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## Health in the Occupied Palestinian Territory 3



# Cardiovascular diseases, diabetes mellitus, and cancer in the occupied Palestinian territory

Abdullatif Husseini, Niveen M E Abu-Rmeileh, Nahed Mikki, Tarik M Ramahi, Heidar Abu Ghosh, Nadim Barghuthi, Mohammad Khalili, Espen Bjertness, Gerd Holmboe-Ottesen, Jak Jervell

Heart disease, cerebrovascular disease, and cancer are the major causes of morbidity and mortality in the occupied Palestinian territory, resulting in a high direct cost of care, high indirect cost in loss of production, and much societal stress. The rates of the classic risk factors for atherosclerotic disease—namely, hypertension, diabetes mellitus, tobacco smoking, and dyslipidaemia—are high and similar to those in neighbouring countries. The urbanisation and continuing nutritional change from a healthy Mediterranean diet to an increasingly western-style diet is associated with reduced activity, obesity, and a loss of the protective effect of the traditional diet. Rates of cancer seem to be lower than those in neighbouring countries, with the leading causes of death being lung cancer in Palestinian men and breast cancer in women. The response of society and the health-care system to this epidemic is inadequate. A large proportion of health-care expenditure is on expensive curative care outside the area. Effective comprehensive prevention programmes should be implemented, and the health-care system should be redesigned to address these diseases.

### Introduction

Over the past century, and like many other developing countries, an epidemiological transition has occurred in Palestine.<sup>1,2</sup> The main causes of death were malaria and tuberculosis at the start of the 20th century,<sup>3,4</sup> pneumonia and enteritis by the middle of the century, with heart disease emerging as the third most important cause of death,<sup>5</sup> and heart disease, cerebrovascular disease, diabetes mellitus (mostly type 2), and cancer in 2005 (figure 1). Together, these diseases account for about half the total deaths in the occupied Palestinian territory, with the highest proportion occurring in adults.<sup>6,7</sup>

Despite the intractable conflict and associated economic uncertainty and instability, the general improvement in the standard of living and medical advances have resulted in diminution of communicable diseases as a public-health hazard.<sup>1</sup> Infectious diseases now account for less than 10% of total mortality rate<sup>6,8–11</sup> and the rates of pulmonary tuberculosis and AIDS are low.<sup>6</sup> Communicable diseases are a serious problem only in children (<4 years; figure 2). One in ten people living in the occupied Palestinian territory and two-thirds of those older than 60 years had at least one chronic disease

according to the 2006 Palestinian family health survey.<sup>7</sup> This pattern is similar to changes elsewhere in the world.<sup>13,14</sup> In 2005, chronic diseases were estimated to account for 72% of total global burden of diseases in people aged 30 years and older, and 80% of deaths related to chronic diseases were expected to occur in low-income and middle-income countries.<sup>15</sup> In 2004, chronic diseases were estimated to account for 47% of disease burden in the eastern Mediterranean region, and were expected to reach 60% by 2020.<sup>16</sup> The chronic diseases and risk factors that are causing a public-health concern in the occupied Palestinian territory are similar to those in other Arab countries (table 1).<sup>6,7,17–20,23–25</sup> The response to this chronic-disease epidemic has been limited to the few providers and donors who have understood the magnitude of this challenge. We review here the burden of the major chronic diseases in the occupied Palestinian territory.

### Cardiovascular disease

Good data for the epidemiology of cardiovascular diseases in the occupied Palestinian territory are scarce. Routine data gathered by the Ministry of Health and obtained from the national surveys done by the Palestinian Central Bureau of Statistics are the main sources of information for these diseases (panel; table 2).<sup>6–11</sup> Furthermore, hardly any reliable data are available for the occupied Palestinian territory about the nature, treatment, and outcomes of cardiovascular diseases. Hypertension, diabetes mellitus, and tobacco smoking are the main risk factors for cardiovascular disease. They result in substantial direct morbidity and mortality. More data are available for these conditions than for others. Few data are available for dyslipidaemia—the fourth modifiable major risk factor. These risk factors together with poor dietary habits,

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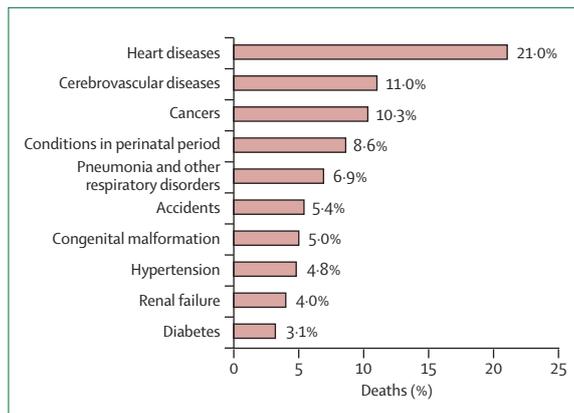
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#### Search strategy and selection criteria

We used Medline (1966–2008) to identify potentially relevant scientific reports, with search terms “Palestine”, “chronic diseases”, “diabetes”, “cardiovascular diseases”, “hypertension”, “cancer”, “West Bank”, “Gaza”, and “occupied Palestinian territory”. All publications were in English. Additionally, we searched for books about chronic diseases in the occupied Palestinian territory. Other sources of information included reports of the World Bank and other funding agencies.



