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# A comparison of health indicators and social determinants of health between Israel and the Occupied Palestinian Territories

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## ABSTRACT

Despite the proximity and interconnections between Israel and the Occupied Palestinian Territories (oPt), great disparities persist in health status between these two regions. This disparity is seen in infant, child and maternal mortality, life expectancy, mortality rates for leading causes of death and measures of mental well-being. This paper compares health indicators between oPt and Israel and examines the social determinants of health that may be responsible for differences between them. Data on health indicators were obtained from publicly available publications or websites of the World Health Organization and The World Bank, as well as the database of the Global Burden of Disease Project of the Institute of Health Metrics and Evaluation. Data on the social determinants of health were obtained from publications and websites of the United Nations, the World Bank, the U.S. Central Intelligence Agency, Palestinian and Israeli government reports, reports from non-governmental organisations, peer-reviewed studies and news articles. The health disparities are due to a complex mix of factors involving economic conditions, food insecurity, environmental exposures, psychological trauma and stress, and access to health services, most of which can be related directly or indirectly to the Israeli military occupation of oPt.

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Israel; Occupied Palestinian Territories; risk factors; health; social determinants of health

## Introduction

Although no government in the world recognises Israeli sovereignty over the Occupied Palestinian Territories (oPt), Israel has controlled oPt or parts of it for more than 50 years.<sup>1</sup> The Israeli government implements military law in oPt. It controls the movement of people and goods within oPt and externally. It enacts and enforces economic and other regulations. Israel and oPt are linked in many ways: Economic activities in oPt exist within the context of and are highly dependent upon the Israeli economy (United Nations Conference on Trade and Development [UNCTAD] 2018). Israel and oPt use a common currency: the Israeli Shekel. Over 500,000 Israelis live in settlements in oPt. These settlements, considered illegal by the United Nations (United Nations, 2016) and most of the international community, are considered by the Israeli government to be a district of Israel. Over 100,000 Palestinian residents of oPt usually work in Israel or in Israeli settlements (Knell, 2020). The government of Israel asserts territorial claims to the West Bank by officially referring to it by the ancient Biblical names of 'Judea and Samaria', and has an agency for administering policies in oPt (Coordination of Government Activity in the Territories [COGAT], n.d.).<sup>2</sup>

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Living conditions in oPt are vastly different than those in Israel. Military law precludes basic civil rights and allows soldiers to arbitrarily arrest and detain residents. Whereas Israelis travel freely, domestically and internationally, movement of Palestinians in oPt is controlled with a system of checkpoints, road closures, travel permits and curfews in the West Bank and control of the borders of the Gaza strip. Unlike other residents of the West Bank, Palestinians living in East Jerusalem have Israeli residency status (but not citizenship), which can be revoked at any time. Their neighbourhoods are surrounded by Israeli settlements and are sometimes isolated by Israel's 'separation barrier'. Palestinians in East Jerusalem face continued house demolitions, evictions, denial of building permits and police surveillance (UN Office for Coordination of Humanitarian Affairs [UNOCHA] 2019). On average oPt residents are worse off economically and have poorer health compared to Israelis. Israelis have universal access to a modern healthcare system; whereas Palestinians face numerous obstacles in accessing healthcare. These differences have grown over the period in which Israel has controlled oPt and exist in the context of the economic and political domination of oPt by Israel.

This paper views Israel and oPt as a single geographical and political region and examines the health indicators, risk factors, and social determinants of health among the inhabitants of the region. Social determinants of health have been categorised as those describing (1) the overall social and political context of a society, such as the healthcare system, (2) the relation of the individual to societal structures, such as employment status, and (3) the 'intermediary' factors that are biological or psychological stressors on the individual, such as environmental exposures (World Health Organization [WHO] 2010) This paper focuses on (1) risk factors that are known to increase a person's chance of contracting or dying from specific diseases. These are primarily intermediary social determinants, but also include determinants such as income and unemployment which have been related to specific health outcomes, (2) behavioural risk factors, such as smoking and lack of physical exercise, which WHO considers a subcategory of intermediary social determinants of health and (3) Access to healthcare and the economic and political relationship of Israel and oPt, aspects which fall into the first two WHO categories of social determinants (WHO, 2010).

