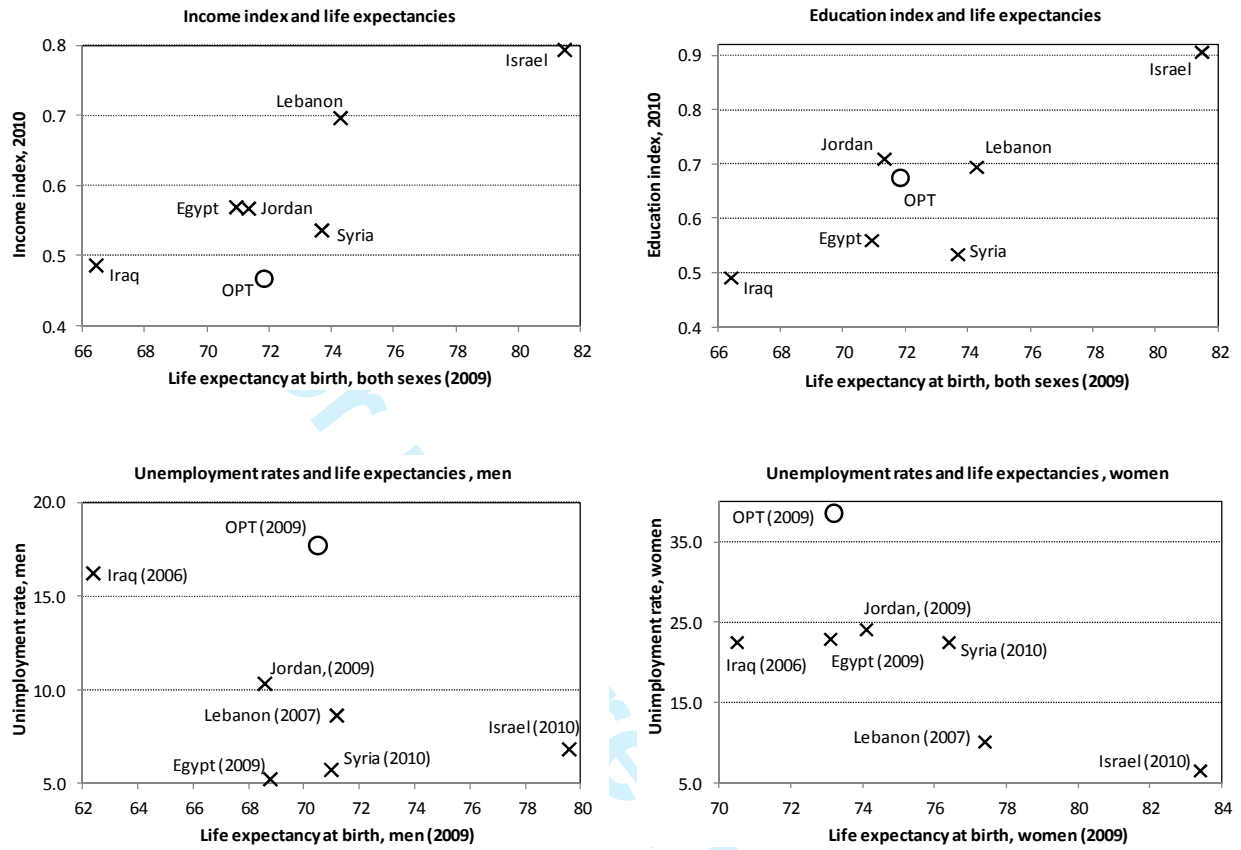
The number of Palestinians worldwide recently reached 11 million. Fewer than half (4.2 million) live in the occupied Palestinian territory. Of these, two million are refugees, the majority living in camps.¹ As only 1.3 million Palestinians live in Israel, 5.5 million of the Palestinian population lives abroad. The total area of historical Palestine is 27 000 square kilometres. Six percent of this was controlled by Jewish immigrants prior to the United Nations resolution on the partition of Palestine in 1947. Today, Israel controls 85% of the total area of historical Palestine. The Gaza Strip is one of the most densely populated parts of the World, with about 4300 individuals per square kilometre.^{2,3} ~~Ever since the state of Israel's establishment in 1948, Palestinians have lived under war conditions, under occupation, or under displacement from their native homes. More than half of the population lives in exile outside of Palestine, and the remaining 4.2 million Palestinians reside in an area of land that has shrunk markedly and is being continuously and systematically eroded by illegal Israeli settlements.~~ Continued land confiscation and intensified tightening of the closure system has increased the prevalence of economic crises, unemployment, and poverty, thereby strengthening dependency on donor financing.⁴ Restrictions on freedom of movement, trading, employment, living a healthy life, access to health care, *etc.* threaten welfare and public health.⁵⁻⁷

In 2010, the share of the population under the age of 20 in the occupied Palestinian territory was 53.3%, with 4.4% of the population being aged 60 years or older.⁸ According to WHO EMRO, the crude birth rate was ~~3129.6~~ births per 1000 persons in 2010, and the crude death rate was ~~3.02.7~~ deaths per 1000 persons.⁹ ~~In 2009~~ life expectancy at birth was 70.5 years for men and 73.2 for women.¹⁰ ~~The neonatal mortality rate (deaths per 1000 live births during the first 28 days of life) was 9.4, the infant mortality rate was 25.0 deaths per 1000 live births,~~