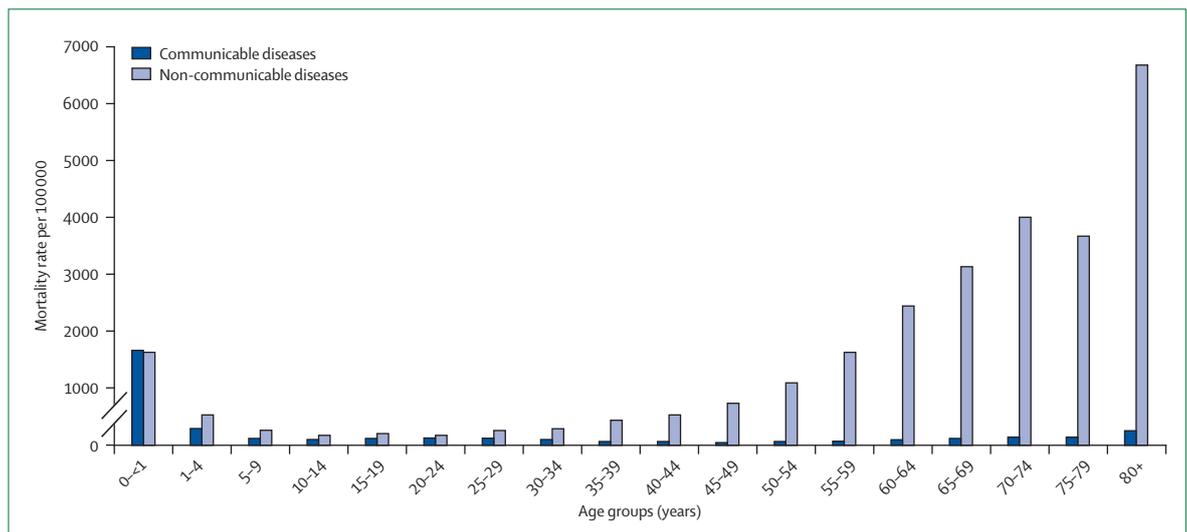
**Figure 1: Leading causes of death in the occupied Palestinian territory in 2005**  
Reproduced from Ministry of Health<sup>6</sup> with permission.

sedentary life style, and obesity, are highly prevalent in the occupied Palestinian territory and are expected to increase during the next decade (table 3).<sup>6,7,17–19,24,25</sup> This rise is likely to increase the burden of cardiovascular disease, manifested by high rates of morbidity, mortality, economic loss, and societal stress.

The few available data for cardiovascular disease in the occupied Palestinian territory have been obtained mostly from household surveys and data from death notification, and they indicate a high incidence and prevalence of cardiovascular disease and hypertension. In 2005, cardiac disease (ischaemic, rheumatic, pulmonary, and other heart diseases) was reported to be the number one cause of death in the occupied Palestinian territory, accounting for 56.5 deaths per 100 000 people and 21.0% of all deaths. Cerebrovascular disease was the next most common cause, accounting for 29.8 deaths per 100 000 people and 11.0% of all deaths;<sup>6</sup> it was the second leading cause of death in women (12.4% of all

deaths) and the third in men (9.9% of all deaths).<sup>6</sup> Hypertension was ranked eighth, accounting for 13.0 deaths per 100 000 population and about 5% of all deaths.<sup>6</sup> Analysis of mortality data for people aged 40 years and older in the West Bank only for 1999–2003 showed that the age-standardised mortality rate for acute myocardial infarction was 78.5 per 100 000, which is by far the most important cause of death.<sup>12</sup> The mortality rate from acute myocardial infarction in Palestinian men was more than twice that in women. The rate for heart failure was 35 per 100 000 men and 32 per 100 000 women.<sup>12</sup> Number of deaths resulting from cerebrovascular disease was 41 per 100 000 men and 35 per 100 000 women.<sup>12</sup> In 2006, the rate of heart disease in Palestinians living in the occupied Palestinian territory was 2.1% at age 40–49 years and 12.1% at 60 years and older.<sup>7</sup> These data, which were self-reported or reported by proxy, are probably an underestimate of the prevalence of cardiovascular disease in this area. A population-based registry study of coronary-heart-disease events in Jerusalem in 1997 provided specific data about Palestinians living in the eastern part of that city and showed a high incidence of acute coronary events and non-fatal myocardial infarction.<sup>30</sup> The rates of acute coronary events in Palestinian men and women were 1.6 times and 2.4 times those in Jewish men and women, respectively, living in Jerusalem.<sup>30</sup> Palestinian women had an increased vulnerability to acute coronary-heart-disease events.<sup>30</sup>

Compared with data obtained in the 1990s from centres in 20 countries, the Palestinian residents of Jerusalem ranked first for rate of total and non-fatal coronary-heart-disease events.<sup>30</sup> Mortality from coronary heart disease was 2.8 times higher in Jerusalem Palestinian men than in Jewish men and 2.7 times higher for Palestinian women than for Jewish women.<sup>30</sup>



