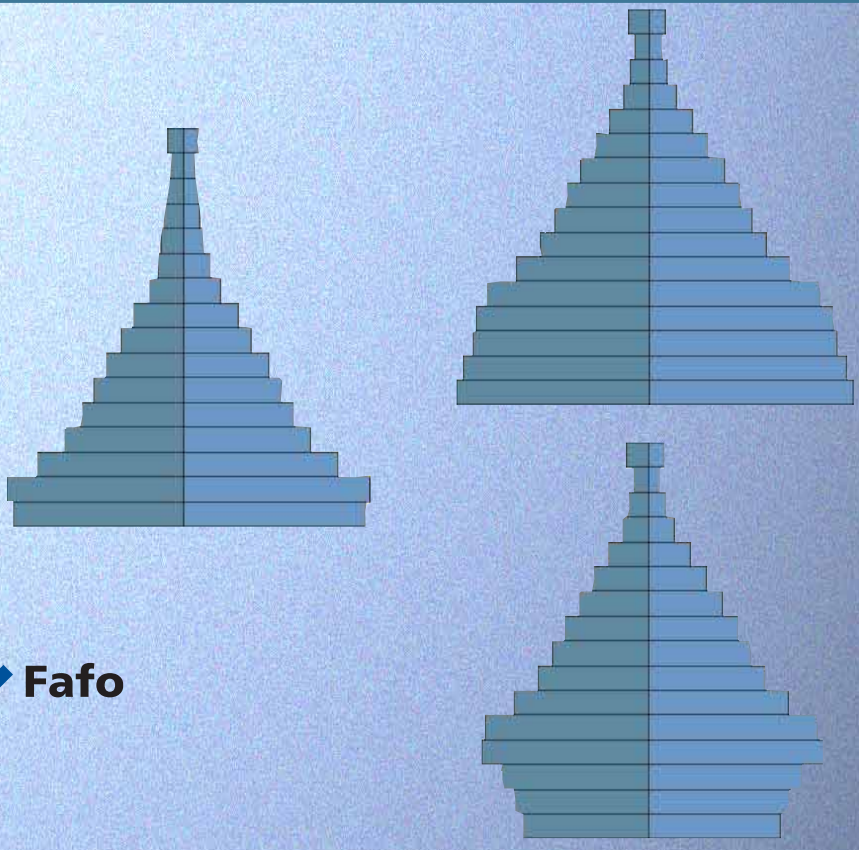
Kristin Dalen and Jon Pedersen

The Future Size of the Palestinian Population of the West Bank and Gaza Strip



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Preface

An important determinant of socio-economic development is the size of the population, which governs - among other things - the demand for jobs and the need for services, including educational and health facilities.

This report presents possible scenarios for the form and substance of the population growth of the West Bank and Gaza Strip, taking into account two important factors: that population growth has traditionally been significant in the occupied territories; and conversely, that recent findings indicate that fertility is now on the decline.

Fafo-AIS has long studied population growth in the West Bank and Gaza Strip as part of its efforts to document the living conditions of Palestinians. This report grew out of work carried out by Fafo, in cooperation with the Palestinian Central Bureau of Statistics on the Demographic Survey of 1995. It builds upon a previous Fafo report produced for the Council on Foreign Relations by Marwan Khawaja and Jon Pedersen, but integrates recent demographic developments in the West Bank and Gaza Strip, into its findings and analysis.

Jon Hanssen-Bauer
Managing Director
Fafo-AIS

Introduction

Population projections are required for planning and monitoring purposes in the short and long run. In this paper we provide a set of population projections as well as short-term forecasting of related factors for the Palestinian territory until the year 2015. The base population used for the current projections is the 1997 census count of the *de jure* population for the West Bank and Gaza Strip.

The main purpose of the paper is to provide some indication of the future size of the population and of various population-related factors: the need for housing, education and health services and the estimated need for new jobs. We begin by describing the methodology and assumptions used in the projections. This includes a description of the baseline population, age-sex distribution, as well estimates of fertility and mortality levels. In addition, we describe the assumptions for the future course of fertility and mortality. Next, we describe the projection results pertaining to trends in population size and composition, and their social and economic consequences. The final section provides some remarks concerning the reliability of the projections and a summary of the main results.

The Palestinian Census of 9–10 December 1997 found the population total to be 2.6 million people of which 1.6 million were in the West Bank (excluding East Jerusalem) and 1.0 in the Gaza Strip. Taking into account an estimated undercount of 2.4 percent and including a population of about 210 000 in East Jerusalem, the adjusted total was 2.9 million, of which 1.9 million were residing in the West Bank and 1.0 in the Gaza Strip (PCBS 1998a: 1, 20–21; PCBS 1999).

Some characteristics of this population are:

1. A young age structure.
2. High fertility, with very high fertility in the Gaza Strip.
3. Some signs of fertility decline, especially in the West Bank. The effect is smaller in the Gaza Strip.
4. Comparatively low mortality, with levels roughly comparable to the Western countries in the early 1960s.
5. Signs that mortality is no longer declining, at least with regard to child mortality.

6. Low labour force participation rates, primarily because of very low female participation rates, especially in Gaza.
7. A population growth of nearly 4 percent per year, even though loss of population through migration has been a characteristic of the West Bank and Gaza Strip for a long time.

The net effect is that the West Bank and Gaza Strip population will grow substantially in the next few years. This will radically increase the challenges currently experienced in the supply of services and the demand for jobs.

Methods and assumptions

The projection method used in this study is the so-called cohort-component method. The core of this method is to take the current population and its age and gender structure as point of departure, then simulate what will happen to each cohort with regard to births, deaths and migration, based on age-specific fertility rates, age-specific death rates, and age-specific migration rates.

The use of the cohort-component projection method defines the need for data: the size and structure of the population at present ("the base population"), and the description of change, that is, the rates of births, death and migration.

The computations have been done using the SPECTRUM computer program (Stover & Kirmeyer 1999).

Base population

All projections start from a baseline population at a particular point in time. In order to create a baseline population, we have used the figures provided by the 1997 census count for the Remaining West Bank (that is, without East Jerusalem) and the Gaza Strip and an estimate of the population in East Jerusalem. The 1997 mid-year population, including foreigners, forms the base population for all projections. The total count is adjusted for an estimated 2.4 percent undercount and reverse-projected from the census date of 9 December 1997 to mid-year 1997. Estimates of the population of East Jerusalem based on the 1995 *Demographic survey*

Table 1: Population of the West Bank and Gaza Strip

	West Bank	Gaza Strip	Total
Population*	1 873 476	1 022 207	2 895 683
Infant mortality#	26/1000	30/1000	28/1000
Total fertility rate#	5.44	7.41	6.06

Source: *1997 Census (PCBS 1998a); #1995 *Demographic Survey* (PCBS 1997a)

(PCBS 1997a) were added to the total census count to create the final baseline population of the Palestinian territories as a whole.