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3 and the total fertility rate was 4.6 births per woman.⁹ The maternal mortality rate was 38 per
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5 10 000 live births.⁹ There have been only very modest improvements in infant and child
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7 mortality rates since the 1990s.¹⁰ The ~~six~~three leading causes of death are heart disease
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9 (21.0% of all deaths), cerebrovascular disease (11.0%), ~~and~~ cancer (10.3%), conditions in
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11 perinatal period (8.6%), respiratory disorders (6.9%), and accidents (5.4%).¹¹
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16 Figure 1 depicts the associations between selected structural indicators (income index,
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18 education index and unemployment rate) and life expectancy in some Middle East countries
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20 from data assessed by UNDP International Human Development Indicators ,¹² UN Statistics
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22 Division – Demographic and Social Statistics¹³ and WHO, Global Health Observatory Data
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24 Repository.¹⁰ Iraq and Israel represent the extremes. Life expectancy for Palestinian men is
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26 close to that of the male populations of Syrian Arab Republic and Lebanon. For Palestinian
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28 women life expectancy is low and close to that of Egyptian women. It appears clearly that in
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30 particular low income level and high prevalence of unemployment retard the development in
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32 the occupied Palestinian territory.
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Fig 1 Income index, education index and unemployment rates by contrast with life expectancy in selected Middle East countries



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3 Health expectancy represents the average lifetime a person can expect to live in a specific
4 state of health (*e.g.* with or without chronic disease). As a summary measure of population
5 health that combines health status and mortality, health expectancy has the strength of
6 offering a more nuanced contribution to the monitoring of population health than do
7 measurements of life expectancy. Health expectancy can be measured in various ways and for
8 different population groups, *i.e.* based on a geographical area, a social group, or a group with
9 other characteristics. The purpose of this study was to estimate expected lifetime with or
10 without chronic disease among Palestinians living in the Gaza Strip and the West Bank and to
11 evaluate changes that have taken place over the past five years.
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25 **Methods**

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28 Health prevalence data was derived from the Palestinian Family Health Surveys carried out in
29 2006 and 2010.^{8 14} The surveys were designed to be representative of the entire Palestinian
30 population of the occupied Palestinian territory (*i.e.* the Gaza Strip and the West Bank,
31 including East Jerusalem). The half million Israelis living in illegal settlements on the West
32 Bank and the more than five million exiled Palestinians were not represented in this study.
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42 For each survey, a stratified two-stage random sample was drawn from lists of all Palestinian
43 households. First, enumeration areas were selected from the Palestinian territories, then a
44 random sample of households was drawn from each enumeration area in the West Bank and
45 the Gaza Strip. The surveys consisted of 13 238 households in 2006 and 15 355 households in
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50 2010. The household response rates were 88.0% in 2006 and 89.4% in 2010. Only in a
51 subsample (7056 households) of the 2006 survey questions on chronic diseases were asked
52 and The present study included adults aged 20 or above from the two surveys: 17 034 and 38
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071 participants respectively. Information on household members' socio-economic and

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3 demographic characteristics was provided by the head of household or another mature person.
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5 Data for all members was collected by self-reported responses or by proxy. Age was assessed
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7 by asking for the exact date of birth or any document with this information. Further details are
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9 available in the survey reports.^{8 14}
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14 Chronic disease was measured by answers to the question ‘Does (name) have any disease
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16 according to a medical diagnosis and receive treatment continuously?’ Whenever disease was
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18 reported, its nature was determined by choosing among 20 diseases. According to data from
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20 the Palestinian Family Survey of 2010,⁸ the four most frequently reported diseases were
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22 hypertension, diabetes, rheumatic condition, and heart disease. The crude prevalence
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24 proportions among adults (aged 20 and above) were 8.5%, 6.5%, 4.9%, and 2.7% respectively
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27 in 2010.
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32 In preparation for constructing life tables Child and infant mortality rates at the age of 0–4
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34 years were estimated on the basis of data from the Palestinian Family Health Surveys, and
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36 abridged life tables were constructed using MortPak, the UN demographic measurement
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38 software package.¹⁵
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43 Health expectancy at the age of 20 was estimated using the Sullivan method^{16 17} in which the
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45 expected number of years lived in the age intervals of 20–24, 25–29, ..., 70–74, >75 years
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47 were calculated on the basis of the life table figures and multiplied by age-specific
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49 proportions of healthy people taken from the health survey data. Health expectancy for 20-
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51 year-olds was then calculated by adding these years for all age groups and dividing the sum
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53 by the number of survivors at the age of 20. A measure of the portion of lifetime spent in
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55 good health was obtained by dividing lifetime in a healthy state with life expectancy.
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3 Furthermore, estimations were made of partial life expectancy, *i.e.* expected lifetime between
4 the ages of 20 and 60. Statistical tests were carried out using a Z-test.¹⁷
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9 A technique for decomposing health expectancies based on the Sullivan method enables
10 comparisons over time of contributions to mortality differences and health differences.¹⁸ A
11 change in age-specific mortality will change life expectancy because a greater or lesser
12 number of years lived affects not only the specific age group but also the years lived in future
13 older age groups. This change (the mortality effect) will increase or reduce expected lifetime
14 in different health states. A change in the proportion of healthy people represents the
15 decomposition's other component (the health effect).
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27 **Results**