**Figure 2: Age-specific mortality rates (per 100 000 population) for communicable and non-communicable diseases in the West Bank (1999–2003)**  
Modified from Abu-Rmeileh and colleagues.<sup>12</sup>

Rates of out-of-hospital cardiac arrest were higher for Palestinian people than for Jewish people. Although acute coronary care in the Israeli hospitals in which 84% of Palestinians from Jerusalem received their care was described as generally equally good, interventions were done less frequently on Palestinian patients than on Jewish patients.<sup>30</sup>

Findings from this study<sup>30</sup> were consistent with a previous report based on cause-of-death statistics from the Israeli-demarcated Jerusalem district, which showed that mortality rate from coronary heart disease in Palestinians was more than twice that of Jewish men and women.<sup>31</sup> In both populations, rates of mortality from coronary heart disease decreased during the study, from 1984 to 1997.<sup>31</sup> In Jerusalem, the rates of diabetes mellitus and passive smoking were higher and those of dyslipidaemia and hormonal replacement therapy were lower in Palestinian women with coronary heart disease than in Jewish-Israeli women with this condition.<sup>32</sup> Arab women had more atypical clinical presentations and more advanced coronary artery disease than did Jewish women living in the city;<sup>33</sup> Arab women were more likely to be physically inactive, obese, and have diabetes mellitus than were Jewish women.<sup>33</sup>

In 2006, the rate of reported hypertension was 8.1% at age 40–49 years, 22.6% at 50–59 years, and 35.2% at 60 years and older.<sup>7</sup> In two population-based cross-sectional studies done in 1996–98, the rate of hypertension ranged from 21.5% to 25.4% in adults aged 30–65 years in two communities in the West Bank.<sup>17</sup> Data routinely gathered by the UN Relief and Works Agency showed that the rate of hypertension was 14.3% in people aged 40 years and older in the West Bank, and 17.4% for registered Palestinian refugees in the Gaza Strip.<sup>34</sup>

### Diabetes mellitus

Mortality directly attributable to diabetes mellitus is difficult to define and ascertain. This disease caused 3.1% of deaths in the total population—ie, 8.5 per 100 000 population, according to 2005 data from the Ministry of Health.<sup>6</sup> No reliable data exist for treatment, complications, economic effect, and outcomes of treatment of diabetes mellitus in the occupied Palestinian territory. Diabetes mellitus and its complications are major health problems in the territory according to all estimates. In 2000, the estimated prevalence rate of diabetes was 9.0% in adults aged 30 years and older.<sup>6</sup> Routine data gathered by the UN Relief and Works Agency<sup>34</sup> showed that the prevalence rate was 10.5% in the West Bank and 11.8% in the Gaza Strip among the registered Palestinian refugees aged 40 years and older. The rate of reported diabetes mellitus was 7.2% at age 40–49 years, 19.1% at 50–59 years, and 24.8% at 60 years and older.<sup>7</sup> Two cross-sectional studies done in Ramallah governorate (an official administrative division of the occupied Palestinian territory) in 1996–98 showed a

	Occupied Palestinian territory <sup>7,17-19</sup>	Jordan <sup>16,20</sup>	Syria <sup>16,20</sup>	Egypt <sup>16,20</sup>	Lebanon <sup>16,20</sup>
Overall population <sup>21</sup>	3 638 000	5 485 000	18 138 000	70 668 000	4 435 000
Hypertension					
Men	23.7%	21.0%	30.4%	26.0%	30.9%
Women	27.8%	21.0%	26.4%	26.0%	18.2%
Diabetes					
Men	10.0%	15.0%	22.9%	8.0%	15.0%
Women	9.6%	13.0%	18.0%	7.0%	10.0%
Smoking*					
Men	34.7%	67.0%	48.0%	48.0%	61.0%
Women	2.1%	8.0%	8.9%	12.0%	47.0%
Obesity and overweight					
Men	58.7%	46.0%	52.9%	44.0%	60.0%
Women	71.3%	44.0%	58.8%	41.0%	53.0%
Physical inactivity					
Men	..	43.0%	..	80.0%	63.0%
Women	..	60.0%	..	95.0%	71.0%

Data for occupied Palestinian territory, based on one study that was done in a rural community in Ramallah, are for adults aged between 30–65 years and are not necessarily an indication of the national data.<sup>22</sup> All other data are for adults aged ≥20 years. \*Smoking prevalence in the occupied Palestinian territory is for the age group ≥10 years.