Table 1 shows the 1997 mid-year population estimates of the West Bank, the Gaza Strip and the total after adjustments for under enumeration. There were nearly 2.9 million people living in the West Bank and Gaza Strip in 1997.

Age-sex distribution

The 1997 Palestinian census (PCBS 1998a) provides the age and sex distribution of the population for the base year. However, as is the case with any census, there are age irregularities, particularly at the youngest ages. Thus, the age structure was smoothed for apparent age misstatement as revealed by a preliminary evaluation of the data.

Several checks on the census age structure indicate that the recorded age for many of those below the age of 10 years is wrong. Age structures for these groups were adjusted, based on surviving the population backward. Age structures for ages 10 and over from the census seem plausible and were accepted for the current projections after minor smoothing.

Likewise, the age distribution of East Jerusalem's population shows obvious irregularities, especially at the middle ages, and it may not be a realistic representation of the true structure. However, the official age structure was accepted for the current projection after minor smoothing. This is due to the lack of information required for a proper adjustment of the East Jerusalem population age structure.

Thus, the final age structure used in the current projections is a hybrid of the adjusted census structure for the Remaining West Bank and Gaza, and the structure of the estimated population of East Jerusalem. Persons with no recorded age in the census were distributed according to the proportion each age group makes up in the total population. The final age distribution is shown in Table 2.

Table 2: Population of the West Bank and Gaza Strip mid-1997

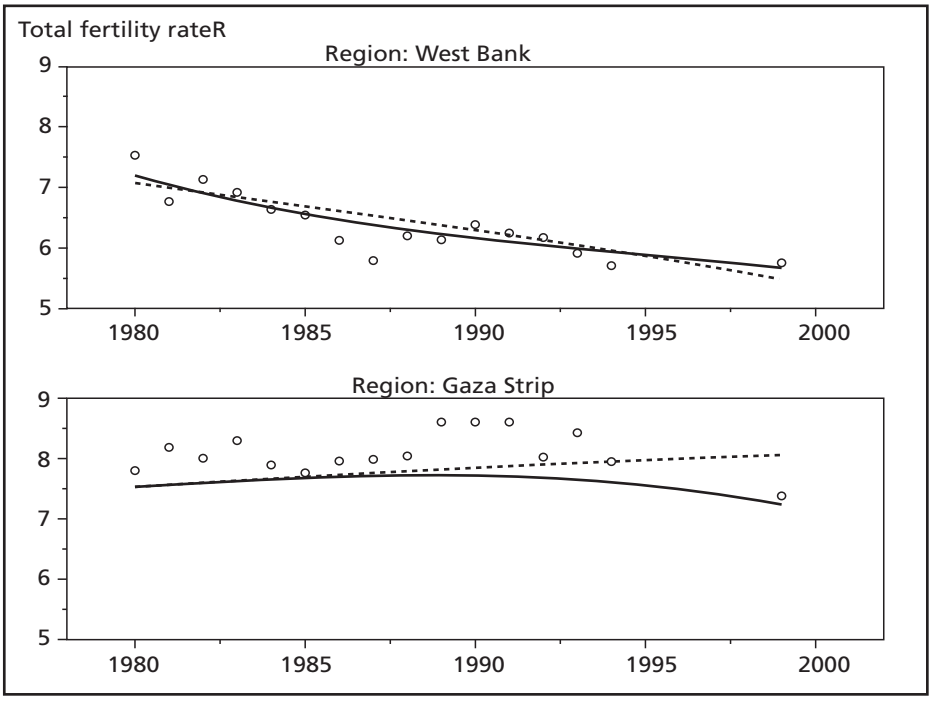
Age	Gaza			West Bank			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–4	104 557	101 179	205 736	165 490	158 405	323 895	270 047	259 584	529 631
5–9	86 923	84 185	171 108	137 393	131 961	269 354	224 316	216 146	440 462
10–14	67 226	63 950	131 176	113 222	107 478	220 700	180 447	171 428	351 875
15–19	53 499	51 182	104 681	98 445	92 203	190 648	151 944	143 385	295 329
20–24	44 379	41 990	86 369	86 977	81 347	168 324	131 356	123 336	254 692
25–29	34 995	32 903	67 897	76 013	70 776	146 789	111 008	103 679	214 687
30–34	31 579	28 250	59 830	60 728	56 874	117 603	92 308	85 125	177 432
35–39	23 805	21 624	45 428	49 188	46 230	95 417	72 992	67 853	140 846
40–44	17 012	16 267	33 279	33 428	31 908	65 336	50 440	48 175	98 615
45–49	13 189	13 724	26 913	24 311	24 485	48 796	37 500	38 210	75 709
50–54	8 508	10 098	18 606	18 631	22 044	40 675	27 139	32 142	59 282
55–59	6 257	8 942	15 198	15 583	18 810	34 393	21 840	27 752	49 592
60–64	6 610	8 159	14 769	13 704	17 720	31 424	20 314	25 879	46 193
65–69	4 973	6 756	11 729	11 384	14 168	25 552	16 357	20 924	37 281
70–74	3 546	4 641	8 187	8 400	10 504	18 904	11 946	15 145	27 091
75–79	2 022	2 319	4 341	5 119	6 152	11 271	7 141	8 471	15 612
80+	2 160	2 749	4 909	6 345	6 595	12 940	8 505	9 344	17 849

Fertility

Fertility estimates for the West Bank and Gaza Strip are available from the Palestinian Census as well as several surveys carried out by the Palestinian Central Bureau of Statistics (PCBS). Estimates from surveys for the West Bank and Gaza Strip are given in Figure 1. The figure shows a steadily declining fertility in the West Bank, but a more equivocal trend in the Gaza Strip. Fertility in the Gaza Strip has historically fluctuated and it is possible that the current indication of decreased fertility is actually just a temporary downward fluctuation.

Using the Brass-Trussel P/F ratio method the total fertility rate (TFR) was estimated from the census as 6.1 children per woman. The rates for Gaza Strip and the West Bank (excluding East Jerusalem) were 7 and 5.6 respectively. The decline of Gaza's fertility (from an estimated 7.4 in 1995 as estimated by the *Demographic survey)* is very rapid, but the *Health survey* (PCBS 2000) shows a similar figure for 1999. There is thus a real possibility that the Gaza Strip fertility rates have started to decline. This is also indicated by a recent report from PCBS (2003) that suggests a total fertility rate of 5.4 for the Gaza Strip for the period 1997–1999.

Figure 1: Survey estimates of total fertility rates for the West Bank and Gaza Strip



The dotted line indicates an OLS regression line, the solid line is a smoothed Cubic Spline.

Because of the uncertainties in the fertility estimates, we have adopted two alternative scenarios of future fertility levels. The first scenario assumes relatively rapid reduction in current fertility rates. Here, TFR in the West Bank is assumed to decline from 5.4 in 1997 to 2.4 in 2015. The TFR in Gaza is assumed to decline at a faster pace, from 7 in 1997 to 2.6 in 2015.