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29 Life expectancy at the age of 20 was about half a year longer among men living in the West
30 Bank than it was in the Gaza Strip and increased by half a year from 2006 to 2010 (table 1).
31 For women, life expectancy increased by a little more than half a year, and the difference
32 between the West Bank and the Gaza Strip remained nearly one year (table 2). For 60 year
33 olds, life expectancy increased by 0.2 years in the West Bank and by 0.3 years in the Gaza
34 Strip.
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45 During this period, expected lifetime without chronic disease at the age of 20 decreased
46 statistically significantly by 1.6 years for men in the West Bank ($p=0.02$) and statistically
47 insignificantly by 1.3 years in the Gaza Strip ($p=0.17$) (table 1). Simultaneously, expected
48 lifetime with chronic disease among male Palestinians increased significantly by
49 approximately 2 years ($p<0.001$). Partial life expectancy between the ages of 20 and 60 with
50 chronic disease increased from 7.0 years in 2006 to 7.4 years in 2010 (table 1). Among 60-
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year-old men, expected lifetime with chronic disease increased by 1.7 years. The proportion of expected lifetime without chronic disease between the ages of 20 and 60 declined from 81.8% to 80.7% and from 43.9% to 34.7% for 60 years olds (table 1). This change does not differ between the West bank and the Gaza Strip.

Table 1 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Men, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old men					
Gaza Strip	2006	52.4	37.8 (36.7 to 38.9)	14.6 (13.4 to 15.7)	72.2 (70.0 to 74.4)
	2010	52.9	36.5 (35.7 to 37.2)	16.4 (15.7 to 17.2)	69.0 (67.5 to 70.4)
West Bank	2006	52.9	37.6 (36.8 to 38.4)	15.3 (14.5 to 16.1)	71.0 (69.5 to 72.5)
	2010	53.5	36.0 (35.4 to 36.5)	17.5 (17.0 to 18.0)	67.3 (66.3 to 68.3)
Palestinian Territory	2006	52.8	37.7 (37.0 to 38.3)	15.1 (14.4 to 15.7)	71.4 (70.2 to 72.7)
	2010	53.3	36.1 (35.7 to 36.6)	17.1 (16.7 to 17.6)	67.8 (67.0 to 68.7)
60-year-old men					
Gaza Strip	2006	16.9	7.6 (6.5 to 8.7)	9.4 (8.3 to 10.5)	44.6 (38.1 to 51.2)
	2010	17.2	6.1 (5.3 to 6.8)	11.1 (10.3 to 11.8)	35.4 (31.1 to 39.7)
West Bank	2006	17.2	7.5 (6.7 to 8.2)	9.7 (9.0 to 10.4)	43.5 (39.1 to 47.8)
	2010	17.4	6.0 (5.5 to 6.5)	11.4 (10.9 to 11.9)	34.3 (31.5 to 37.2)
Palestinian Territory	2006	17.1	7.5 (6.9 to 8.1)	9.6 (9.0 to 10.2)	43.9 (40.3 to 47.5)
	2010	17.3	6.0 (5.6 to 6.4)	11.3 (10.9 to 11.7)	34.7 (32.3 to 37.0)
Partial life expectancy between age 20 and 60					
20-year-old men					
Gaza Strip	2006	38.2	31.5 (30.8 to 32.1)	6.7 (6.0 to 7.4)	82.4 (80.7 to 84.2)
	2010	38.3	31.3 (30.9 to 31.8)	7.0 (6.6 to 7.4)	81.7 (80.6 to 82.9)
West Bank	2006	38.3	31.2 (30.8 to 31.7)	7.1 (6.6 to 7.6)	81.5 (80.3 to 82.8)
	2010	38.5	30.8 (30.5 to 31.2)	7.7 (7.3 to 8.0)	80.1 (79.3 to 81.0)
Palestinian Territory	2006	38.3	31.3 (30.9 to 31.7)	7.0 (6.6 to 7.3)	81.8 (80.8 to 82.8)
	2010	38.4	31.0 (30.7 to 31.3)	7.4 (7.2 to 7.7)	80.7 (80.0 to 81.3)

For 20-year-old women living in the West Bank, expected lifetime without chronic disease increased statistically significantly by 1.6 years ($p=0.02$) (table 2). The gain in disease-free