**Table 1: Proportions of selected chronic diseases and risk factors in men and women living in the occupied Palestinian territory and selected neighbouring countries**

higher rate of this disease in an urban community (12.0%) than in a rural community (9.8%) at age 30–65 years (table 3).<sup>17,18</sup>

### Cancer

In 2005, the reported number of new cancer cases in the occupied Palestinian territory was 1623 and the crude incidence was 43.1 per 100 000 population—49.2 per 100 000 in the West Bank and 32.7 per 100 000 in the Gaza Strip.<sup>6</sup> 45% of all cases were in men and 55% in women.<sup>6</sup> Reported age-adjusted cancer incidence for the occupied Palestinian territory for 1998–2001 was lower than that in Jordan, Lebanon, and in Arabs living in Israel (table 4),<sup>6,35-37</sup> probably because it was an underestimate since some patients use services outside the territory. In 2005, combined cancer mortality rate was 27.8 per 100 000, which is not much different from that in 2000.<sup>6</sup>

Lung cancer, the most commonly diagnosed and most deadly cancer worldwide,<sup>38</sup> is the most common type in Palestinian men, those living in Jordan and Lebanon, and Palestinian Arabs living in Israel (table 4).<sup>6,36,37</sup> The estimated incidence is 5.2 per 100 000 men.<sup>6</sup> Lung cancer is the leading cause of death from cancer in men—7.1 deaths per 100 000 in 2005 and 22.8% of all cancer deaths.<sup>6</sup> Prostate cancer is the second most common type in Palestinian men, followed by colorectal cancer (table 4).<sup>6</sup> After lung cancer, the four types of cancer resulting in similar mortality rates in men are prostate (9.5%), nervous system (9.5%), colorectal (9.3%), and liver (9.1%).<sup>6</sup>

**Panel: Sources and quality of data, and methods of analysis**

- Routine data were gathered by health providers, including the Palestinian Ministry of Health, UN Relief and Works Agency, and non-governmental organisations. Mortality data gathered by the Ministry of Health and reported yearly were based on death notifications in the West Bank and Gaza Strip and provide information about the underlying cause of death, age, sex, and present address. The causes of death are classified with the International Classification of Diseases-10 code. Mortality data are reported as total number of deaths and proportion of specific causes of all deaths; but not age-specific mortality rates for the different age groups. The completeness and quality of data were assessed and reported by Abu-Rmeileh and co-workers.<sup>12</sup>
- Mortality data reported in a peer-reviewed report<sup>13</sup> are based on raw data gathered by the Ministry of Health. Age-specific and sex-specific mortality rates were reported for adults (≥40 years) in the West Bank only; no data were available for analysis from the Gaza Strip.
- Data for cancer were reported in a special report produced by the Ministry of Health.<sup>26</sup> The West Bank and Gaza Strip have two registries for registration and follow-up of all cancer cases. The registries gather information about the types, stages, and treatment of cancer in addition to some patient background characteristics. The registries were developed with the help of the International Agency for Research on Cancer and use similar methods and follow-up procedures as those used by other regional registries. The data are reported for the West Bank and Gaza Strip separately and stratified by sex and age.
- Routine morbidity data, such as diabetes and hypertension, are based on service-use records. These data are reported in the yearly reports from the Ministry of Health, UN Relief and Works Agency, and non-governmental organisation reports.

The Palestinian Family Health Survey is a national survey done by the Palestinian Central Bureau of Statistics in 2006–07 of 11 661 households with a response rate of 88%. The survey gathered health and demographic information about household members in the selected sample, such as age, sex, education, participation in labour force, diseases, smoking, and disability; information about family planning, antenatal care, postnatal care, and fertility from women of reproductive age; and assessed vaccination coverage and nutritional status of children younger than 5 years. The information is self-reported and proxy-reported in response to standard questionnaires with restricted coverage of cardiovascular disease. The rates of chronic disease and smoking in this survey were based on answers to the following questions by the head of household:

- Does the person (name) in the household have any disease according to a medical diagnosis and receive treatment continuously for this disease? Hypertension, diabetes, cardiac disease, cancer, renal disease, stroke, asthma, hypercholesterolaemia, and other selected chronic diseases.
- Did the person (name) in the household smoke? Yes, mostly cigarettes, yes mostly *narghile* (water pipe), ex-smoker, does not smoke, and never smoked.

**Epidemiological studies in Palestine**

Few data are available from standardised population-based epidemiological studies of cardiovascular and cerebrovascular diseases in the occupied Palestinian territory. Five epidemiological studies (table 2) done in the West Bank and Gaza Strip are referred to in this report. These cross-sectional studies were usually based on a sample from the areas in which they were done and do not necessarily indicate the national numbers of the general Palestinian population. However, they give an idea about the situation of a disease. Structured questionnaires were used to obtain information—eg, about demographics, diet, physical activity. The rates of diabetes, hypertension, dyslipidaemia, metabolic syndrome, obesity, and other risk factors were based on physical measurements and blood samples.