For the second scenario, we assume a slower reduction in current fertility rates. During the same period, fertility is assumed to decline from 5.4 to 3.3 in the West Bank and from 7 to 3.5 in Gaza.

For each series, the TFR values for intermediate years are estimated by fitting a logistic curve to the 1995 TFR and assumed TFR for 2025. According to this curve, fertility rates change slowly in the beginning of the period, then more rapidly before gradually assuming a final value. The low and high asymptotes used for fitting the curve are 2.1 and 7.5 children per woman respectively.

Age-specific fertility rates are also needed for the projections. When fertility declines, the age pattern of fertility also changes, and this must be taken into account in a projection. The prediction is far from certain, especially because the standard fertility schedules established for the Arab countries (Stover & Kirmeyer 1999) poorly match the data from the West Bank and Gaza. For projecting slow and rapid reduction of fertility in the Gaza Strip, we use estimates of age-specific fertility rates for educated women in the West Bank. For projections of slow and rapid reduction of fertility in the West Bank, we use fertility rates for educated Palestinian women in Syria. The fertility pattern of West Bank women is expected to become similar to that of Palestinian women in Syria.

Mortality

Mortality levels in the Palestinian territories are low compared to other populations with very high fertility. Results from the 1995 *Demographic survey* show an estimated infant mortality rate of 24 per 1000 births for males and 30 for females.

Life expectancy at birth is the mean number of years a person may expect to live when he or she is born. All other things being equal, a population will obviously grow faster when people are expected to live longer. Moreover, the distribution of the population across age groups depends on when people die: the same average life expectancy could be the result of high infant mortality and low adult mortality, or low infant mortality and high adult mortality.

Life expectancy should ideally be estimated from observed deaths at different ages. However, this is not possible because there is no reliable vital registration of Palestinians.

In order to circumvent the limitations of the data we have combined two sources of information: Firstly, we gauged adult mortality by the so-called orphanhood method, that is, from reports that children give of whether their parents are still alive. From the conditional survival probabilities found by this method, life expectancies were estimated, based on the assumption that a given mortality pattern is valid (the Coale-Demeny "West" model). Secondly, we used infant mortality data to find corresponding life expectancies, again given an age distribution of mortality which follows the Coale-Demeny "West" model.

The resulting estimates have different locations in time, and they have been combined using the simple expedient of using the average of the four most recent estimates

The life expectancy at birth used in the base year was 68.5 years for males and 71.8 for females in Gaza. The corresponding rates for the West Bank was 69.8 and 73.1.

We have assumed stable mortality rates. There is evidence that mortality has been stable since the end of the 1980s (Pedersen 2001). With the current stresses put on the health care system we doubt that it will be possible to achieve much more in the immediate future than to defend the gains that have been made.

Migration

Migration into and out of the West Bank and Gaza Strip has been quite erratic, and it is intensely subject to the effects of political events. Given the "transitional" nature of the political situation in the territories, any assumptions concerning the future of international migration tend to be highly speculative. For example, in one of its previous projections, PCBS (1994) assumed a net inflow of 75 000 migrants in 1994. Another 50 000 migrants a year were assumed for the period from 1995 to 1999 along the lines suggested in the Palestinian development plan. In its most recent projection PCBS (1999) assumes an inflow of 5 000 in 1997, 10 000 in 1998, 15 000 in 1999, 20 000 in 2000 and 45 000 annually during the period 2001–2010. Thereafter zero migration is assumed. However, there is evidence that West Bank and Gaza Strip continued to have net out-migration. Due to the extreme uncertainties we have assumed no migration for the two projection series. They therefore only show the effect of natural increase.

Two projection series

As noted, the two different projection series are prepared based on alternative assumptions of future fertility levels. Future levels of mortality are assumed to decline at the same rate among the two series. Due to the difficulties of projecting migration in the area, we have chosen to leave this aspect out.

The first series, using the assumption of rapid fertility decline, is referred to as the "low series". The second series, using the slow fertility decline assumption, is referred to as the "high series". A summary of the population projection results is presented below and we discuss the main findings pertaining to population and socio-economic factors.

The total population

The projected populations from the two series are presented in Table 3. In both the scenarios, the total population will increase from 2.9 million in mid-year 1997 to over four million in 2015.

According to the low growth scenario, assuming a rapid decline in fertility, the population will reach 3.5 million by 2005, increasing to nearly 4.2 million by 2015. The high growth scenario, assuming a slow decline in fertility rates, projects that the total population will reach 3.6 million by 2005, increasing to nearly 4.7 million by 2015. This scenario projects a 65 percent increase from the baseline pop-

Table 3:Total population projection for the Gaza Strip and West Bank – Two series (thousands)

	1997	2002	2005	2010	2015
West Bank low	1 822	2 062	2 193	2 389	2 562
Gaza Strip low	1 010	1 206	1 314	1 473	1 609
Total	2 832	3 268	3 508	3 862	4 171
West Bank high	1 822	2 094	2 265	2 558	2 854
Gaza Strip high	1 010	1 219	1 350	1 579	1 815
Total	2 832	3 313	3 616	4 137	4 669

ulation by 2015. The low growth scenario indicates a 47 percent increase of the population over the same period.

The increase can be attributed entirely to fertility. As a result, there is a significant difference in population growth between the West Bank and the Gaza Strip. According to the low fertility series, the West Bank population increases by about 40 percent during the period from 1997 to 2015, while the population of the Gaza Strip goes up by 59 percent over the same period. In the high series, the increase from 1997 is one million in the West Bank (57 percent) and 800 000 in the Gaza Strip (80 percent). The West Bank will account for adding more people to the population in absolute terms than the Gaza Strip, assuming that the current regional population distribution holds in the future.

Equally significant is it that the Gaza Strip will increase its overall share of the population by the year 2015 regardless of the series in question, owing to the higher fertility levels it has compared to the West Bank. The Gaza Strip will account for about 39 percent of the population in 2015, regardless which of projection series is being used.

Examination of the trends in the annual rate of population growth shows that the population will continue to grow fast, regardless of the particular series. This demonstrates that the Palestinian population has a high population momentum in the short run, especially in Gaza. However, there are noticeable differences between the two projection scenarios.

According to the projections for the West Bank, the annual growth rate for the population will decrease consistently during the projection period. According to the projections based on rapid fertility decline, the rate will decrease from an estimated 3.4 percent in mid 1997 to a low of 1.3 percent by mid 2015. According to the moderate fertility decline projection, the growth rate will drop from 3.4 percent in 1997 to 2.1 percent by 2015.

In the Gaza Strip, the annual growth rates consistently decline in both series. According to the rapid fertility decline scenario, the rate will decrease from an estimated 3.9 percent in mid-1997 to 3.2 in 2002, to reach a low of 1.6 percent by mid-2015. For the slow fertility decline scenario, the growth rate will drop from an estimated 3.9 percent in mid-1997 to 3.5 percent in 2002 to a low of 2.6 percent in 2015.

