

Increasing disability-free life expectancy among older adults in Palestine from 2006 to 2010

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Background: The population of Palestine comprises almost 200 000 Palestinians aged 60 or older. The purpose of the study was to estimate disability-free life expectancy for Palestinians living in the West Bank and Gaza Strip and to evaluate changes from 2006 to 2010. **Methods:** The study combined mortality data and prevalence of activity limitation derived from the Palestinian Family Health Surveys carried out in 2006 and 2010. Based on questions about the ability to perform five basic daily activities, disability-free life expectancy was estimated. Changes between 2006 and 2010 were decomposed into contributions from changes in mortality and disability. **Results:** Life expectancy at age 60 increased from 17.1 years in 2006 to 17.3 years in 2010 for men and from 18.7 years to 19.0 years for women. Disability-free life expectancy increased significantly, by 1.3 years for 60-year-old men (from 12.8 years to 14.1 years) and 1.8 years for 60-year-old women (from 12.6 years to 14.4 years). This increase was seen in the Gaza Strip as well as in the West Bank. While the modest contribution of the mortality effect did not differ between gender and regions, the strong contributions from the disability effects varied, being greatest for women in the Gaza Strip. **Conclusion:** The significant increase in disability-free life expectancy for both genders is remarkable and, to our knowledge, not seen in other low-income countries. This change may be due to decreasing incidence of disability and greater recovery from disability as a result of better prevention, care and rehabilitation of chronic diseases.

Introduction

The number of Palestinians living in the continuously shrinking land of Palestine in 2012 is 4.4 million, of which 2 million are refugees, the majority living in camps.¹ Since the state of Israel was established in 1948, the Palestinian population has been living under war conditions, occupation or dislodged from their native soil. The situation has deteriorated because Israel aggravates the conflict by extending restrictions on movement and access to resources, markets and health services, resulting in continuing dependency of donor financing.²

The imbalance between the lives of Palestinians and Israelis is striking. According to the World Bank, gross national income per capita in Palestine is 18 times less than that of Israel.³ In 2010, the unemployment rate was 23.7% in Palestine (17.2% in the West Bank and 37.8% in the Gaza Strip)⁴ and 6.6% in Israel.⁵ Although life expectancy at birth is higher in Palestine than in some Arab countries, it is ~9 years shorter among Palestinians than Israelis,⁶ and regardless of which indicator for welfare and sustainability is chosen, the situation in the occupied society is unfavourable and in stark contrast to the situation in the occupying power.

The health and quality of life of the Palestinian population have been described in several papers.^{7–13} The mortality pattern has changed from infectious diseases to non-communicable diseases as the main causes of death.¹⁴ Today, heart disease, stroke, diabetes and cancer account for about one-half of the total deaths. Increasing urbanization has entailed a transition from a rural to an urban lifestyle with adverse changes in the risk profile.⁷ Smoking (among men), poor dietary habits, sedentary lifestyle and obesity are now highly prevalent among Palestinians living in Palestine (e.g. the prevalence of obesity is ~ 40%).^{8,15} In urban areas, which represent about half of the population, diastolic blood pressure, fasting blood glucose, cholesterol and triglycerides are significantly

higher than in the rural population.⁷ As a result, hypertension, heart diseases, the metabolic syndrome, diabetes and cancer today are common illnesses among Palestinians; for example, among the growing number of 60-year-olds or older, ~ 35% reported having hypertension in 2006 and 25% reported having diabetes.^{11,16}

Recently we found that expected lifetime with chronic disease at the age of 20 increased from 2006 to 2010 both for Palestinian men and women (from 15.1 to 17.1 years for men, and from 13.6 to 14.4 years for women), in both the Gaza strip and the West Bank.⁶ In particular, the increase in expected lifetime with hypertension and diabetes for men was substantial (2.0 and 1.6 years, respectively). Furthermore, the expected lifetime without chronic disease at the age of 20 decreased for men (from 37.7 to 36.1 years). However, among women, expected lifetime without chronic disease at the age of 20 increased (from 32.5 to 33.8 years), especially in the West Bank. The proportion of expected lifetime without chronic disease decreased significantly for men and increased—but not significantly so—for women. Hence, a tendency towards expansion of morbidity was seen for men but not for women.