Breast cancer is the most common type in Palestinian women (table 4).<sup>6</sup> The proportion is similar to that in neighbouring countries except Lebanon, where breast cancer accounts for nearly half of all cancers in women (table 4).<sup>37</sup> This disease causes the highest cancer-related mortality in Palestinian women, 21.1% of all deaths from cancer, and 5.2 deaths per 100 000 women.<sup>6</sup> In theory some features of Palestinian society, including a high total fertility rate (4.6%), high rate of breast feeding (95.6%) with a mean duration of 10.9 months, young mean age at first birth (20 years), and low alcohol consumption, should be protective against breast cancer.<sup>7</sup> Other features—eg, obesity and nulliparity—might act against these protective factors.<sup>39</sup> About a third of Palestinian women of reproductive age are single and thus mostly childless.<sup>7</sup> Colorectal cancer is the second most common type in Palestinian women and causes the second highest mortality rate from cancer.<sup>6</sup> The traditional Palestinian Mediterranean diet, characterised by high intake of fibre and carbohydrate and low intake of fat and protein, should provide some protection against colorectal cancer.<sup>40,41</sup> The nutritional transition that is underway in the occupied Palestinian territory, however, with the economic hardship, is reducing the consumption of a healthy diet in favour of a western-style diet, and thereby mitigating the protective effect of the traditional Palestinian diet.<sup>42,43</sup>

**Risk factors for chronic diseases**

The rate of reported hypercholesterolaemia was 0.7% at age 40–49 years and 3.2% at 60 years and older.<sup>7</sup> The rate of hypertriglyceridaemia in adults aged 30–65 years was 34.8% in an urban community compared with 22.6% in a rural community in the Ramallah governorate.<sup>17</sup> The magnitude of the problem of dyslipidaemia and its treatment in the occupied Palestinian territory remains poorly defined.

Rate of tobacco smoking in the Palestinian male population aged 10 years and older was high (34.7%) and that in the female population was low (2.1%).<sup>7</sup> The proportion of smokers was lower in the Gaza Strip than in the West Bank.<sup>7</sup> The rate of cigarette smoking reported by the Israeli national health survey (2003–04) was 36.1% and 18.6% for men and women, respectively, aged 21 years and older.<sup>44</sup> A survey done in 1999–2001 showed a particularly high rate of smoking in Palestinian adolescents. The rate of cigarette smoking was 9.0% in boys aged 13–15 years in the Gaza Strip and 13.9–14.7% in regions of the West Bank.<sup>45</sup> In 2005, the same age group showed a fall in the rate to 6.6% in the Gaza Strip and an increase to 18.0% in the West Bank.<sup>46</sup> Compared with other eastern Mediterranean countries, smoking in adolescents in the West Bank was higher than in any other population in the region for which data are available.<sup>46</sup>

*Narghile* (water pipe) smoking has increased in adolescent boys and girls<sup>47,48</sup> and seems more culturally acceptable in Palestinian women, as it is in neighbouring Arab countries.<sup>49,50</sup> The rate of smoking tobacco products

other than cigarettes (mostly narghile) in Palestinian adolescents aged 13–15 years was estimated to be 11.7% in the West Bank and 16.7% in the Gaza Strip.<sup>46</sup>

Physical inactivity and poor diet are potentially modifiable risk factors for chronic diseases, especially cardiovascular disease.<sup>15</sup> Obesity in adolescents is associated with cardiovascular<sup>51</sup> and metabolic diseases,<sup>52</sup> and increased risk of chronic diseases late in life, independent of adult weight.<sup>53</sup> Adolescents in the West Bank and the Gaza Strip are slightly overweight or obese (girls more than boys),<sup>28</sup> compared with those in Arab countries in the Arabian Gulf,<sup>54–57</sup> but are close to Israeli adolescents.<sup>58</sup> The combined rate of overweight and obesity was 13.3% for boys in the Hebron area and 21.1% for girls in Ramallah, West Bank (table 5; Mikki N, unpublished).

Palestinian boys were more physically active than were girls, with those in the West Bank more physically active than those in the Gaza Strip.<sup>29</sup> Adolescents in the West Bank consume more fruit, sweets, soft drinks, red meat, and chicken than do those in the Gaza Strip.<sup>29</sup> Girls reported healthier food choices, with higher consumption of fruit and vegetables and fewer soft drinks, than did boys.<sup>29</sup>

The association between poor nutrition and risk of chronic diseases late in life is more complex in the occupied Palestinian territory than in developed countries because Palestinian society is in the stage of nutrition transition that is characteristic of low-income countries, where undernutrition and overnutrition coexist.<sup>59</sup> An increase in stunting in children in the occupied Palestinian territory, particularly in the Gaza Strip, is alarming.<sup>60</sup> Undernutrition during childhood is associated with increased risks of obesity and chronic diseases in adulthood.<sup>61,62</sup>

Cross-sectional data for adults (age 30–65 years) in two Palestinian communities in the West Bank showed high rates of obesity (defined as body-mass index >30 kg/m<sup>2</sup>). Rates in the urban population were higher than those in the rural community. Obesity was highest in urban women and lowest in rural men (table 3).<sup>17</sup>

### Public-health and health-service responses

The causes of morbidity and mortality for major chronic diseases in the occupied Palestinian territory have been given only some of the attention they deserve. Before the establishment of the Palestinian National Authority, the Israeli administration of the occupied Palestinian territory focused on controlling vaccine-preventable diseases, leading to a pronounced reduction in infant mortality rate and frequency of infectious diseases. However, the administration did not adequately address chronic diseases and made virtually no investment in the health-system development in this area, thereby creating a dependency on the Israeli health system for secondary and tertiary care of chronic diseases during 1967–93. The response of the Palestinian National Authority to the chronic-disease challenge was also muted, probably because of absence of interest from the international donors on whom the authority has depended for funding