A comparison of the annual growth rates of the countries in the region shows that the Palestinian territories have a generally high growth rate. The growth rate of 3.4 percent for the West Bank in 1997 is higher than all the other countries except Jordan. The same is true for the annual growth rate for the Gaza Strip in 1997 (3.9 percent). The post-Gulf War influx of extradited Palestinians from Kuwait into Jordan led to a high rate of population growth in that country.

Table 4: Annual growth rates (percent per year) West Bank and Gaza

	2002	2005	2010	2015
West Bank low	2.2	1.9	1.6	1.3
West Bank high	2.7	2.6	2.3	2.1
Gaza Strip low	3.2	2.7	2.0	1.6
Gaza Strip high	3.5	3.3	2.9	2.6

Table 5: Annual growth for other countries in the region (percent per year)

	1990–2000
Egypt	1.9
Jordan	4.2
Lebanon	2.6
Saudi Arabia	2.8
Syria	2.7
Tunisia	1.5

Source: WHO 2003a

Table 6 shows the projected time it will take for the population to double if the growth rate remains constant. In all the projection series the doubling time for the Gaza Strip is shorter than that for the West Bank, due to the higher growth rate.

According to the 1997 census, 41 percent of the population of the Palestinian territories are counted as refugees, but the West Bank has a lower proportion of refugees than the Gaza Strip. In the West Bank 26 percent of the population are refugees, compared to 65 percent in the Gaza Strip. The two projection series indicate the expected number of refugees in the Palestinian territories (Table 7). We have projected the increase in the refugee population with the same fertility rates and age distribution as for the total Palestinian population. After comparing the refugee population to the non-refugee population in the territories, we found that there is no discernable difference in the age distribution between the two groups. As for fertility, there are indications that fertility among refugees is slightly lower

Table 6: Population doubling time (years)

	2002	2005	2010	2015
West Bank low	31	36	45	53
West Bank high	26	27	30	33
Gaza Strip low	22	26	34	43
Gaza Strip high	20	21	24	26

Table 7: Projected number of refugees (thousands)

	1997	2002	2005	2010	2015
West Bank low	474	536	570	621	666
Gaza low	657	784	854	957	1 046
Total	1 161	1 340	1 438	1 584	1 710
West Bank high	474	544	589	665	742
Gaza high	657	792	878	1 026	1 180
Total	1 161	1 358	1 482	1 696	1 914

than in the non-refugee population, but this will not make a large difference to the projections.

According to Table 7, taking the high projection series as a starting point, the total refugee population will increase by 65 percent by 2015. The refugee population in the West Bank will increase by 57 percent, amounting to 268 000 people, whereas the number of refugees in the Gaza Strip will increase by about 80 percent –more than 523 000 people.

In another paper (Pedersen 2002) we estimated the growth of the Palestinian refugee population. The numbers presented in the previous projection (Table 8) indicate a higher refugee population in the West Bank in the first period of the projection, whereas the numbers for Gaza in the same period are predicted to be lower than the estimates presented in Table 7. However, by the end of the projection period in 2015, the population estimates in Table 7 and Table 8 tend to converge. The differences between the two estimations are due to slightly different estimates of fertility decline in the two projections. The projection presented in Table 8 assumed a linear fertility decline whereas in the projections presented in this paper fertility declines asymptotically toward a fixed level.

Table 8: Previous projections for Palestinian refugees (thousands)

	2002	2005	2010	2015
West Bank	585	628	692	749
Gaza Strip	772	854	996	1 143
Total	1 357	1 482	1 688	1 892

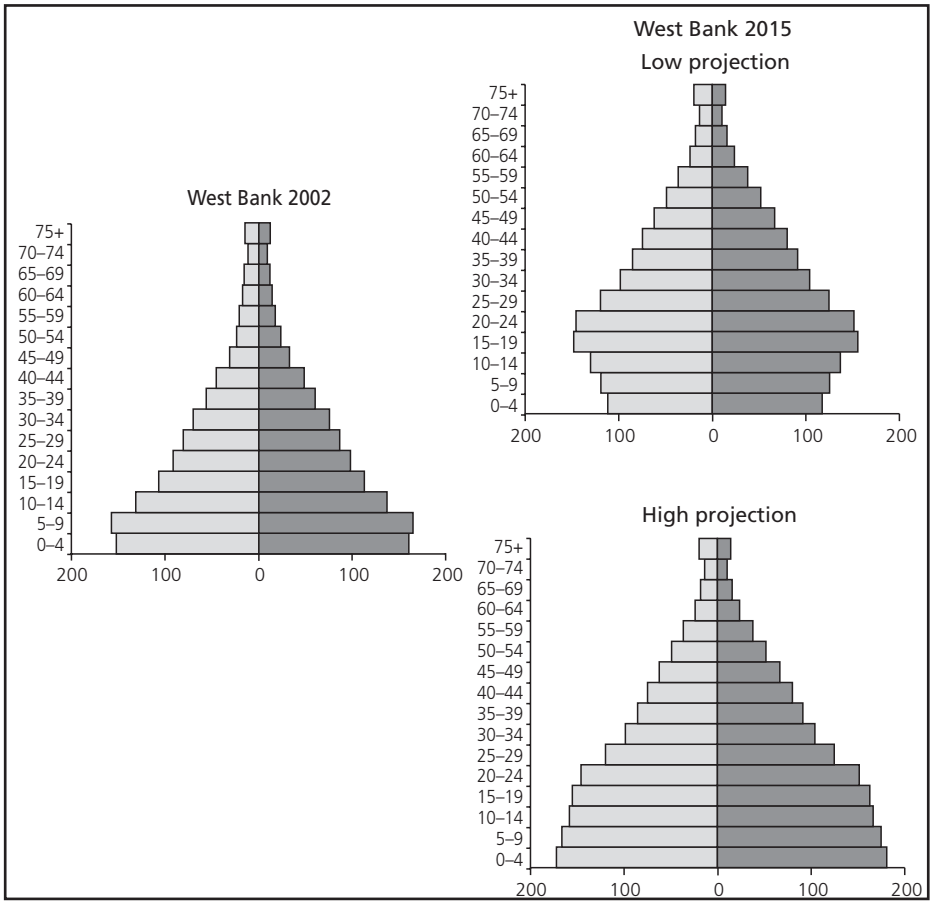
Source: Pedersen 2002

Population structure

A key factor in how a population can relate to its natural and social resource base is the ratio between consumers and producers. This is largely determined by the population structure by age, but is also related to the division of labour in society, especially by age and gender.