## Methods

Using publicly available data bases, the following health indicators were examined: life expectancy, infant, child and maternal mortality, and disease-specific age standardised mortality rates. Tests for significant differences in infant, child and maternal mortality, between Israel and oPt were done using standard hypothesis testing for the difference between two population proportions (Daniel, 1974). The role of specific risk factors in causing disease-specific deaths was assessed using estimates of the population attributable fraction (PAF), provided by the Institute of Health Metrics and Evaluation (IHME) Global Burden of Disease project (GBD, 2017 Risk Factor Collaborators, 2017). The PAF for a disease and risk factor is defined as the fraction of deaths due to the disease that would be prevented if the risk factor is eliminated. PAF for a disease and risk factor is calculated based on the relative risk vs. exposure level for the disease, and the distribution of exposures in the population (Ezzati et al., 2002). Because most diseases are multifactorial, the sum of PAFs for a given disease and different risk factors may be greater than 100%. The GBD data base provides confidence limits on its estimates of PAF, determined from the statistical uncertainties in exposure values and relative risk estimates. Statistically significant differences ( $p < 0.05$ ) in PAF values were identified by examining whether these confidence limits overlap (Schenker & Gentleman, 2012). The overlap test is conservative, i.e. in some cases, even where the intervals overlap, the difference between the point values is statistically significant ( $p < 0.05$ ). Values of PAF are considered valid only when there exist credible studies establishing a causative relationship between a risk factor and a disease, which is assessed by IHME using criteria of the World Cancer Research Fund (WCRF) for 'convincing evidence' or 'probably evidence' (GBD, 2016 Disease and Injury Incidence and Prevalence Collaborators, 2017). In cases where such studies are not available, the GBD database indicates 0% for

the value of PAF. However, in this paper, to indicate that the lack of a value of PAF may be due to either a lack of knowledge or a lack of effect, the cell in the corresponding table is left blank.

Data on social determinants of health were obtained from reports of World Bank, United Nations, U.S. Central Intelligence Agency, reports from Palestinian and Israeli governments and non-governmental organisations, peer-reviewed studies and news articles. For each determinant, an effort was made to obtain parallel data for oPt and Israel; where this was not possible, the determinant is discussed in general terms as it applies to oPt and Israel.

## Results

### Health indicators

#### Life expectancy and mortality rates

Although life expectancy has increased in both Israel and oPt since 1980, a disparity of 8 - 10 years has persisted. (Table 1) (The World Bank, 2019). In 2017 the infant mortality rate was about six times higher in oPt compared to Israel. Disparities also persist in child and maternal mortality (Tables 2 and 3) (United Nations Inter-agency Group for Child Mortality Estimation, 2018; WHO, 2014). The differences in infant mortality, child mortality and maternal mortality, between Israel and oPt are highly statistically significant ( $p < 0.0001$ ). Except for lung cancer, age-standardised mortality rates of 20 leading causes of disease are greater in oPt compared to Israel (Table 4) (IHME, 2019a). Although, consanguineous marriage is more frequent in oPt than in Israel and is a known risk factor for congenital abnormalities leading to infant death (Pedersen, 2002), this does not account for the disparity in infant mortality between Israel and oPt, since a greater percentage of infant deaths are due to congenital disease in Israel than in oPt (30.7% vs. 22.5%): (data from 2017; IHME, 2019a).

#### Population attributable fractions for diseases and risks

**Environmental exposures.** For leading causes of death, except for lung cancer, PAFs due to environmental risks were greater in oPt than in Israel. For six diseases (Ischemic Heart Disease, Stroke, Diabetes, Lung Cancer, Lower Respiratory Infection, COPD), particulate air pollution accounted for a greater fraction of deaths in oPt compared to Israel. Lead exposure accounted for between 1.9 and 2.6 times the fraction of deaths in oPt vs. Israel for ischemic heart disease, stroke and chronic kidney disease. (Table 5) (IHME, 2019b). Although diarrhea and lower respiratory infection (LRI) account for an overall smaller fraction of deaths in oPt compared to Israel (data not shown), the PAF for LRI and unsafe water source was greater in oPt (73.6% vs. 3.8%). The PAF for LRI and lack of access to a handwashing facility is 4.8% in oPt vs. 0.6% in Israel (IHME, 2019b).