	Year	Number of participants	Response rate	Target area
Kobar study <sup>22</sup>	1996–97	500	85%	Kobar village/Ramallah governorate
Old Ramallah study <sup>27</sup>	1998	492	59%	Ramallah city
Adolescents' lifestyle study—West Bank*	2005	1942	93%	Ramallah and Hebron governorates
Adolescents' lifestyle study—Gaza <sup>28</sup>	2002	1022	84%	Gaza city, Jabalia village, and Jabalia refugee camp
Survey of Palestinian health behaviour of school-aged children <sup>29</sup>	2004	8885	100%	National samples of students in grades 6, 8, 10, and 12 in West Bank and Gaza Strip

\*Mikki N, unpublished.

**Table 2: Epidemiological studies done in the Gaza Strip and West Bank**

	Proportions			Year
	Men	Women	Total	
Diabetes mellitus				
National <sup>6</sup>	..	..	9.0%	2000
Urban <sup>17</sup>	7.4%	14.9%	12.0%	1998
Rural <sup>18</sup>	10.0%	9.6%	9.8%	1996–97
Hypertension				
Urban <sup>17</sup>	23.2%	18.9%	21.5%	1998
Rural <sup>17</sup>	23.7%	27.8%	25.4%	1996–97
Overall obesity				
Urban <sup>17</sup>	30.0%	48.7%	41.5%	1998
Rural <sup>17</sup>	17.4%	36.0%	28.2%	1996–97
Smoking (ages ≥10 years) <sup>7</sup>	34.7%	2.1%	18.3%	2006

Data for urban and rural populations are based on two studies that were done in a rural and urban community in Ramallah and are not necessarily an indication of national data.<sup>22,27</sup>

**Table 3: Proportions of selected cardiovascular diseases, diabetes mellitus, and related risk factors in adults aged 30–65 years in the occupied Palestinian territory**

of such programmes. Donor aid has often been tied to specific projects in disciplines such as family planning and maternal and child health. This link can be partly explained by the increase in the rate of chronic diseases while infectious diseases were still the focus of the health system in the occupied Palestinian territory.

The Palestinian Ministry of Health is the main provider of health care to people living in the occupied Palestinian territory. It has a network of primary health-care clinics that provide first-line services, and some units specialising in chronic diseases. The total number of primary health-care centres in the occupied Palestinian territory was 654 in 2005, and the Ministry of Health had the largest share (63.3%).<sup>6</sup> Diabetes clinics have been established by the Ministry of Health in all governorates. Tertiary cardiovascular care, such as cardiac catheterisation and open heart surgery, is available at one Ministry of Health hospital and a few private hospitals. Patients who need further care and are covered by the Palestinian National

	West Bank Palestinians	Israeli Arabs	Israeli Jews	Jordanians	Lebanese
<b>Women</b>					
Year(s)	1998–2001 <sup>35</sup>	1996–2001 <sup>36</sup>	1996–2001 <sup>36</sup>	1996–2001 <sup>36</sup>	1998 <sup>37</sup>
Age-adjusted incidence (per 100 000 population)	88.5	128.7	272.1	112.2	134.8
Total cancer cases					
Year	2005 <sup>6</sup>	2000 <sup>36</sup>	2002 <sup>36</sup>	2002 <sup>36</sup>	1998 <sup>37</sup>
Breast	31.4%	27.7%	31.5%	32.5%	46.7%
Colon and rectum	9.2%	9.6%	14.1%	9.0%	11.5%
Thyroid	5.5%	7.0%	3.6%	5.4%	..
Corpus uteri	4.4%	5.0%	4.1%	2.4%	6.5%
Ovary	3.8%	3.2%	2.7%	4.1%	5.9%
Cervix uteri	1.0%	2.0%	1.7%	2.2%	2.3%
Lung and bronchus	3.0%	3.5%	4.6%	2.3%	4.5%
<b>Men</b>					
Year(s)	1998–2001 <sup>35</sup>	1996–2001 <sup>36</sup>	1996–2001 <sup>36</sup>	1996–2001 <sup>36</sup>	1998 <sup>37</sup>
Age-adjusted incidence (per 100 000 population)	108.0	175.7	282.6	115.2	154.2
Total cancer cases					
Year	2005 <sup>6</sup>	2000 <sup>36</sup>	2002 <sup>36</sup>	2002 <sup>36</sup>	1998 <sup>37</sup>
Lung	13.8%	19.0%	9.8%	12.2%	14.1%
Prostate	11.3%	8.4%	17.5%	7.5%	14.2%
Colon and rectum	9.6%	9.9%	14.1%	9.1%	12.3%
Non-Hodgkin lymphoma	5.0%	7.7%	5.7%	7.1%	4.2%
Stomach	4.7%	3.4%	4.3%	4.7%	7.9%

**Table 4: Age-adjusted cancer incidence and site-specific proportions of all cancers in the occupied Palestinian territory and in neighbouring countries**