One way of illustrating the structure in a total population is through the use of population pyramids showing the distribution of age and gender. The popula-

Figure 2: Future age structures of the West Bank population

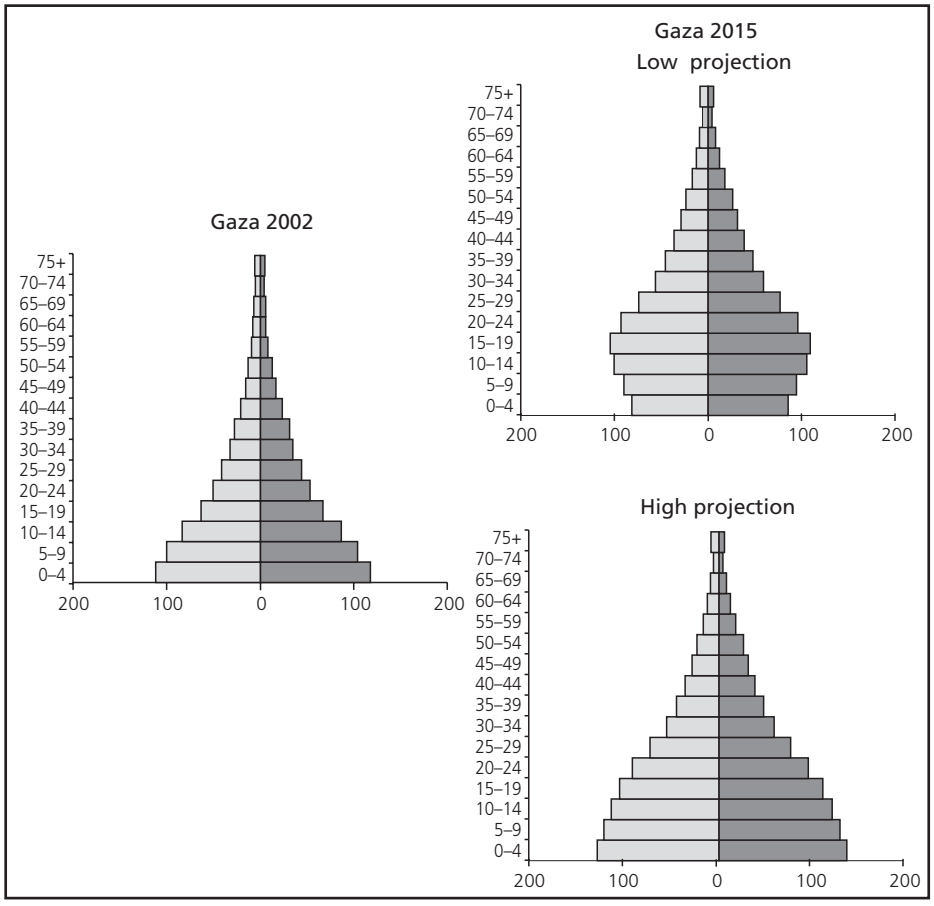


tion pyramids in Figure 2 are a visual representation of the differences between the projections.

Both projection pyramids for the West Bank show the effect of a fertility decline with a rapid onset, in that one can observe a break in the age distribution around the age of 20 years. In the low series, the three youngest age groups are smaller than those above them, producing a "rounded" pyramid. This is not the case in the pyramid illustrating the slower fertility decline.

In the population pyramids illustrating the forecast for the Gaza Strip, we see the same patterns as for the West Bank. The low series yields a pyramid with a narrower bottom, indicating that the majority of the population is in the producing segment. The effect is the same as in the West Bank. The high series shows a pyramid broadest at the bottom but rounded, indicating a more equal distribution between the age groups.

Figure 3: Future age structures of the population in the Gaza Strip



Dependency ratios

The number of people that the productive members of the population have to provide for is indicated by the dependency ratio. This term refers to the ratio between people aged 0–14 years and 65 and over on the one hand and those who fall in the age group 15–64 years on the other. It is also possible to define a child dependency ratio[1] which indicates the proportion of children to potential producers.

Table 9 shows a summary of the projected size of the adult population, the annual growth rates, the dependency ratios as well as child dependency according to the two different scenarios, in the two different locations added up.

Table 9: Dependency ratios for the West Bank and Gaza Strip

		2002	2005	2010	2015
Population size (thousands)	Low	3 268	3 508	3 862	4 171
	High	3 313	3 616	4 137	4 669
Adult population (thousands)	Low	1 695	1 905	2 316	2 739
	High	1 695	1 905	2 316	2 758
Dependency ratio (Dependents per adult 15-64)	Low	0.92	0.86	0.7	0.54
	High	0.95	0.86	0.81	0.72
Child dependency (Children 0-14 per adult)	Low	0.90	0.82	0.64	0.49
	High	0.93	0.87	0.76	0.67
Annual growth rates (percent)	Low	2.96	2.3	1.78	1.45
	High	3.22	2.92	2.62	2.35

[1] Formally speaking, the dependency ratio is calculated as the population below 15 and above 64 divided by the population between 15 and 64, that is:

$$d = \frac{N_{0-14} + N_{65+}}{N_{15-64}}$$

where N is population and the subscript indicates the age group. The child dependency ratio is then:

$$c = \frac{N_{0-14}}{N_{15-64}}$$

The senior citizen dependency ratio is analogous to the child dependency ratio.

The size of the adult population (age 15 and above) will increase dramatically during the period from 2002 to 2015. This is true for both projections, mirroring the present high population growth and the population momentum caused by high fertility in the past. The size of this group will increase from about 1.6 million in 2002 to about 2.7 million by the year 2015. This is an increase of about 75 percent, compared to 43 percent for the population as a whole.

The dependency ratios will not change much between 2002 and 2005 according to either scenario, given the assumptions built into the projections. The differentiation between the scenarios starts to get clearer in the period 2005–2015. In 2015 the dependency ratio for the rapid decline in fertility scenario drops to 0.54 compared to the high fertility scenario in which the dependency ratio declines much more slowly.

There is about one producer for each consumer in 2002. According to the low projection series, there will be two producers for each consumer by 2015. If the high projection series is accurate, the population will remain one in which a comparatively small number of producers have to provide for a large number of consumers.

It is important to note that if a significant decline in fertility occurs, the effect will be an improvement in the child dependency ratio but, especially in the long run, an increase in the number of elderly persons. This can be seen by comparing both ratios projected in the two scenarios for 2015.

Comparing the dependency ratios in the Palestinian territories to other countries in the region indicates that, regardless of whether we consider the low or high projection series, the dependency ratio for 2000 is higher in the Palestinian territories than in any other Middle Eastern country. This is particularly true for the Gaza Strip, having a dependency ratio that is 0.25 higher than any other county in the region.

Table 10: Dependency ratios for other countries in the region (Dependants per adult 15–64 years old)

	2000
West Bank	0.88
Gaza	1.10
Egypt	0.65
Jordan	0.75
Lebanon	0.59
Saudi Arabia	0.85
Syria	0.78
Tunisia	0.55

Source: WHO 2003a: Annex Table 1

Table 11 shows the projected dependency ratios for the West Bank, indicating it will reach 0.48 in 2015 according to the low projection series, while the high one results in one of 0.64. As can be seen, the fertility assumptions are quite important here.