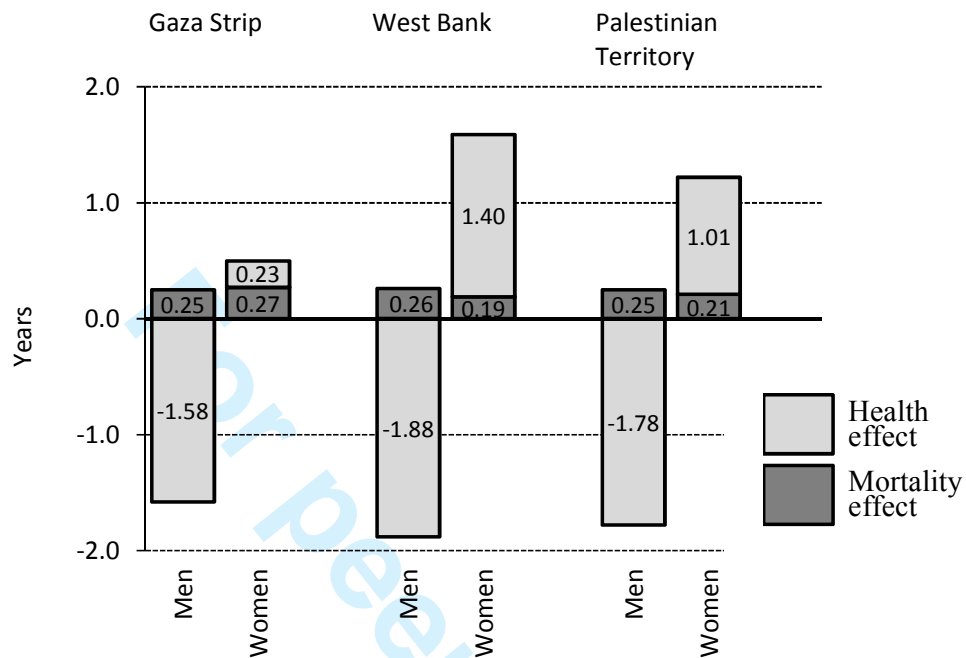
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3 life expectancy thus exceeded the increase in life expectancy. In the Gaza Strip, the gain of
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5 0.7 years in life expectancy among 20-year-old women was evenly distributed, with 0.5 years
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7 without disease and 0.2 years with disease (table 2). For Palestinian women between ages of
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9 20 and 60, expected years with chronic disease decreased from 10.6 to 9.1 during the period
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11 of 2006-2010 (table 2). The general gain in disease-free life expectancy did not, however,
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13 favour elderly Palestinian women. Thus, among 60-year-old women, expected lifetime with
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15 chronic disease increased by 0.8 years (table 2).
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Table 2 Life expectancy at age 20 and 60, partial life expectancy (age 20–60), and expected lifetime without and with chronic disease, and proportion of expected lifetime without chronic disease – Women, Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime without chronic disease years (95% CI)	Expected lifetime with chronic disease years (95% CI)	Proportion of expected lifetime without chronic disease % (95% CI)
20-year-old women					
Gaza Strip	2006	54.5	34.4 (33.3 to 35.5)	20.1 (19.0 to 21.2)	63.1 (61.1 to 65.2)
	2010	55.2	34.9 (34.2 to 35.7)	20.3 (19.5 to 21.0)	63.2 (61.9 to 64.6)
West Bank	2006	55.4	31.6 (30.8 to 32.4)	23.8 (23.0 to 24.6)	57.1 (55.6 to 58.5)
	2010	56.0	33.2 (32.7 to 33.7)	22.8 (22.2 to 23.3)	59.3 (58.4 to 60.2)
Palestinian Territory	2006	55.1	32.5 (31.9 to 33.2)	22.5 (21.9 to 23.2)	59.1 (57.9 to 60.2)
	2010	55.7	33.8 (33.3 to 34.2)	21.9 (21.5 to 22.4)	60.6 (59.9 to 61.4)
60-year-old women					
Gaza Strip	2006	18.5	5.7 (4.7 to 6.6)	12.8 (11.8 to 13.8)	30.6 (25.3 to 35.9)
	2010	18.8	5.2 (4.6 to 5.9)	13.6 (12.9 to 14.2)	27.9 (24.4 to 31.4)
West Bank	2006	18.9	5.0 (4.3 to 5.6)	13.9 (13.3 to 14.6)	26.3 (22.9 to 29.7)
	2010	19.2	4.4 (4.0 to 4.8)	14.8 (14.3 to 15.2)	22.9 (20.7 to 25.2)
Palestinian Territory	2006	18.8	5.2 (4.6 to 5.7)	13.6 (13.0 to 14.1)	27.6 (24.7 to 30.5)
	2010	19.0	4.7 (4.3 to 5.0)	14.4 (14.0 to 14.7)	24.5 (22.6 to 26.4)
Partial life expectancy between age 20 and 60					
20 year-old women					
Gaza Strip	2006	38.4	29.5 (28.8 to 30.2)	8.9 (8.2 to 9.7)	76.7 (74.9 to 78.6)
	2010	38.6	30.3 (29.8 to 30.8)	8.3 (7.9 to 8.8)	78.4 (77.2 to 79.6)
West Bank	2006	38.7	27.2 (26.7 to 27.7)	11.5 (10.9 to 12.0)	70.4 (69.0 to 71.7)
	2010	38.8	29.3 (28.9 to 29.6)	9.6 (9.2 to 9.9)	75.4 (74.5 to 76.3)
Palestinian Territory	2006	38.6	28.0 (27.6 to 28.4)	10.6 (10.2 to 11.0)	72.5 (71.4 to 73.6)
	2010	38.7	29.6 (29.3 to 29.9)	9.1 (8.9 to 9.4)	76.4 (75.7 to 77.1)

Figure 2 shows the results of decomposing into mortality and health effects the change over time in disease-free life expectancy at the age of 20. The mortality effect of approximately one fourth of a year was nearly equal for men and women and did not differ between the Gaza Strip and the West Bank. The divergent change from 2006 to 2010 between men and women in expected lifetime without chronic disease thus resulted from the health effect (*i.e.* prevalence of disease increased among men and decreased among women).