**Dietary factors.** Except for chronic kidney disease, PAFs due to dietary factors combined were greater in oPt than in Israel. The PAFs for sixteen pairs of dietary deficiency and disease, were greater in oPt compared to Israel. For most dietary risks involving an excess of a nutrient, except for trans fatty acids, the PAF was greater in Israel compared to oPt (Table 6; IHME, 2019b). For diarrheal

**Table 1.** Life expectancy in Israel and the Occupied Palestinian Territories (oPt).

Year	Israel	oPt	Difference
1990	76.6	68.1	8.5
2000	79.0	70.8	8.2
2010	81.6	72.4	9.2
2015	82.1	73.3	8.8
2016	82.4	73.5	8.9

Source: The World Bank, 2019.

**Table 2.** Infant and child mortality rates in Israel and the Occupied Palestinian Territories (per 1000)\*.

Year	Infant Mortality		<5 y Mortality		5–14 y Mortality	
	Israel	oPt	Israel	oPt	Israel	oPt
1990	9.7	35.7	9.7	44.6	2.0	no data
2000	5.6	25.1	5.6	30.2	1.5	4.9
2010	3.7	19.9	3.8	23.5	1.1	3.9
2015	3.0	18.6	3.0	21.9	1.0	3.4
2016	2.9	18.3	2.9	21.4	1.0	3.1
2017	2.9	17.9	2.9	20.9	0.9	3.2

Source: United Nations Inter-agency for Child Mortality Estimation, 2018.

\*all difference between Israel and oPt are statistically significant ( $p < 0.0001$ ).

**Table 3.** Maternal mortality rates in Israel and oPt (per 100,000)\*.

Year	Israel	oPt
1990	12	96
1995	10	71
2000	9	59
2005	7	59
2013	2	47

\*all differences between Israel and oPt are statistically significant ( $p < 0.0001$ ).

Source: WHO, 2014.

disease the PAF for ‘Child and Maternal Nutrition’ (CMN) was 40.8% in oPt vs. 2.3% in Israel. For LRI the PAF for CMN was 8.5% in oPt vs. 0.5% in Israel (IHME, 2019b).

**Behavioural risks.** For all diseases examined, the PAF for smoking was less in oPt compared to Israel. For the five diseases where estimates were available, the PAF for high body mass index (BMI) was greater in oPt compared to Israel. Low physical activity accounted for approximately an equal percentage of deaths in Israel and oPt, for ischemic heart disease, diabetes and colorectal cancer, whereas for breast cancer and stroke the PAF for this risk factor was greater in oPt. Alcohol use was protective against ischemic heart disease and diabetes in both Israel and oPt. For other diseases, the PAF for alcohol use was greater in Israel compared to oPt (Table 7; IHME, 2019b).

**Table 4.** Mortality rate, age-standardised, per 100,000, in Israel and the Occupied Palestinian Territories (oPt) for 20 leading causes of death in the oPt (2017).

	Israel	oPt	Ratio
Ischemic heart disease	47.7	153.0*	3.2
Stroke	23.9	81.6*	3.4
Alzheimer’s Disease	34.0	43.3*	1.3
Diabetes	17.4	37.9*	2.2
Chronic Kidney Disease	17.7	28.5*	1.6
Lower respiratory infection	17.4	22.6*	1.3
Neonatal disorders	2.9	15.8*	5.5
Lung cancer	47.7	14.9*	0.3
Hypertensive	1.7	13.0*	7.6
Colorectal cancer	14.0	12.6	0.9
COPD	12.3	12.1	1.0
Breast cancer	10.8	10.2	0.9
Cirrhosis	6.2	9.2*	1.5
Road injuries	6.3	8.6*	1.4
Congenital birth defects	2.7	7.6*	2.8
Leukemia	6.1	6.1	1.0
Brain and nervous system cancer	4.6	6.0*	1.3
Liver cancer	3.3	5.9*	1.8
Interpersonal violence	2.1	5.8	2.8
Stomach cancer	5.8	5.4	0.9

\*statistically significant difference between Israel and oPt ( $p < 0.05$ ).

Source: IHME, 2019a.