The expansion of morbidity could be due to a higher prevalence of chronic diseases caused by a higher incidence as part of the recent changes in the risk profile.^{8,11,15,16} However, despite the conflicts and instability, and despite unfavourable health status and inadequate health services in Palestine, there has been some improvement in education, medical advances, prevention focusing on diabetes and hypertension and greater civic engagement in health policy with, for example, the creation of the Palestinian Social Action Movement, the Palestinian Medical Relief Society and the General Union of Disabled Palestinians.^{10,11,17} An expansion of morbidity, therefore, could also be caused in part by earlier and improved detection of diseases and/or better treatment and rehabilitation, leading to longer survival with chronic diseases, and perhaps also less disabling

diseases. Thus, it is of interest to estimate disability-free life expectancy (DFLE) at older ages, and to evaluate recent trends.

DFLE represents the average lifetime a person can expect to live without disability. It is a summary measure of population health that combines health status and mortality, and is useful for monitoring the health of elderly populations. In many countries, the prevalence of disability has decreased and DFLE has increased substantially in recent decades, especially in the 1980s and 1990s.^{18–20} However, in some countries, particularly in recent years and among middle-aged or younger older adults, the trend has not changed or has even worsened, depending on which indicators of functional limitation or disability are measured.^{21–23}

Diverging trends in different periods and populations are not surprising. If mortality declines because older adults with disabling chronic diseases survive, and the incidence of these diseases is unchanged (or the decline is lower), the prevalence of disability increases, and thereby also expected life-years with disability increases.²⁴ This may occur with or without changes in the DFLE, depending on the effect of the reduction of mortality among the disabled and non-disabled. However, this increase in the prevalence of disability can be more than compensated for by a decrease in the incidence of disability (or a postponement of the onset of disability) and improvement in recovery from disability, leading to an increase in DFLE.

In the Palestinian Family Health Surveys, which were conducted in 2006 and 2010, participants aged 60 and older were asked about their activities of daily living (ADLs). The purpose of the study was to estimate DFLE for 60-year-old Palestinians, investigate differences between the Gaza Strip and the West Bank, evaluate whether improvement has taken place from 2006 to 2010 and decompose the change into contributions from changes in mortality and disability.

Methods

Data on disability prevalence were derived from the Palestinian Family Health Surveys conducted in 2006 and 2010.^{25,26} The surveys were designed to be representative of the entire Palestinian population of Palestine (i.e. the Gaza Strip and the West Bank, including East Jerusalem) and comprised 13 238 households in 2006 and 15 355 in 2010, with response rates of 88.0% and 89.4%, respectively. The 2006 survey was divided into two representative sections, one of them included a questionnaire specially designed for senior citizens (aged 60 and above) allocated for members of 7056 households. Thus, 1722 participants in the 2006 survey and 3633 participants in the 2010 survey aged 60 or older were interviewed. The sample procedure and design of the two surveys are described in detail in the reports.^{25,26} Self-care disability was determined by answers to questions about ability to perform five basic daily activities: 'Using toilet', 'Bathing', 'Undressing/dressing', 'Going to bed or seat' and 'Eating'. Disability was identified according to three levels:

- 'No disability': All daily activities without help;
- 'Mild disability': One or two daily activities with (partial or complete) help;
- 'Severe disability': Three or more daily activities with (partial or complete) help.

Life tables were established using MortPak (The UN software package for mortality measurement).²⁷ DFLE at age 60 was estimated by Sullivan's method,²⁸ in which the expected number of years lived in 5-year age intervals was calculated on the basis of the life-table figures and multiplied by age-specific proportions of non-disabled people taken from the health survey data. DFLE for 60-year-olds was then calculated by adding these years for all age groups and dividing the sum by the number of survivors at age 60. By relating DFLE to life expectancy, a measure of the proportion of lifetime without disability was established. Statistical tests of equality between gender, region and time period were done using a Z-test.