Authority's health insurance are referred to specialty clinics in the authority's system or to external (non-ministry-affiliated) health-care providers within the occupied Palestinian territory, Jordan, Egypt, or Israel.<sup>6</sup> UN Relief and Works Agency is the second main health-care provider in the occupied Palestinian territory. Since 1995, it has had a well established programme for the prevention and control of chronic diseases, including its own detailed technical instructions and management protocols. Because of scarce resources, the UN Relief and Works Agency's intervention strategy for the prevention and control of chronic diseases focuses on diabetes and hypertension.<sup>63</sup>

Several non-governmental organisations have used community-based approaches for the prevention and management of chronic diseases. Examples are the mobile-clinic programme and chronic-disease centre at the Palestinian Medical Relief Society in Ramallah, and the diabetes centre and outreach programme at the Augusta Victoria Hospital in the occupied eastern part of Jerusalem. These initiatives are patient-friendly and integrate models for prevention and management of cardiovascular disease and diabetes mellitus. The diverse private medical sector does not have a common approach to management of chronic diseases. The private sector offers quick access to specialised services, although quality varies. However, the sector is not properly regulated and monitored by the Ministry of Health

because the ministry has restricted ability to play a major supervisory part under present circumstances. The main health providers have developed guidelines, adapted to the Palestinian context, for the management of diabetes mellitus and hypertension in accordance with the recommendations of relevant professional and academic international societies.<sup>63–65</sup> The difficulty, however, is not the availability of guidelines but the absence of training, supervision, follow-up, and assessment of these interventions. Such guidelines alone are inadequate to improve and unify the management of patients with chronic diseases in the occupied Palestinian territory.

Organised efforts for the primary prevention of cancer are insufficient, such as anti-smoking measures or education initiatives to promote a healthy diet and lifestyle. The occupied Palestinian territory has two units for cancer treatment in the West Bank and two in the Gaza Strip.<sup>66</sup> Radiotherapy is not available in the Gaza Strip, and some expensive chemotherapies are often not available.<sup>67</sup> Palestinian patients with cancer are generally diagnosed at a late stage of their disease. Data from the Palestinian cancer registry in Gaza suggest that breast cancer is diagnosed at an advanced stage of the disease. 42.2% of reported cases had regional lymph-node involvement (stage III) and 17.8% had distant metastases (stage IV);<sup>26</sup> 10.7% of reported cases of lung cancer had regional lymph-node involvement and 54.4% had distant metastases.<sup>26</sup>

Detailed data about human resources and health professionals specialising in cardiovascular disease, diabetes, and cancer are scarce. Information provided by the Medical Association in Jerusalem about registered specialists showed that there are 92 internists, 27 cardiologists, five endocrinologists and diabetologists, six haematologists, and five oncologists in the West Bank.<sup>68</sup> The quality of their training and experience varies, and the certification, licensure, and accreditation processes have been suboptimum. Furthermore, no mandatory system exists for continuing medical education. Cardiac surgery, imaging, and anaesthesia, which are specialties relevant to cardiovascular disease and cancer care, also have severe shortages of specialists.<sup>69</sup>

The cost of appropriate care for cardiovascular disease, diabetes, and cancer are beyond the resources available to developing countries. An example of the high direct cost incurred from chronic diseases within the occupied Palestinian territory is the cost of treatment abroad. In 2005, more than 31000 patients were referred for treatment outside the Palestinian Ministry of Health facilities, within the occupied Palestinian territory or in other countries (mainly Egypt, Jordan, and Israel). The total cost was about US\$60 million.<sup>6</sup> Cardiac, oncological, and ophthalmic care were among the top five disciplines for referral in 2005.<sup>6</sup> The three main referral hospitals used by the Palestinian Ministry of Health inside the occupied Palestinian territory were Makassed, Augusta Victoria, and Saint John Eye, all located in the Israeli-occupied Palestinian

Arab East Jerusalem. The Israeli authorities prevent entry by Palestinians, including patients referred to these hospitals from other areas in the occupied Palestinian territory, unless they have special permits. This prevention of entry increases patients' physical suffering and financial costs since they will have to travel outside the territory for treatment. Treatment elsewhere poses major financial and logistic burdens on the Palestinian Ministry of Health, and efforts have been made to regulate, control, and reduce the costs of referral to other countries.<sup>70</sup> Another disadvantage of treatment abroad is the partial or complete loss of medical information about patients. Such loss undermines the appropriate delivery of medical care in the Palestinian health system.

### Challenges and opportunities

Chronic diseases in general, and cardiovascular disease and cancer in particular, pose a major and increasing challenge to the health of the Palestinian population in the occupied Palestinian territory. The inadequacy of the societal and health-care-system responses to this challenge creates several opportunities for improvement. One of many challenges in treatment and prevention of chronic diseases in the occupied Palestinian territory is the dearth of reliable and complete data. The effects of disease prevention and management programmes are impossible to monitor without such data. Use of population-based studies, registries, and surveillance programmes to gather data should be urgently addressed.