**Table 5.** Percent of deaths attributed to environmental risk factors, in Israel and Occupied Palestinian Territories.

Cause of death	All environmental and occupational risks combined		Ambient particulate air pollution		Ambient ozone		Lead exposure		Second hand smoke		Occupational exposures	
	Israel	oPt	Israel	oPt	Israel	oPt	Israel	oPt	Israel	oPt	Israel	oPt
Ischemic Heart Disease	12.2	20.1*	10.1	15.3	–	–	2.2	5.4	2.0	4.8*	–	–
Stroke	8.6	14.2	6.7	9.4	–	–	2.0	5.1	1.2	3.0*	–	–
Diabetes	24.5	27.5	24.3	27.1	–	–	–	–	4.0	10.9	–	–
Chronic Kidney Disease	2.2	4.2	–	–	–	–	2.2	4.2	–	–	–	–
Lower Resp Infection	19.4	28.9	18.7	25.0	–	–	–	–	4.2	7.0	–	–
Neonatal disorders	–	–	–	–	–	–	–	–	–	–	15.4	6.7*
Lung cancer	29.2	28.9	13.2	17.3	–	–	–	–	3.7	3.6	–	–
Hypertensive heart disease	4.0	9.9	–	–	–	–	4.0	9.9	1.4	4.1	–	–
COPD	39.7	44.2	20.8	24.6	17.7	17.6	–	–	4.3	6.4	7.3	9.9
Breast cancer	–	–	–	–	–	–	–	–	1.4	4.1	–	–
Road injury	8.9	29.5*	–	–	–	–	–	–	–	–	8.9	29.5*
Leukemia	0.4	0.8	–	–	–	–	–	–	–	–	0.4	0.8

\*Statistically significant difference between oPt and Israel ( $p < 0.05$ ).

Source: IHME, 2019b.

**Table 6.** Percent of deaths attributed to dietary risks, in Israel and oPt.

		Cause of Death						
		Ischemic Heart Disease	Stroke	Diabetes	Chronic Kidney Disease	Lung cancer	Colorectal Cancer	Hypertensive Heart Disease
All dietary factors	Israel	53.4	28.2	24.7	8.2	5.0	22.8	15.4
	oPt	72.0*	42.6*	34.9*	4.3	11.9	33.7	9.6
Low in fruits	Israel	4.7	6.5	3.0	–	5.1	–	–
	oPt	12.3	19.3	9.2	–	11.9	–	–
Low in vegetables	Israel	3.4	1.7	–	–	–	–	–
	oPt	14.1	8.0	–	–	–	–	–
Low in whole grains	Israel	21.0	15.3	15.9	–	–	–	–
	oPt	24.3	21.0	20.4	–	–	–	–
Low in fibre	Israel	5.8	–	–	–	–	8.0	–
	oPt	8.8	–	–	–	–	11.4	–
Low in seafood	Israel	8.7	–	–	–	–	–	–
	oPt	19.3*	–	–	–	–	–	–
Low in polyunsaturated fats-	Israel	3.2	–	–	–	–	–	–
	oPt	11.1	–	–	–	–	–	–
Low in nuts and seeds	Israel	14.1	–	–	5.1	–	–	–
	oPt	24.5	–	–	10.6	–	–	–
Low in milk	Israel	–	–	–	–	–	11.4	–
	oPt	–	–	–	–	–	16.5	–
Low in legumes	Israel	4.4	–	–	–	–	–	–
	oPt	7.2	–	–	–	–	–	–
Low in calcium	Israel	–	–	–	–	–	14.5	–
	oPt	–	–	–	–	–	25.3	–
High in sugar sweetened beverages	Israel	2.2	–	2.3	–	–	–	–
	oPt	0.4	–	0.4*	–	–	–	–
High in sodium	Israel	8.6	–	8.0	8.2	–	–	15.4
	oPt	5.5	–	5.2	4.3	–	–	9.6
High in transfatty acids	Israel	0.5	–	–	–	–	–	–
	oPt	2.1	–	–	–	–	–	–
High in red meat	Israel	–	–	–	–	–	0.64	–
	oPt	–	–	–	–	–	0.0005*	–
High in processed meat	Israel	0.8	–	–	0.7	–	0.5	–
	oPt	0.3	–	–	0.02	–	0.01*	–

\*Statistically significant difference between oPt and Israel ( $p < 0.05$ ).

Source: IHME, 2019b.

## Social determinants of health

### Economic factors

In 2017, per capita Gross Domestic Product in Israel was \$40,270 compared to \$3,095 in oPt; the unemployment rate in oPt was 27.9% compared to 4.2% in Israel. Statistics from 2017 and 2018 indicate a 46.9% unemployment rate for youth (age 15–24) compared to 7.3% in Israel (Central Intelligence Agency (CIA), n.d.). In 2017 the deep poverty rate (unable to meet minimum requirements for food, clothing, housing) in Gaza was 33.7% and the unemployment rate was 52% (up from 29% in 2011) (Palestinian Central Bureau of Statistics, 2018a).