Fig 2 Decomposition into the mortality and health effects of changes between 2006 and 2010 in disease-free life expectancy at age 20 in the occupied Palestinian territory

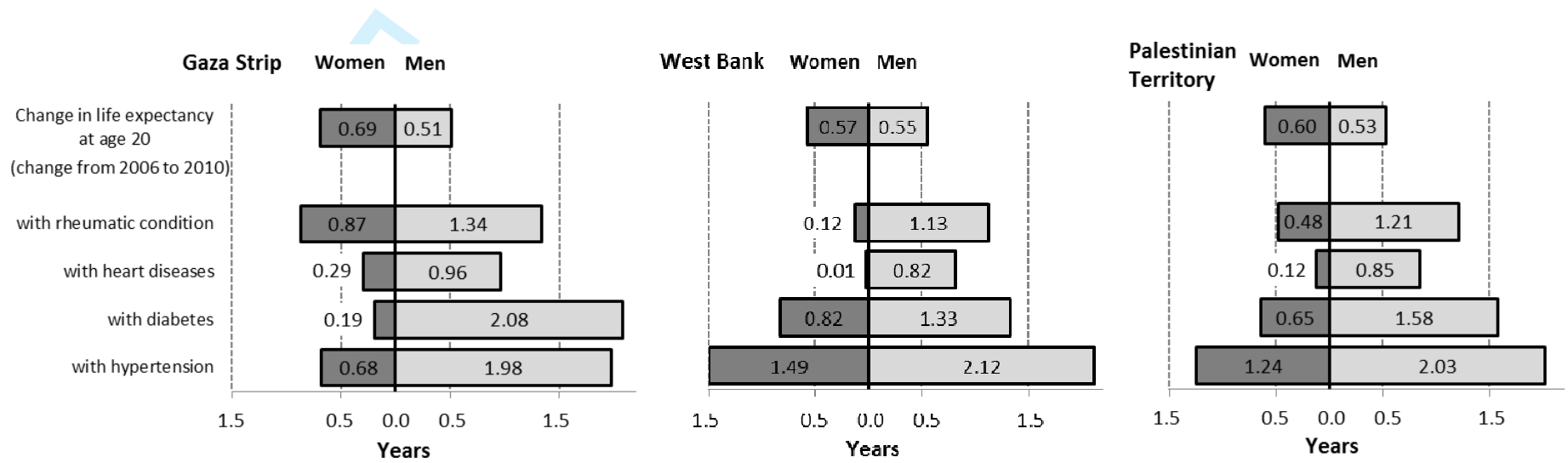


In 2010, 20-year-old men and women could expect 3.6 years (95% CI: 3.3 to 3.9) and 3.2 years (95% CI: 3.0 to 3.5) with heart disease respectively. For the three other most prevalent chronic conditions, women could expect a greater number of years with a disease than could men (12.5 versus 7.7 years with hypertension, 8.3 versus 6.7 years with diabetes, and 6.8 versus 3.6 years with rheumatic conditions) (table 3). No gain in disease-free life expectancy was observed for any of the four diseases, with the exception of heart disease among women. In particular, the health status of men worsened, and the gender gap decreased during the period of 2006 to 2010 (table 3, figure 3).

Table 3 Life expectancy at age 20 and expected lifetime with the four most prevalent diseases – Palestine, 2006 and 2010

	Calendar year	Life expectancy years	Expected lifetime with			
			Hypertension years (95% CI)	Diabetes years (95% CI)	Heart diseases years (95% CI)	Rheumatic conditions years (95% CI)
20-year-old men						
Gaza Strip	2006	52.4	6.0 (5.1 to 6.8)	4.6 (3.9 to 5.4)	2.4 (1.8 to 2.9)	2.1 (1.5 to 2.7)
	2010	52.9	7.9 (7.2 to 8.6)	6.7 (6.0 to 7.4)	3.3 (2.8 to 3.8)	3.4 (2.9 to 4.0)
West Bank	2006	52.9	5.5 (4.9 to 6.1)	5.4 (4.8 to 6.0)	2.9 (2.4 to 3.3)	2.5 (2.1 to 3.0)
	2010	53.5	7.6 (7.2 to 8.1)	6.8 (6.3 to 7.2)	3.7 (3.3 to 4.1)	3.7 (3.3 to 4.0)
Palestinian Territory	2006	52.8	5.7 (5.2 to 6.2)	5.1 (4.7 to 5.6)	2.7 (2.4 to 3.1)	2.4 (2.0 to 2.7)
	2010	53.3	7.7 (7.3 to 8.1)	6.7 (6.3 to 7.1)	3.6 (3.3 to 3.9)	3.6 (3.3 to 3.9)
20-year-old women						
Gaza Strip	2006	54.5	11.8 (10.8 to 12.8)	7.9 (7.0 to 8.8)	2.4 (1.8 to 3.0)	4.1 (3.4 to 4.8)
	2010	55.2	12.5 (11.7 to 13.2)	8.1 (7.4 to 8.7)	2.7 (2.3 to 3.2)	5.0 (4.4 to 5.6)
West Bank	2006	55.4	10.9 (10.2 to 11.7)	7.5 (6.9 to 8.2)	3.5 (3.0 to 4.0)	7.6 (7.0 to 8.3)
	2010	56.0	12.4 (11.9 to 13.0)	8.4 (7.9 to 8.8)	3.5 (3.1 to 3.9)	7.8 (7.3 to 8.2)
Palestinian Territory	2006	55.1	11.2 (10.6 to 11.8)	7.6 (7.1 to 8.1)	3.1 (2.7 to 3.5)	6.4 (5.9 to 6.9)
	2010	55.7	12.5 (12.0 to 12.9)	8.3 (7.9 to 8.7)	3.2 (3.0 to 3.5)	6.8 (6.5 to 7.2)