The dependency ratios for the Gaza Strip predict the dependency burden will stay relatively high regardless of the projections; in the high projection series the dependency ratio reaches 0.79 in 2015, this being close to the dependency ratio for the West Bank in 2005 and Jordan in 2000. The dependency ratio drops below 0.6 in the low series.

Table 11: Projected dependency ratios for the West Bank

		2002	2005	2010	2015
Population (thousands)	Low	2 062	2 193	2 389	2 562
	High	2 094	2 265	2 558	2 854
Adult population (thousands)	Low	1 115	1 241	1 488	1 730
	High	1 115	1 241	1 488	1 744
Dependency ratio (Dependants per adult 15–64)	Low	0.85	0.77	0.61	0.48
	High	0.88	0.83	0.72	0.64
Child dependency (Children per adult 15–64)	Low	0.78	0.70	0.55	0.43
	High	0.81	0.76	0.66	0.58
Annual growth rates (Percent)	Low	2.24	1.94	1.55	1.30
	High	2.67	2.55	2.30	2.07

Table 12: Projected dependency ratios for the Gaza Strip

		2002	2005	2010	2015
Population (thousands)	Low	1 206	1 314	1 473	1 609
	High	1 219	1 350	1 579	1 815
Adult population (thousands)	Low	581	664	829	1 009
	High	581	664	829	1 013
Dependency ratio (Dependants per adult 15–64)	Low	1.08	0.98	0.78	0.59
	High	1.10	0.90	0.90	0.79
Child dependency (Children per adult 15–64)	Low	1.02	0.93	0.73	0.55
	High	1.04	0.98	0.86	0.75
Annual growth rates (Percent)	Low	3.15	2.67	2.01	1.60
	High	3.52	3.28	2.94	2.62

The number of households

Needs for housing and related needs for infrastructure depend to a large extent on the number of households rather than directly on the number of people, because the household often is the unit of consumption of public goods. The number of households in the future depends both on the total population size and how people in different age groups form households.

The assumption used for our projections is one of constant headship rates. A headship rate is the probability that a person will be the head of a household. It is calculated for five-year groups. We assume this probability to be the same in the future as it is today. The headship rates used were derived from census data. There are more realistic methods of projecting the number of households, but we have no access to data that can support such methods.

According to our estimates there will be no difference between the projections regarding the number of households, due to the fact that we are estimating the changes in population growth solely from the fertility rates, and people are not assumed to start a new household before they have reached 18 years of age. Thus, we have chosen to collapse the estimated new households for both the projections from 2002 to 2015 in Tables 13, 14 and 15.

The most important proximate determinant of fertility change is increased age at marriage. This may imply that the projections overestimate the number of households. Household formation is also related to social factors such as kinship, structure of the labour market and types of industry in an area. If, for example, the supply of housing were to increase more than the population were to grow, people may form new households more readily and our projections would underestimate the number of new households.

Table 13: Projected number of households in the West Bank and Gaza Strip (thousands)

		2002	2005	2010	2015
Population	Low	4 473	3 508	3 862	4 171
	High	4 532	3 616	4 137	4 669
Total households		510	573	694	839
Female-headed households		36	39	46	55

Table 14: Projected number of households in the West Bank (thousands)

		2002	2005	2010	2015
Population	Low	3 268	2 193	2 389	2 562
	High	3 313	2 265	2 558	2 854
Total households		349	391	469	561
Female-headed households		26	28	33	40

The joint projection series of the West Bank and Gaza Strip indicates that the number of new households will increase from about 510 000 in mid 2002 to 839 000 in 2015 – a 65 percent increase. The projected population growth amounts to 28 percent for the low projection and 41percent for the high one. This indicates that the relative increase of households will be higher than the increase in population, irrespective of which projection series we look at. The general trend in the area seems to be that the number of members in each household will decrease. Table 14 contains separate projections for the West Bank and Gaza Strip showing that the two areas might develop differently.

It is estimated that the increase of new households in the West Bank will be 61 percent, 4 percent lower than the total projection for the Palestinian area. The increase of new households is higher than the increase of population in both series – 24 percent for the low and 36 percent for the high projections. Again this indicates that the household size in the area will become smaller, irrespective of the projection series.

The number of female-headed households is expected to increase by 54 percent. This is lower than the general increase of new households but relatively higher than the population growth. It is worth noting that the increase in female-headed households in the West Bank is higher than in the area as a whole.

The estimated growth of households in the Gaza Strip is 73 percent, 12 percent higher than the estimates for the West Bank. However the relative increase in households to population is substantially different, depending on the projection series. The percentage of new households exceeds the percentage of population growth in both series. The difference between the high and low projections

Table 15: Projected number of households in the Gaza Strip (thousands)

		2002	2005	2010	2015
Population	Low	1 206	1 314	1 473	1 609
	High	1 219	1 350	1 579	1 815
Total households		161	182	225	278
Female-headed households		10	11	13	15

is that the high projection indicates households with many children, while the low projection has the same number of households but with fewer children.

The 50 percent increase in female-headed households is smaller than the total increase of households on the Gaza Strip, and smaller than on the West Bank.

These comparisons support what has been asserted earlier in this paper – that the population growth will be higher on the Gaza Strip but, since we are not factoring migration into the projections, the number of households will stay constant between the two projections. This is because the growth in population will take place in the age group 0–18 years, while household heads will be older. The total number of households will of course be affected by any net in-migration or out-migration that may take place.

The labour force

The labour force participation in the West Bank and the Gaza Strip has three main characteristics. The first is very low female participation rates. This is especially true in Gaza, but also in the West Bank. The second is low crude participation rates, which are mainly due to the large number of children in the population, but can also be attributed to a number of people having given up looking for a job. The third is large variability over time due to the unstable political situation.

A projection of the labour force can give some indication of the number of jobs needed in the future. The projection given here is based on labour force participation rates for 1997. This year was relatively unaffected by border closures and other disruptions. Nevertheless, given the lack of "normal" years, it is not at all clear what "normal" labour force participation should be in the West Bank and Gaza Strip, so the projection must therefore be considered with considerable caution.

One particular caution must be noted: if female participation rates increase, as they currently do in the Middle East generally, the labour force may increase much faster than projected here. Table 16 shows the projected size of the labour force for males and females and the estimated number of new jobs each year.

As can be seen from Table 16, the labour force will increase by more than 60 percent during the period 2002–2015. According to the projection scenarios, the number of labour force participants will increase from 0.7 in 2002 to 1.2 million by 2015. The labour force will increase by about 10 000 more if the high growth scenario proves right. The rate of increase is essentially the same for males and females. There is no significant difference between the series before 2015; this is

because the projections only differ in respect of level of fertility. Since people do not become part of the labour force before they reach the age of 15, the differences between the projection series can only be seen in 2015. Depending on the scenario, there is a need for 194 000–205 000 new jobs by 2015.