### Nutrition

In 2017 the prevalence of severe food insecurity in oPt was over 8 times that in Israel (9.5% vs. 1.1%) (Food and Agricultural Organization of the United Nations, 2017). Malnutrition is a greater problem in Gaza compared to the West Bank. For example, a report by UNICEF (2010) stated that in 2006, the prevalence of childhood stunting was 8% in the West Bank compared to 13% in Gaza; in 2010 the rate of childhood anemia, 6 months to 59 months was 25% in Gaza compared to 13.4% in the West Bank (Palestinian Central Bureau of Statistics, 2013).

**Table 7.** Percent of deaths attributed to behavioural risk factors, in Israel and Occupied Palestinian Territories.

Cause of death	Smoking		High BMI		Low Physical Activity		Alcohol Use	
	Israel	oPt	Israel	oPt	Israel	oPt	Israel	oPt
Ischemic Heart Disease	15.7	15.5	16.9	26.6	12.0	11.8	-5.1	-0.5
Stroke	10.8	8.1	14.1	23.9	6.2	8.9	1.5	0.2
Alzheimer's Disease	14.4	6.6	14.9	15.8	-	-	-	-
Diabetes	7.4	5.7	35.8	50.6	3.6	3.8	-3.4	-0.4
Chronic Kidney Disease	-	-	29.0	37.3	-	-	-	-
Lower Respiratory Infection	16.4	10.1	-	-	-	-	1.2	0.03
Neonatal disorders	-	-	-	-	-	-	-	-
Lung cancer	68.2	45.4*	-	-	-	-	-	-
Hypertensive heart disease	-	-	41.4	49.3	-	-	7.8	0.009*
Colorectal cancer	13.1	7.4	9.1	10	4.1	4.0	3.6	0.2
COPD	41.5	32.4	-	-	-	-	-	-
Breast cancer	4.7	0.4	5.3	2.7	1.9	4.0	6.9	0.3
Cirrhosis	-	-	-	-	-	-	32.9	5.9
Road injury	0.7	0.4	-	-	-	-	5.4	0.4
Leukemia	25.6	11.5	8.1	7.6	-	-	-	-
Liver cancer	18.3	9.5	16.2	16.8	-	-	29.2	9.9*
Interpersonal violence	0.08	0.02*	-	-	-	-	11.7	0.5*
Stomach cancer	17.9	9.4*	-	-	-	-	-	-

\*Statistically significant difference between oPt and Israel ( $p < 0.05$ ).

Source: IHME, 2019b.

### Environmental factors

In 2018, in Gaza, an estimated one million women and one million children were at health risk 'associated with poor water quality, poor wastewater collection and treatment, lack of storm water infrastructure and lack of proper hygiene practices' (UNOCHA, 2018a, p. 22). In 2015 100% of the Israeli population had access to an improved water source (i.e. protected from external contamination); in the West Bank and Gaza this percentage was 41.6% (CIA, n.d.). In 2015, improved sanitation facilities (i.e. those that hygienically separate human excreta from human contact) were available to 100% of the Israeli population, whereas in oPt, 7% were lacking in these facilities (CIA, n.d.). More than 25% of Gazans live in areas without adequate sewage treatment infrastructure due to insufficient treatment plant capacity, lack of spare parts for repairs, and inadequate electric power to operate the plants. (Efron et al., 2018).

There is a paucity of published air pollution measurements in oPt; the GBD data base relies on (unpublished) satellite measurements to compute population attributable risks for air pollutants (Shaddick et al., 2018). Among Israeli and Palestinian cities, Heo et al. (2017) found a 60% higher contribution of mobile sources to fine particulate levels in East Jerusalem compared to West Jerusalem, and the highest contribution of biomass burning to fine particulate levels in Nablus.