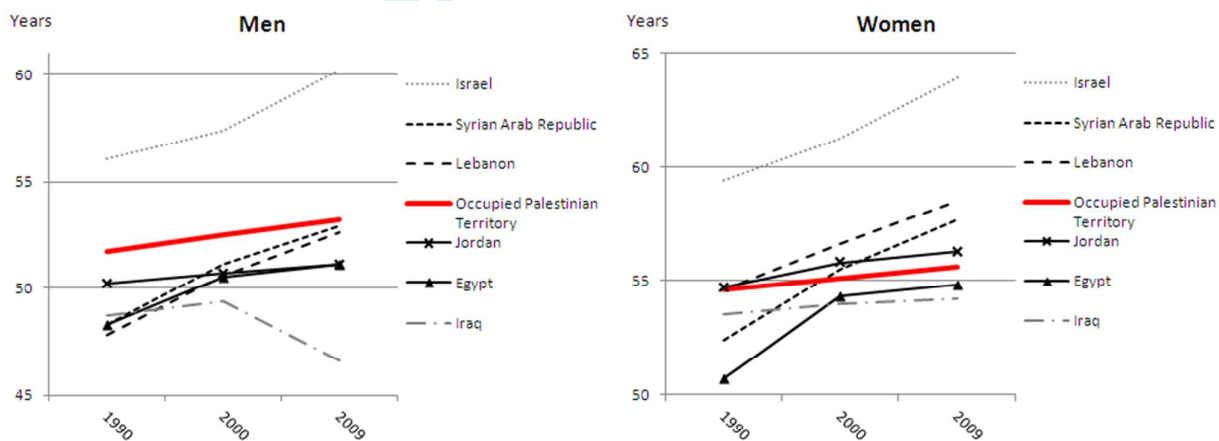
Fig 3 Change between 2006 and 2010 in life expectancy and expected lifetime at age 20 with the four most frequent chronic diseases in the occupied Palestinian territories



Discussion

As in other populations, Palestinian women live longer than Palestinian men and endure a greater number of years with health problems. But Palestinian women's advantage of 2.7 more years of expected lifetime in 2009 is much less than the gender difference in the neighbouring populations. During the last 20 years life expectancy has increased more for Palestinian men than women, but for both genders the increase has generally been slower for Palestinians than for the neighbouring populations (figure 4).

Fig 4 Life expectancy at age 20 in the occupied Palestinian territory and other Middle East countries



Sources: World Health Organisation, Global Health Observatory Data Repository and Palestinian Central Bureau of Statistics

Remarkably, the changes in partial life expectancy (age interval 20 to 60) without chronic disease from 2006 to 2010 went in opposite directions for men and women. At age 60 lifetime without chronic disease decreased for both sexes, but more among men than women. Health has thus worsened among men, and the gender gap in expected lifetime with chronic disease has narrowed. The changes in health expectancy between 2006 and 2010 were mainly due to the increasing prevalence of chronic disease and not due to increasing life expectancy (figure 2). The gain in life expectancy for men thus consisted not only of additional years with