Table 16: Projected labour force in thousands for the West Bank and Gaza Strip (thousands)

		2002	2005	2010	2015
Total labour force	Low	731	819	991	1 185
	High	731	819	991	1 188
Male labour force	Low	666	747	904	1 082
	High	666	747	904	1 085
Female labour force	Low	65	72	87	103
	High	65	72	87	103
New jobs required	Low		88	172	194
	High		88	172	197

Table 17: Projected labour force in the West Bank (thousands)

		2002	2005	2010	2015
Total labour force	Low	508	565	676	796
	High	508	565	676	799
Male labour force	Low	448	499	596	702
	High	448	499	596	704
Female labour force	Low	60	67	80	94
	High	60	67	80	95
New jobs required	Low		58	110	120
	High		58	110	123

Table 18: Projected labour force in the Gaza Strip (thousands)

		2002	2005	2010	2015
Total labour force	Low	223	253	315	389
	High	223	253	315	389
Male labour force	Low	218	248	308	380
	High	218	248	308	381
Female labour force	Low	5	6	7	9
	High	5	6	7	9
New jobs required	Low		31	62	74
	High		31	62	74

The difference between the West Bank and the Gaza Strip again underlines the higher population growth on the Gaza Strip; the total labour force increases by about 75 percent from 2002 to 2015. Over the same time period the total labour force on the West Bank increases by "only" about 57 percent. There are few differences between the projection series in the two geographical areas, again due to background conditions for our projections and the fact that people do not enter the labour force before they have reached the age of 15.

Health

An important aspect of providing health services for the population is the number of health personnel required. Based on the respective ratios of health personnel to the population in 1997 we project the needs for three of the usual indicators: physicians, nurses and hospital beds. According to the PCBS (1997b) and United Nations (1999) the base-year rates (per 10 000 population) for the three indicators are 11.3, 13.7 and 11.5. The results of the projections are reported from Table 19 through to Table 21.

The projection for the West Bank and Gaza Strip together indicates that the required number of physicians, nurses and hospital beds will increase at similar rates during the projection period. However, there are clear differences between

Table 19: Projected numbers of physicians, nurses and hospital beds West Bank and Gaza

		2002	2005	2010	2015
Physicians required	Low	3 692	3 963	4 364	4 713
	High	3 743	4 086	4 674	5 275
Nurses required	Low	4 476	4 805	5 291	5 714
	High	4 538	4 953	5 667	6 396
Hospital beds required	Low	3 760	4 036	4 445	4 800
	High	3 812	4 161	4 760	5 373

Table 20: Projected number of physicians, nurses and hospital beds in the West Bank

		2002	2005	2010	2015
Physicians required	Low	2 330	2 478	2 700	2 895
	High	2 366	2 560	2 890	3 224
Nurses required	Low	2 824	3 005	3 273	3 510
	High	2 868	3 103	3 504	3 909
Hospital beds required	Low	2 373	2 524	2 750	2 949
	High	2 409	2 607	2 943	3 284

the low and high growth scenarios. According to the high growth scenario, there will be an increase in demand for physicians, nurses and hospital beds of 41 percent, while the low growth shows one of 28 percent.[2]

It should be pointed out that the projection for health, as for the other variables, varies greatly between the West Bank and the Gaza Strip. More rapid population growth on the Gaza Strip will lead to a more rapid increase in demand for health services. According to the low projection series, the Gaza Strip will need 33 percent more health personnel and hospital beds whereas the West Bank will need 24 percent more. According to the high growth projections, the Gaza Strip needs 49 percent more health personnel and beds, whereas the West Bank need "only" 36 percent more. Even though the real numbers are higher in the West Bank, the relative need is substantially higher on the Gaza Strip.

Comparing the base-year rates (per 10 000 population) of physicians and nurses in the Palestinian territories to other countries in the Middle East region shows that the rates for the West Bank and Gaza Strip are lower than all the other countries in the region (Table 22). If the ratio of physicians and nurses to population

Table 21: Projected numbers of physicians, nurses and hospital beds on the Gaza Strip

		2002	2005	2010	2015
Physicians required	Low	1 363	1 485	1 664	1 818
	High	1 377	1 526	1 784	2 051
Nurses required	Low	1 652	1 800	2 018	2 204
	High	1 670	1 850	2 163	2 487
Hospital beds required	Low	1 388	1 512	1 695	1 851
	High	1 403	1 554	1 817	2 089

Table 22: Number of health personnel in other countries in the region (per 10 000 population). Source: WHO 2003b

	Physicians	Nurses
West Bank and Gaza	11.3	13.4
Egypt	20.2	23.3
Jordan	16.6	29.6
Lebanon	21.0	10.0
Saudi Arabia	16.6	33.0
Syria	14.4	18.9
Tunisia	7.0	28.6

[2] These increases are equal to the population increase, since the number of physicians, nurses and hospital beds required has been estimated using rations which are fixed relative to the population size.

were to be raised to the level of the surrounding countries, the need for health personnel would increase by a rough figure of 50–100 percent.

The number of births per year is commonly used as an important indicator to assess future needs for pre-natal as well as post-natal care of mothers and infants. Clearly, the number of births per year is affected by changes in fertility. The predicted number of births by year according to the various scenarios is shown in Table 23.

The number of births in 2015 is projected to vary in the range 80 000–130 000. Significant disparities between the West Bank and the Gaza Strip are due to differences in fertility. According to the scenario based on rapid decline in fertility, the number of births is reduced consistently in the West Bank and on the Gaza Strip during the entire projection period, from 56 000 to 47 000 in the West Bank and from 44 000 to 34 000 in Gaza – a decline of 10 000 births in each area. According to the scenario based on slower decline in fertility, the number of births will increase in both geographical areas, from 66 000 to 73 000 in the West Bank, and from 49 000 to 57 000 in the Gaza strip. The increase is 10 percent in the West Bank and 15 percent in the Gaza strip.

Table 23: Projected number of births in the West Bank and Gaza Strip (thousands)

	2002	2005	2010	2015
Low	101	95	86	80
High	116	120	126	130

Education

The educational sector in the Palestinian territories is a hybrid, consisting of public, not-for-profit, and private institutions. However, the primary and secondary education system is primarily public. The expenditure component was calculated on the basis of the public sector expenditure and number of students in public schools, but the results hold for the sector as a whole. In addition, we use the prevailing rates for 1997/1998 to project a number of widely used education indicators including enrolment and number of teachers. The results of the projections are displayed from Table 24 through to Table 26.

The male school age population (age 6–17 years) was estimated to be 0.55 million in mid-2002. By 2015 the number will increase to between 0.58 and 0.70 million. The female school population will experience a similar increase, resulting

in a total of 1.13 to 1.36 million children belonging to the school population by 2015. Not all of this population will attend school. If we use the enrolment rate provided by the 1997 census, the size of the student body will increase from 0.97 million in 2002 to 0.99 million in 2015 if the territories experience low growth. The corresponding number with high population growth will be 1.22 million.