In 2015, the 252 Israeli industrial facilities, in industrial zones in the West Bank (Applied Research Institute Jerusalem [ARIJ], 2015) were exempt from many Israeli environmental regulations, and some pollute nearby Palestinian areas. Lack of regulatory enforcement has resulted in dumping of construction debris and sewage from Israeli settlements into Palestinian residential areas (Rinat, 2014). Health effects of this pollution are suggested by two studies that showed greater prevalence of markers of DNA damage in blood samples taken from people living in Palestinian areas subject to this pollution compared to samples obtained in Palestinian areas further from settlements (Hammad & Qumsiyeh, 2013; Khalif & Qumsiyeh, 2017)

Housing is considerably more crowded in oPt compared to Israel. In 2017 the average number of persons per room was 1.3 in the West Bank and 1.6 in Gaza. In Israel, in 2014, it was 0.9. In 2017, 7% of households in oPt (5% in West Bank and 12% in Gaza) lived in units with more than 3 persons per room. In Israel, in 2014, this percentage was 1%. (Cohen, 2017; Palestinian Central Bureau of Statistics, 2018b). Substandard housing conditions, such as crowding, dampness, and insufficient ventilation are especially found in refugee camps, which house approximately 800,000 Palestinians in oPt



(United Nations Relief and Works Agency [UNRWA], n.d.). Al-Khatib and Tabakhna (2006) found statistically significant relationships ( $p < 0.02$ ) between poor housing conditions (e.g. dampness, mould and overcrowding) and the common cold, cough, tonsillitis, and ear infections in the Jalazone refugee camp on the West Bank. Abu Mourad (2004) found statistically significant relationships between housing conditions in a Gaza refugee camp and intestinal parasites and diarrhoea.

### *Physical inactivity*

Tesler et al. (2019), found that among a sample of Israeli adolescents, 16% of the Jews and 20% of the Arabs did not meet the guideline of 60 min/day of physical activity (PA), whereas Ghrayeb et al. (2013) found that approximately 90% of a sample of adolescents in the West Bank did not meet this guideline. Merom et al. (2012), in Palestinian-Israeli Jerusalem, found Israeli men had a slightly greater percentage of insufficient PA compared to oPt men, whereas Palestinian women were more than twice as likely to have insufficient PA.

### *Psychological and psychosocial factors*

Several studies have examined the effects of conditions in oPt on psychological health and social functioning. McNeely et al. (2014), surveying 508 Palestinians in the West Bank, Gaza and East Jerusalem found that exposure to 'political violence' and movement restriction was significantly ( $p < 0.05$ ) associated with depression, symptoms of trauma-related stress, and feelings of hopelessness. In this study, 'political violence' was defined by 'whether the respondent was ever injured due to the conflict; imprisoned due to the conflict; had heard or experienced the effects of a bomb; was hit, kicked, shot at or verbally abused by Israelis; had their home raided by Israeli forces; or witnessed their father or someone else close to them humiliated by Israeli forces.' These authors also found that 42% of the people surveyed reported that their physical health limited their 'ability to meet ... other demands in ... life such as financial, educational or family responsibilities', and found statistically significant associations between these limitations and (1) Loss or injury of a parent in violence due to the Israeli-Palestinian conflict, (2) Perception of threats to life or security, and (3) Unemployment.

A study by Al-Krenawi et al. (2009), of Jewish-Israeli and, Gazan adolescents, found significantly greater exposure to 'political violence' ( $p < 0.05$ ) as well as greater problems in social functioning and greater mental health symptoms among the Gazans ( $p < 0.001$ ). Ayer et al. (2017) reviewed 56 articles relating to psychological aspects of the Israeli-Palestinian conflict and concluded that Palestinians were at higher risk of experiencing psychological distress as a result of the conflict, compared to Jewish Israelis. Exposure to political violence and trauma for residents of oPt vs. Israel can also be found in the number of deaths categorised in the Global Burden of Disease database as due to 'conflict and terrorism'. In 2017 the rate of such deaths was 2.64 per 100,000 in oPt and 0.23 per 100,000 in Israel, with a similar ratio of these rates for the years 2008–2016 (IHME, 2019b).