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3 hypertension, diabetes, heart disease, and rheumatic conditions because expected lifetime
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5 without these diseases was shorter in 2010 than in 2006. This tendency toward expansion of
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7 morbidity was less distinct for women.
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11 The increase in lifetime with hypertension and diabetes among men is particularly worrisome,
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13 although it might partly reflect trends in ascertainment. Hypertension and diabetes are initial
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15 stages of cardiovascular disease, and the risk is elevated because of the high prevalence of
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17 tobacco smoking among men. The percentage of smoking among men exceeds 40% but is
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19 less than 3% among women.^{8 19} The prevalence of smoking is significantly higher in the
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21 West Bank than the Gaza Strip. The percentage of smokers aged 18 and over has declined
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23 from 29.2% in 2000 to 26.9% in 2010 in the West Bank and from 24.1% to 14.6 in the Gaza
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25 Strip.⁸ Lung cancer is the most frequent cancer type among Palestinian men.¹¹ In general,
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27 chronic disease develops gradually, caused by exposure to risk factors such as the effects of
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29 psychological stressors or the long-term cumulative effects of tobacco smoking. Poor
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31 nutrition or undernourishment, in particular in the Gaza Strip and during childhood, increases
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33 the risk of obesity and chronic disease.^{11 20-22} Along with tobacco smoking among men, poor
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35 nutrition and physical inactivity are the most important preventable lifestyle-related risk
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37 factors for Palestinians. Prevention related to these risk factors requires particular attention in
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39 order to reduce the incidence of cardiovascular and metabolic disease.
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47 Men – particularly young men – face greater exposure to violations by the Israeli army and
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49 Israeli settlers than do women.²³⁻²⁶ Since 1967, a lot over a quarter of the Palestinians, mostly
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51 young men, have been imprisoned on political grounds and have suffered various health
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53 problems following their release.^{27 28} The fluctuations and instability of Palestinians' societal
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55 and political life could affect men and women differently. A survey among young Palestinians
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3 in Ramallah showed that exposure to political violence affects the mental health of
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5 adolescents and that depressive-like symptoms were more prevalent among girls than among
6
7 boys.²⁹
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11 Health services and access to diagnosis and treatment are complicated in the West Bank and
12
13 the Gaza Strip due to a variety of factors related to restrictions on movement in the West
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15 Bank and the blockade that cuts the Gaza Strip off from the outside world.^{5 30} Some of these
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17 deficiencies are, however, partially remedied by humanitarian aid from international bodies.
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21 As the character of the abnormal living circumstances differ between the West Bank and the
22
23 Gaza Strip, no simple interpretation can be applied to differences between the two territories.
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26 The economic hardship can be illustrated by the high unemployment rates. According to the
27
28 Palestinian National Authority the unemployment rates in 2011 were 15.9% and 22.6 % for
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30 men and women in the West Bank and 25.8% and 44.0% in the Gaza Strip.³¹
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34 In spite of the high number of deaths, attacks on medical personnel and civilians, destruction
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36 of hospitals, *etc.*³² associated with the Israeli assault on the Gaza Strip shortly before the
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38 second survey in 2010, we cannot expect that this assault would be directly visible in the
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40 health expectancy estimates. The direct effect of Israeli attacks should be assessed by studies
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42 with a more focused design, such as on the impact of the Israeli attack on the Gaza Strip,³²⁻³⁶
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44 the Israeli military invasions in the spring of 2002,^{29 37} and the army's reaction to the 2000
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46 uprising.²⁵
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51 In 2009, the *Lancet* published a series of comprehensive studies on the health status of the
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53 population and the health services available in the occupied Palestinian territory, providing
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55 complete information on and evidence of the situation.^{5 6 11 30 38} The unsuccessful attempt to
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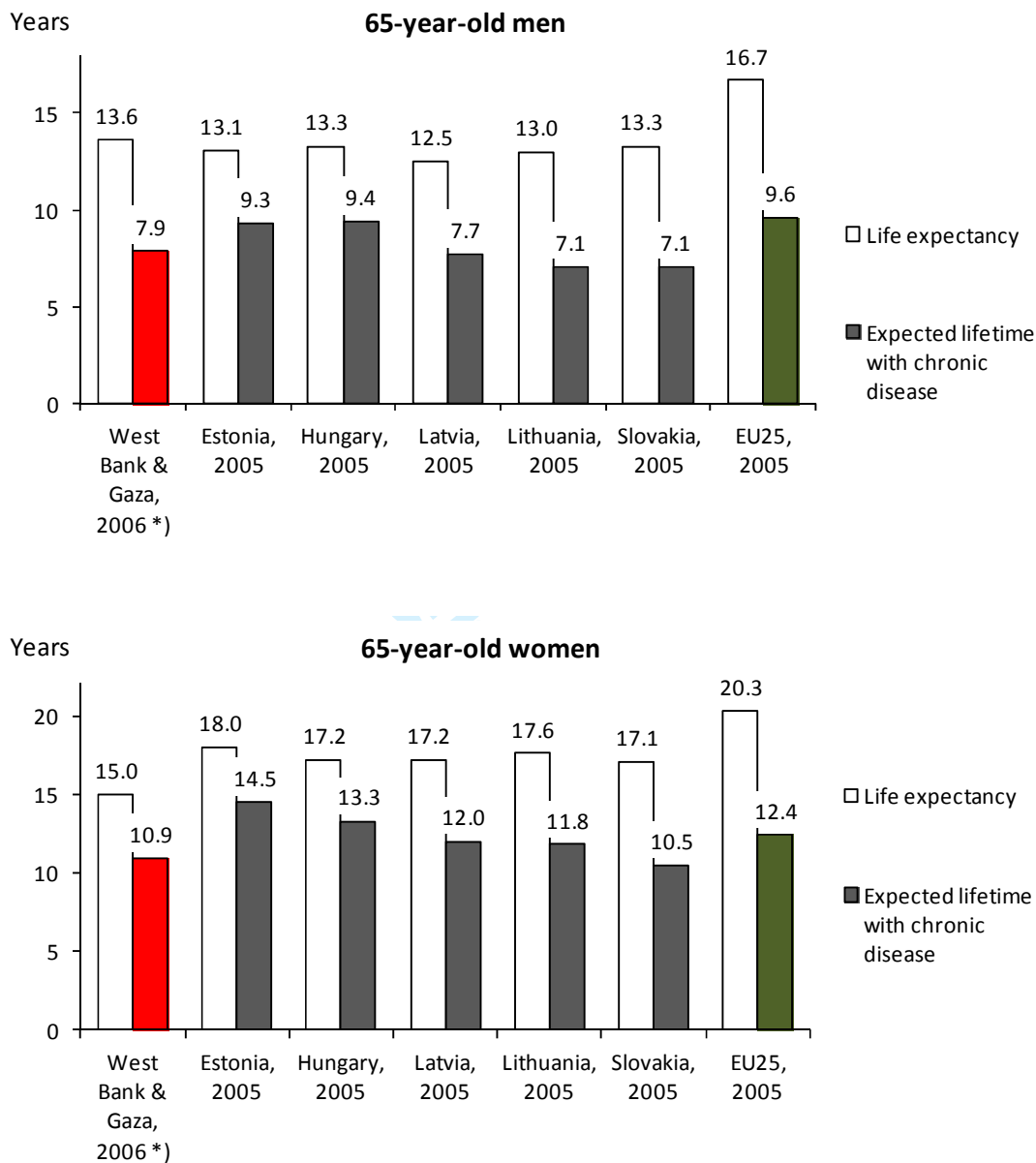
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3 establish an efficient health-care system under military occupation has also been examined.³⁰
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5 Health status has not improved satisfactorily since the mid-1990s, and the health services
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7 have remained in stasis.³⁰
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11 Account has been taken of logistical difficulties related to data collection under military
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13 occupation and how this may influence participation and responses by interviewees. The
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15 quality of the survey data is high due to a thoroughly centralised interview training process,
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17 pilot testing, and the quality-control mechanisms applied to data processing. The Palestinian
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19 Central Bureau of Statistics received technical assistance from international organisations
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21 (UNICEF, UN Population Fund, and the Arab League). Furthermore, the standardisation of
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23 questionnaires and sampling methods enables comparisons over time. Study design,
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25 representativeness, non-participation, *etc.* in the Palestinian Family Health Surveys have been
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27 described previously in reports by the Palestinian Central Bureau of Statistics.^{8 14}
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34 Over half of the Palestinian population is between the ages of 0 and 19, and less than 5% is
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36 over 60 years old. Thus, we did not estimate the widely used disability-free life expectancy
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38 indicator that is typically based on questions related to ageing such as functional disability in
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40 activities of daily living (ADLs) or instrumental activities of daily living (IADLs). The
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42 Minimum European Health Module includes a question on chronic conditions: ‘Do you suffer
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44 from any long-standing illness or condition (health problem)?’³⁹ Health expectancy estimates
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46 based on this question are available for European countries.⁴⁰ Among the 25 EU member
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48 states in 2005 life expectancy at age 65 varied from 12.5 years to 17.7 years for men and from
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50 17.1 years to 22.0 years for women. The average expected lifetime without chronic morbidity
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52 was estimated at 9.6 years for 65-year-old men and 12.4 years for 65-year-old women.⁴⁰ In
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54 general life expectancy was lowest in East European countries. While uniformly constructed
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3 life tables make international comparisons of life expectancy possible it is a challenge to
4 compare health expectancies. Due to the lack of international harmonised questionnaires
5 including chronic disease questions we still need comparable data on health expectancy.
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10 However, figure 5 presents expected lifetime with chronic disease for 65-year-old Estonians,
11 Hungarians, Latvians, Lithuanians, Slovaks and the whole Europe (EU25) in 2005⁴⁰ and
12 Palestinians in 2006. Because the wording of the questions on chronic diseases in the
13 Minimum European Health Module and in the Palestinian Family Health Survey 2006 differs
14 it is unwise to attribute much weight to the comparison of expected lifetime with chronic
15 disease between the European countries and the occupied Palestinian territory.
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25 There was a striking different gender gap in life expectancy between Europeans and
26 Palestinians (figure 5). Among 65-year-old Palestinians the women's life expectancy was
27 only 10% longer than men's whereas the gap in the East European countries varied between
28 28% and 35%. The average gap in EU25 was 22%. The different gender gap in life
29 expectancy and health expectancy between the more established EU countries and the newer
30 EU countries has been discussed previously.^{41 42}
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Fig 5 Life expectancy and expected lifetime with chronic disease*) at age 65 in selected European countries, the whole EU, and the occupied Palestinian territory