According to the high projection series, the number of teachers required will increase throughout the time period. Using the prevailing student/teacher ratio in the educational system as a whole (29 students:1 teacher), the number of teachers required will increase from 34 000 in 2002 to 42 000 in 2015. By contrast, according to the low projection series the number of teachers required are expected to increase from 34 000 in 2002 to 37 000 in 2010 before it returns to 34 000 in 2015 due to the decreasing number of births projected in this scenario.

For expenditure, we used the reported official recurrent expenditure in the public sector to calculate the amount of expenditure per student for the whole sector. Thus, we ignore expenditure for investments, which has been provided from donor funds in recent years. The recurrent educational expenditure is expected to increase from US$250 million in 2002 to US$260 million by 2015 if the low growth scenario holds up in the future. The high growth scenario adds another US$57 million in expenditure by 2015.

The low projection series for the West Bank indicates that the number of enrolled students will increase slightly until 2010, then decline and end up at a lower level in 2015 than was the case in 2002. By 2015 the number of students, costs

Table 24: Projected education indicators in the West Bank and Gaza Strip

		2002	2005	2010	2015
School age population Total (thousands)	Low	1 075	1 160	1 206	1 130
	High	1 075	1 172	1 290	1 361
School age population males (thousands)	Low	548	592	617	579
	High	548	598	660	698
School age population females (thousands)	Low	527	568	589	551
	High	527	574	630	664
Enrolled students (thousands)	Low	972	1 044	1 071	996
	High	972	1 055	1 153	1 215
Teachers required (thousands)	Low	34	36	37	34
	High	34	36	40	42
Recurrent cost (millions of US$)	Low	253	271	278	259
	High	253	274	300	316
Cumulative cost (millions of US$)	Low	253	524	803	1 061
	High	253	527	827	1 143

and teachers required is 5 percent lower than in 2002 due to the rapidly declining fertility rates. The high growth scenario for the West Bank projects 17 percent increase in the number of enrolled students, from 600 000 in 2002 to 705 000 in 2015. The numbers of required new teachers and costs change by the same per-

Table 25: Projected education indicators for the West Bank

		2002	2005	2010	2015
School age population total (thousands)	Low	661	700	705	644
	High	661	709	763	788
School age population males (thousands)	Low	338	358	361	330
	High	338	362	390	404
School age population females (thousands)	Low	324	342	344	314
	High	324	347	372	384
Enrolled students (thousands)	Low	600	631	627	569
	High	600	640	683	705
Teachers required (thousands)	Low	21	22	22	20
	High	21	22	24	24
Recurrent cost (millions of US$)	Low	156	164	163	148
	High	156	166	177	183
Cumulative cost (millions of US$)	Low	156	320	483	631
	High	156	322	500	683

Table 26: Projected education indicators for the Gaza Strip

		2002	2005	2010	2015
School age population total (thousands)	Low	661	700	705	644
	High	661	709	763	788
School age population males (thousands)	Low	338	358	361	330
	High	338	362	390	404
School age population females (thousands)	Low	324	342	344	314
	High	324	347	372	384
Enrolled students (thousands)	Low	600	631	627	569
	High	600	640	683	705
Teachers required (thousands)	Low	21	22	22	20
	High	21	22	24	24
Recurrent cost (millions of US$)	Low	156	164	163	148
	High	156	166	177	183
Cumulative cost (millions of US$)	Low	156	320	483	631
	High	156	322	500	683

centage, in other words, it is assumed that there will be no change in the level of services.

The projections for the Gaza Strip are substantially different from those of the West Bank, the low growth series project a 15 percent growth in the number of enrolled students, teachers and costs. The high growth scenario predicts a 37 percent increase for the same variables. This amounts to nearly 140 thousand students and 5 thousand teachers, the same numbers as for the high projections in the West Bank, even though the West Bank numbers are much higher in 2002.

Conclusions

The dynamics of population are one of the key factors in the socio-economic development of the West Bank and Gaza Strip. Growth in the immediate future is likely to be rapid. Even if the West Bank and Gaza Strip experience a radical decline in fertility levels, population growth will remain high because many young people are currently coming of reproductive age.

In general, population projections for the short term tend to provide reliable estimates. This is particularly true for cohorts that are already alive on the baseline year (1997). Only mortality and migration affect the size of these cohorts. Mortality tends to change slowly and the pattern of change (by age) is fairly predictable.

The most uncertain aspect of the projections is migration. Because the migration rates are very dependent on the development of the economic and political situation in the West Bank and Gaza Strip, it is difficult to predict what the effect of migration will be on the population of these territories. Other projections have assumed in-migration to the territories, while we have assumed zero net migration. It may be that the historic pattern of out-migration will continue, but it is almost impossible to predict it either in its totality or its sex- and age-specific characteristics.

Fertility affects the cohorts not yet born by 1997, namely those aged 0–18 years in 2015. For the years prior to 2015, the fertility assumptions only influence the size of the younger age populations. Variations in fertility could cause errors in the estimates since fertility levels are still high and, should the projected decline not occur, the projections may be inaccurate. In an extreme case, fertility could become stable at its currently high levels. If this were to happen, the 2015 population of the West Bank would be 3.11 million while that of the Gaza Strip would

be 2.13 million, yielding a total population of 5.42 million – 12 percent higher than our high estimate with fertility decline.

The alternative projections, a low and high growth projection, were made for the geographical areas of the West Bank and the Gaza Strip. The purpose of the alternatives is to demonstrate the implications of future changes in fertility and mortality. Our own preference is for the high growth scenario, since this appears to follow apparent trends in fertility in the West Bank and Gaza Strip. However, since the situation in the West Bank and Gaza Strip appears to have changed from a situation of stable high fertility to one of rapidly declining fertility, it may well be that the low series will prove more accurate.

The two scenarios show essentially similar population estimates in the very short term. There is a difference of only 145 000 persons between the lowest and highest scenario in 2002. The difference becomes larger with time. The minimum population estimate is 4.1 million and the maximum estimate is 4.6 million by 2015. Variations in fertility have a relatively large cumulative effect on the final estimate.

Notwithstanding the projected drop in fertility, the demand for social and economic services will increase dramatically during the projection period. With the exceptions of health and education, the rates of increase of the various social and economic indicators used are larger than that of population increase over the projection period. Moreover, increases in spending may be expected in order to effect necessary improvements in services, not simply to keep pace with population growth.

The geographical differences between the West Bank and the Gaza Strip are a consistent trend throughout the material. No matter which of the projections we look at, there is a clear tendency for higher population growth in the Gaza Strip than in the West Bank.

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The Future Size of the Palestinian Population of the West Bank and Gaza Strip

The Palestinian population of the West Bank and Gaza Strip has long had some of the highest growth rates in the world, due to a combination of high fertility and low mortality. Although fertility has recently declined, the age structure of the population implies that the brisk population growth will continue over the coming years. This report presents likely scenarios for this population growth, and traces some of its implications for the delivery of services to society.

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