Primary prevention of cardiovascular diseases and cancer should be urgently addressed by the Palestinian National Authority and donors.<sup>71</sup> So far the authority has been unable to implement some of the measures that have proven effective against chronic diseases in other countries.<sup>15,72</sup> The Palestinian legislative council has passed laws for anti-smoking, public health, and the environment. Implementation of such laws requires introduction of fiscal policies, differential taxation and subsidies, and enforced prohibition of smoking in public places. Other relevant interventions are effective educational programmes aimed at the adolescents, promotion of incentives for healthy lifestyle, and other society-specific measures that have proven effective in other countries.<sup>73,74</sup> Such programmes require political will at the highest level of government besides transparent and democratic governance. Representatives of civil society need effective oversight and advocacy, and the public and private sectors need to collaborate. Effective prevention of chronic disease is also economically beneficial.<sup>75</sup> Civil society, through advocacy groups and organisations, non-governmental organisations, international organisations (such as WHO and the World Bank), development agencies, private sector, and academics, should all adopt prevention as a national priority and work towards a common goal.<sup>76</sup> Disappointingly, the most recent national strategic health plan for 2008–10 did not give adequate attention to the primary prevention of major chronic diseases.<sup>77</sup>

	Gaza Strip <sup>28</sup>		Ramallah*		Hebron*	
	Boys (n=473)	Girls (n=549)	Boys (n=437)	Girls (n=498)	Boys (n=458)	Girls (n=549)
Overweight†	9.5%	15.3%	10.5%	15.1%	8.5%	13.5%
Obese‡	5.9%	4.9%	8.0%	6.0%	4.8%	3.5%
Stunting§	13.7%	6.2%	9.2%	5.8%	9.4%	4.2%
Underweight¶	7.0%	3.8%	9.4%	3.8%	12.9%	6.0%

\*Mikki N, unpublished. †Body-mass index (BMI) calculated from measured weights and heights between 85th and 95th percentiles of the US National Center for Health Statistics/WHO reference for age and sex. ‡BMI calculated from measured weights and heights greater than the 95th percentile of the US National Center for Health Statistics/WHO reference for age and sex. §Defined as height less than the third percentile of the National Center for Health Statistics/WHO reference for age and sex. ¶BMI calculated from measured weights and heights less than the fifth percentile of the US National Center for Health Statistics/WHO reference for age and sex.

**Table 5: Nutrition-related risk factors among adolescents in the occupied Palestinian territory**

Adaptation and contextualisation of effective interventions, such as those already mentioned, are important for their success. The Ministry of Health's restricted budget encourages emphasis of the role of primary prevention, whereas segregation and movement restriction encourage decentralisation. Community-based care and the use of easily administered and adequate drug treatment for major risk factors, such as high blood pressure and dyslipidaemia through the primary health-care centres in the occupied Palestinian territory, are important contributions to the prevention and management of chronic diseases.

Another priority should be the creation of an effective integrated health-care system, based on good knowledge of the health problems, and directed towards health promotion, disease prevention, and effective disease management, with equal access to everyone. Such a system would require a creative re-evaluation of the national health-insurance system. It would entail improved regulation and oversight of the fragmented private medical services to promote cost-effective evidence-based services and would keep to a minimum duplication of diagnostic procedures and conflicts of interest of medical providers. The establishment of national tertiary-care referral centres for the treatment and management of cardiovascular disease, diabetes mellitus, and cancer is an important strategic component of an effective health-care system. Such centres would reduce the burden of referral abroad for medical care and allow standardisation and quality assurance of tertiary care for cardiovascular disease and cancer.

Yet another opportunity is the creation of a cadre of health-care professionals capable of tackling the challenge of chronic diseases. An integrated national health-care capacity-building strategy, including investment in appropriate training for specialist physicians, qualified nurses, and allied health-care professionals, would be an essential component of a national chronic-disease management programme.

One of the major impediments to the improvement of the Palestinian health-care system is the continuing military occupation with all its consequences, as

discussed in the first report<sup>78</sup> in this Series. Relevant to the challenge of chronic diseases is the effect of a state of perpetual limbo on the national economy, strategic planning, health-care policy formulation, and national priority setting. The geographic and administrative fragmentation of the occupied Palestinian territory, the military checkpoints and barriers to movement, and the separation wall and many other fences and barriers, all have detrimental effects on the ability to deliver good health care.<sup>79,80</sup> The separation of Gaza Strip and the near impervious blockade of its population can only worsen health status and ability to deliver health care.<sup>81</sup>

#### Contributors

All authors contributed to the conceptualisation of the report and have approved the final version. AH had a major role in conceptualising the report, writing the drafts, organising sections, and revising the report. NMEAR contributed to the analysis of figures 1 and 2, writing the section about cancer, provision of data, and commenting on the report as a whole. NM contributed to writing the section about risk factors for chronic diseases, and commenting on the report as a whole. TMR contributed to rewriting the sections about cardiovascular disease and challenges and opportunities, and his major contribution was reorganising and drafting the initial submission, and commenting on the report as a whole. HAG, NB, and MK contributed to the provision of data and commenting on the report as a whole. EB, GHO, and JJ contributed to commenting on the report as a whole.

#### Conflict of interest statement

We declare that we have no conflict of interest.

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