*) Different questions on chronic diseases in the Minimum European Health Module and the Palestinian Family Health Survey (see text)

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3 | Because the study describes health expectancy after the age of 20, less than half of the
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5 population is presented. Demography in the occupied Palestinian territory requires great
6
7 attention to the health and welfare of Palestinian children and adolescents.
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11 The occupied Palestinian territory is well supplied by data from health surveys, which could
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13 help strengthen the health information system. We recommend that health expectancy be
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15 introduced as a summary measure of population health for monitoring the health status in
16
17 Palestine. The data necessary for introducing this indicator is available by conducting
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19 successive uniformly designed health surveys. Coordination with and the simultaneity of the
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21 Pan Arab Project for Family Health furthermore enables future comparisons of health
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23 expectancy between populations in the Arab countries.
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Article summary**Article Focus**

- Health expectancy divides life expectancy into average lifetime in various states of health
- The concept of health expectancy has attracted increased interest among researchers and policymakers as a summary measure of population health and has been estimated in nearly all European countries as well as in many other countries worldwide but has never been estimated for a Middle Eastern population
- The study presents expected lifetime with and without chronic disease as well as what changes have taken place among Palestinians living in the Israeli-occupied Palestinian territory over the past five years

Key Messages

- Expected lifetime with the four most prevalent chronic diseases (hypertension, diabetes, heart diseases, and rheumatic conditions) has increased for men. For women, the gain in life expectancy was more evenly distributed as years with and without diseases
- The divergent trends for men and women might be due to different exposures to lifestyle-related risk factors (e.g. smoking) and the impact of military occupation

Strengths and Limitations

- The household response rates of the Palestinian Family Health Surveys of 2006 and 2010 were 88.0% and 89.4% and included information on 17 034 and 38 071 adult participants respectively
- In spite of difficulties related to data collection under military occupation representativeness and high quality of the survey data were ensured. International organizations contributed with technical assistance

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