### *Disparities in access to health services*

Per capita expenditures on health as well as physician, nurse and hospital density are substantially less in oPt compared to Israel (Table 8; CIA, n.d.; WHO, 2019a; The World Bank, 2016; WHOROEM, n.d.; WHO, 2016; WHO Regional Office for the Eastern Mediterranean [WHOROEM], 2016). Because of limited access to health services, patients in Gaza and West Bank are often referred to hospitals outside oPt. However, permission to travel to these hospitals is often denied. In Gaza, patient travel permit approvals declined from 92.5% in 2012, to 61.2% in 2016–54% in 2017. In the first half of 2018, 10% of the permits were outright declined whereas 32% were delayed with no definitive response to the patient's application.' (UNOCHA, 2018b). In the West Bank, in 2016, 22.6% of travel permits for patients and their companions were denied or delayed (WHOROEM, 2017). Healthcare facilities in oPt often face shortages of medicines and supplies. In Gaza in 2016, on average, 30% of essential drugs and 40% of required medical disposables were at zero

**Table 8.** Parameters of healthcare delivery in Israel and oPt\*.

	Israel	oPt
Per capital health expenditure (2017)	\$3145 <sup>1</sup>	\$306 <sup>2</sup>
Physicians per 1000 inhabitants <sup>3</sup>	3.5 (2017)	1.5 (West Bank, 2017); 2.8 (Gaza, 2018)
Nursing and midwifery personnel per 1000 inhabitants (2017)	6.1 <sup>4</sup>	2.6 <sup>5</sup>
Hospital beds per 1000 inhabitants <sup>3</sup>	3 (2017)	1.3 (2018)

\*Data year is indicated in parenthesis. Sources: (1) WHO, 2019a; (2) WHOROEM, n.d.; (3) CIA, n.d.; (4) WHO, 2016; (5) WHOROEM, 2016.

stock (WHOROEM, 2016). In Gaza, in 2018, WHO reported that 40% of medications were totally depleted, with an additional 10% running out within a month (UNOCHA, 2018c).

Other factors affecting the access to healthcare for Palestinians in oPt are limitations on ambulance movement, high cost of medications, and the underfunding of mobile health clinics (UNOCHA, 2018d). A survey conducted in 2003 found that high costs prevented one third of the oPt population, in the West Bank and Gaza, from accessing health services (Mataria et al., 2009).

Access to healthcare is limited by movement restrictions. In 2017, there were over 700 road obstacles controlling Palestinian movement on the West Bank, including 140 fully or occasionally staffed checkpoints, 165 unstaffed, often closed, road gates and about 400 other types of road obstructions (UNOCHA, 2018c). Movement is also restricted by 'closures barring travel both between and outside the territories, internal closures that bar Palestinians from leaving their town, village or refugee camp and curfews that bar Palestinians from leaving their homes, sometimes for days at a time' (McNeely et al., 2018). Movement restrictions have been associated with decrements in self-rated health status (McNeely et al., 2018) and drops in prenatal health care visits and childhood vaccinations (Leone et al., 2019). A survey conducted among residents of the northern West Bank in 2004 found that the separation barrier erected by Israel in the West Bank adversely impacted access to health and education services (Qato et al., 2007).

Access to health services in oPt is also impeded by 'health attacks' defined by WHO, defined as acts of 'verbal or physical violence, or other psychological violence or obstruction that interfere with the availability, access, and delivery of curative and/or preventive health services.' In 2017 there were 111 such attacks; in 2018 there were 432 (WHOROEM, 2018; WHOROEM, 2019).

## Discussion

By almost every measure, health status in oPt is worse compared to Israel. The disparities in health can be attributed to: (1) The overall lower economic level of oPt compared to Israel, (2) Nutritional deficiencies, (3) Environmental exposures, (4) Lesser access to health and medical services in oPt vs. Israel, (5) The stresses of living under military occupation.

The link between economic conditions and population health is well known. Economic distress leads to food insecurity and causes health decrements in other ways: Unemployment impairs health, even after controlling for other socioeconomic factors (Wilson & Walker, 1993). Low income leads to difficulty in obtaining health services, poor housing conditions and psychological stress. Economic growth in oPt has been thwarted by the military occupation, which created an economic dependency on Israel, raised prices on imported goods, and blocked the development of trade relations between oPt and surrounding countries (Kubursi & Naqib, 2008; Samhouri, 2018; UNCTAD, 2018). This situation was exacerbated by the 1994 Paris Protocol adopted by Israel and the Palestine Liberation Organization, which formalised asymmetric trade relations between oPt and Israel, reduced employment of residents of oPt in Israel and allowed frequent closures of portals between Israel and oPt (Arnon & Weinblatt, 2001). According to a 2018 report by the World Bank, 'the economy [of oPt] has been restrained for more than two decades by restrictions on movement, access, and

trade that have kept investment levels extremely low and resulted in deindustrialization' (The World Bank, 2018, p. 8).