Changes between 2006 and 2010 in DFLE were decomposed into the contributions from changed mortality and changed prevalence of disability by a technique based on Sullivan's method.²⁹ A change in age-specific death rates (the mortality effect) will change life expectancy and add or reduce expected lifetime with or without disability. A change in the proportion with or without disability represents the other component in the decomposition (the disability effect).

Results

Life expectancy at age 60 increased by 0.2–0.3 years in the West Bank and the Gaza Strip between 2006 and 2010. As can be seen in [table 1](#), it appears that DFLE increased more than life expectancy. Thus, DFLE increased significantly by 1.3 years from 2006 to 2010 for Palestinian men, and lifetime expected to be spent with mild or severe disability decreased by 1.0 year ($P=0.023$). No differences in this trend between the West Bank and the Gaza Strip were detected. However, DFLE was estimated to be 1 year longer in the West Bank than in the Gaza Strip, and in 2010, the proportion of expected lifetime without disability was 82.5% in the West Bank and 78.2% in the Gaza Strip, but with insufficient power to attain statistical significance.

For women, the improvement was more pronounced in the Gaza Strip than in the West Bank, as DFLE increased by 2.3 years ($P=0.016$) and 1.6 years ($P=0.017$), respectively. Also for women, there was a tendency to spend more years without disability in the West Bank than in the Gaza Strip ($P=0.045$ in 2006; $P=0.064$ in 2010). In 2010, the proportion of DFLE among women was 77.7% in the West Bank and 72.0% in the Gaza Strip with borderline statistical significance.

Women's DFLE increased more than that of men's and, interestingly, women seem to catch up with men, although no significant difference was observed. Among women, the decline in expected lifetime with disability was evenly distributed between mild and severe disability, whereas for men, the pattern was less unambiguous, comparing changes between lifetime with mild and severe disability and between the West Bank and the Gaza Strip ([Table 1](#)).

[Figure 1](#) depicts the results of decomposing into the mortality, and the disability effects the change between 2006 and 2010 in DFLE. While the modest contribution of the mortality effect did not differ across gender and regions, the contributions from the disability effects varied. Thus, for women, the gain in DFLE was due to evenly distributed effects of mild and severe disability. For men, however, the main source for longer DFLE in the West Bank was due to the effect of declining prevalence of severe disability ([figure 1](#)).

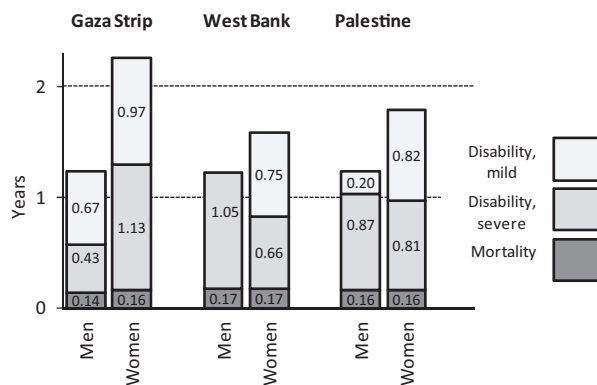
Discussion

In spite of a small increase in life expectancy at age 60, from 2006 to 2010, DFLE increased significantly. The health gain was seen both in the Gaza Strip and the West Bank. Furthermore, expected lifetime with disability decreased for both genders, with both mild and severe disability. While the contribution of mortality was modest, the contribution from the disability effects was substantial and varied across genders and regions, with a high contribution of severe disability among men in the West Bank, and the highest contribution of both mild and severe disability among women in the Gaza Strip.

Although life expectancy at birth for Palestinians living in Palestine is progressing slowly and is higher than in some Arabic countries,⁶ it is ~8–10 years lower than in most European countries. Palestinian life expectancy at the age of 60 is about the same level as life expectancy at age 65 in Denmark, although the gender gap is smaller in Palestine.^{30,31} The significant increase in DFLE for Palestinians living in Palestine is therefore remarkable and, to our knowledge, not seen in other developing countries. In contrast, the

Table 1 Life expectancy at age 60 and expected lifetime without, with mild and with severe disability – Palestine, 2006 and 2010

	Calendar year	Life expectancy Years	Expected lifetime without disability Years (95% CI)	Expected lifetime with mild disability Years (95% CI)	Expected lifetime with severe disability Years (95% CI)
Men					
Gaza Strip	2006	16.9	12.2 (11.3–13.1)	2.0 (1.3–2.7)	2.8 (2.0–3.5)
	2010	17.2	13.4 (12.8–14.0)	1.4 (1.0–1.7)	2.4 (1.9–2.9)
West Bank	2006	17.2	13.1 (12.5–13.8)	1.5 (1.1–2.0)	2.5 (1.9–3.0)
	2010	17.4	14.4 (14.0–14.8)	1.6 (1.3–1.9)	1.5 (1.2–1.7)
Palestine	2006	17.1	12.8 (12.3–13.4)	1.7 (1.3–2.1)	2.6 (2.1–3.0)
	2010	17.3	14.1 (13.7–14.4)	1.5 (1.3–1.8)	1.7 (1.5–2.0)
Women					
Gaza Strip	2006	18.5	11.3 (10.3–12.2)	2.7 (1.9–3.4)	4.6 (3.7–5.4)
	2010	18.8	13.5 (12.9–14.2)	1.7 (1.3–2.2)	3.5 (3.0–4.1)
West Bank	2006	18.9	13.3 (12.7–14.0)	2.6 (2.1–3.1)	3.0 (2.5–3.6)
	2010	19.2	14.9 (14.5–15.3)	1.9 (1.5–2.2)	2.4 (2.1–2.7)
Palestine	2006	18.7	12.6 (12.1–13.2)	2.6 (2.2–3.0)	3.5 (3.0–4.0)
	2010	19.0	14.4 (14.1–14.8)	1.8 (1.6–2.1)	2.8 (2.5–3.1)

**Figure 1** Decomposition into the mortality effect and the mild and severe disability effects of changes between 2006 and 2010 in disability-free life expectancy at age 60 in Palestine.

short-term trend in disability among older Asians increased in recent years according to four of five Asian studies, and was unchanged in the fifth study.³²

We can only speculate about the causes of the increase in DFLE in Palestine. According to the Palestinian Central Bureau of Statistics reports,^{25,26} the prevalence of chronic disease has increased in the same period both among men and women at age 60 or more (72.4–75.4% and 56.2–64.7%, respectively). This finds expression in a rise in expected lifetime with chronic disease at age 60.⁶

However, the prevalence of chronic disease may increase in spite of a decrease in the incidence if more diseased survive.³³ Also, chronic disease may not lead to disability if patients are well treated.^{21,24} The strong contribution of the disability effect suggests that it is in part due to a decreasing incidence of disability and/or a higher recovery from disability as a result of better prevention, care and rehabilitation of chronic diseases. A successful effect of prevention, care and rehabilitation on disability is not exceptional but is observed in many other countries.^{19,20}

The disabling impact of chronic diseases has been evaluated in previous studies based on data from surveys administered in high-income countries.^{21,34–36} Musculoskeletal diseases, cardiovascular diseases, chronic lung disease, obesity and diabetes contribute the most to the burden of disability. Musculoskeletal and circulatory diseases together with vision impairment explain much of the declining DFLE in the USA in the 1980s and 1990s, and obesity seems to explain some of the discontinuance of the declining trend in the beginning of the 2000s.³⁷ Among older Mexicans, the

DFLE at age 50 was 9 years lower among those with diabetes than among those without diabetes.³⁸

It can therefore be assumed that even moderate improvement in detection, treatment and rehabilitation of these diseases may have a substantial impact on DFLE. Since the beginning of the 2000s, prevention in Palestine has focused on diabetes and hypertension, which are also risk factors for circulatory diseases.¹¹ In addition, disability rehabilitation has been given high priority with community-based rehabilitation projects for the disabled.³⁹

Maybe these factors, including education, income and employment, which have been higher in the West Bank than in the Gaza Strip, to some extent can explain a higher DFLE in the West Bank. However, the prevalence of smoking increased from 33.9% in 2006 to 35.6% in 2010 among men aged 60 or more in the West Bank but decreased from 28.5–20.6% in the Gaza Strip. Palestinian women more than 60 years old are mainly non-smokers (less than 4% in the West Bank and less than 1% in the Gaza Strip). Furthermore, the prevalence of exposure to risk factors such as hypertension, obesity and diabetes does not differ among those over 60 in the West Bank and the Gaza Strip. On the other hand, most socio-economic indicators have worsened in the Gaza Strip and the gap between the West Bank and Gaza Strip has widened. The unemployment rate has reached 38% compared with 17% in the West Bank.⁴ Poverty reached 39% in the Gaza Strip, but it is 18% in the West Bank. The extensive damage to houses, institutions and infrastructure, as a result of the war against Gaza in 2008–2009, and the embargo continuously aggravate the situation.

The modest mortality effect on the increased DFLE suggests that advanced medical treatment, which improves survival for patients with chronic diseases, has played a more moderate role. This could be a result of Israel's intensification of the restrictions on access to advanced medical treatment in the large Palestinian hospitals in East Jerusalem, particularly for Palestinians living in the Gaza Strip.

The gender gap in life-expectancy at age 60 was much smaller than the gender gap at age 65 in the European Union in 2010 (1.7 years vs. 3.5 years),³¹ but as in Europe, DFLE is a little higher among women than among men in Palestine. This attenuation of the so-called gender health-survival paradox—men have higher mortality but women live longer both without and with disability⁴⁰—may be explained by the fact that women living in Palestine have much higher prevalence of obesity and diabetes than men, especially among 60–65-year-old adults, and also higher prevalence of hypertension, although the proportion of smokers is much smaller than among men.^{7,8,11,15,16} However, improvement in the prevention of obesity, diabetes and hypertension among women may have occurred in the period between 2006 and 2010, as the DFLE for women increased more than for men. It is difficult to elucidate possible explanations for the gender difference in the contribution

of mild and severe disability effects in the Gaza Strip and the West Bank, respectively, but it is remarkable that almost all of the increased DFLE for men in the West Bank was due to reduced prevalence of severe disability.

The strength of the study is that it is based on representative samples with high response rates. One weakness is that the information on the ability to carry out basic ADLs was self-reported, although older adults' responses to the items included in the measurement of self-care disability are known to be relatively reliable, and to be consistently associated with performance-based limitation.

Some caution is needed when interpreting secular trends in DFLE estimated by Sullivan's method on cross-sectional data, as this method is not suitable for detecting sudden changes in population health. Disability prevalence data from cross-sectional surveys only implicitly reflect past transitions between state of disability and changes in mortality rates. The increase in life expectancy at the age of 60 for Palestinians living in Palestine has increased relatively regularly for several years.

Another limitation is the short period covered and that the study is based only on data from two surveys. The situation in Palestine can easily deteriorate in the coming years due to Israel's occupation and restrictions, especially in access to health services, and due to the high level of poverty and unemployment. Therefore, the study should be replicated after the next survey and the development of disability in a Palestinian cohort should be followed based on several waves to estimate DFLE using a multi-state life-table approach based on longitudinal data, which take into account the incidence of disability and recovery from disability.

In conclusion, DFLE increased substantially for men and women from 2006 to 2010 in spite of a small increase in life expectancy. The result may reflect a decreasing incidence of disability and a higher recovery from disability due to better prevention, care and rehabilitation of chronic diseases. Improving educational levels, which increase healthy behaviour, also may have contributed.

Acknowledgements

K.Q., B.J. and H.B.H. initiated the study. M.D. provided life tables and health status prevalence tables. H.B.H. conducted the analyses. H.B.H. and B.J. drafted the manuscript with contributions from K.Q. and M.D. All authors have seen and approved the final version.

Conflicts of interest: None declared.

Key points

- Life expectancy increased modestly among Palestinians from 2006 to 2010.
- Disability-free life expectancy at age 60 has increased for both genders in the West Bank as well as in the Gaza Strip.
- This change may partly be due to decreasing incidence of disability and greater recovery from disability as a result of better prevention, care and rehabilitation of chronic diseases.

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