The economic situation is particularly bleak in Gaza. Since 2007, Israel has severely restricted the passage of people and goods into and out of Gaza, which has reduced the market for Gazan goods, and prevented critical inputs of raw materials for factories and businesses. In 2011, UNOCHA reported that imports to Gaza were 40% of pre-2007 levels and exports were tightly restricted (UNOCHA, 2011). There are frequent power outages, which compromise sewage treatment, hospital operations and household survival. Between 2017 and 2018, the supply of electricity was restricted to an average of 4–5 h/day (UNCTAD, 2019).

The higher PAFs for nutritional deficiencies in oPt, across many food categories, are likely related to food insecurity that exists in oPt, although inadequate education on nutrition and access to appropriate food sources may also play a role. Studies have found that food insecurity is associated with inadequate consumption of nutrient rich foods such as fruits and vegetables (Araujo et al., 2018). Higher BMI, associated with higher PAFs in oPt compared to Israel for most diseases, has also been found to be greater in households with food insecurity (Lohman et al., 2018). In contrast to the nutritional deficiencies, excess consumption of sugary beverages and foods high in sodium present a higher risk in Israel compared to oPt (Table 6) depending on the disease.

Environmental factors contribute to greater disease burdens in oPt compared to Israel, especially with respect to particulate air pollution, lead exposure and water quality. The higher PAF, in oPt compared to Israel, for deaths due to diarrheal disease and lower respiratory infection is consistent with the poor water quality in oPt compared to Israel, a problem which is especially severe in Gaza. Water quality may also affect health more generally. Poor water quality and lack of proper sanitation has been associated with childhood stunting, with a possible mechanism being repeated bouts of diarrhea impairing adequate nutrition (Millward, 2017). This may be compounded by food insecurity. Poor water quality may also have economic effects e.g. due to family expenditures for bottled water, and increased time need to obtain adequate water (Van Minh & Nguyen-Viet, 2011).

Many studies have found relationships between inadequate housing and poor health (United States Department of Health and Human Services, 2009). Studies reviewed in this paper indicate that in refugee camps, housing many Palestinians in oPt, poor housing conditions have impaired health. Beyond refugee camps, an overall inadequacy of housing in oPt is highlighted by a 2014 report of the Palestinian Ministry of Housing, which found that almost 300,000 Palestinians in 500 communities are 'witnessing continuous threats of eviction, home demolition, replacement, various forms of development restrictions and shelter inadequacy' (State of Palestine, 2014, p. 46). Between 2016 and 2018, in area C of the West Bank (under complete Israeli control), 98% of Palestinian construction permit application were denied between 2016 and 2018 (Shazef, 2020). The lack of opportunities for formal permitted housing development has resulted in 'the transformation of many Palestinian Neighbourhoods into informal areas with substandard services, overcrowding' and 'demolition threats by the Israeli Occupation'. (State of Palestine, 2014, p.46). Crowded housing conditions are likely a factor contributing to higher PAFs associated with second-hand tobacco smoke in oPt vs. Israel (Table 5).

Enforcement of environmental regulations by the Palestinian Authority is often weak and ineffective. This is further complicated by the fact that there is much industrial development close to residential areas (ARIJ, 2015; Karlstedt et al., 2014)

Behavioural factors appear to play a secondary role in health differences between oPt and Israel. Despite the relatively high prevalence of smoking among Palestinian males (WHO, 2019b), the PAF for smoking and ischemic heart disease is similar in oPt and Israel and somewhat greater in Israel for other diseases (Table 5). This is likely due to high prevalence of smoking among males in both countries and the extremely low prevalence of smoking among females in oPt (WHO, 2019a). Checkpoints and Israeli settlements may impede outdoor physical activity due to harassment and movement restrictions (Collier & Kienzler, 2018). Furthermore, in oPt there are insufficient facilities for participating in sports, particularly for women (Collier & Kienzler, 2018). Among Palestinians,

sports participation may be less culturally acceptable for women compared to men (Al Sabbah et al., 2007).

Several studies have linked psychological stress with adverse health outcomes (Eriksson et al., 2014; Gomez-Bernal et al., 2018; Kivimäki & Steptoe, 2018). It is thus likely that the higher levels of psychological stress experienced by Palestinians living in oPt, compared to Israelis, contribute to their lower health status. Ayer et al. (2017) suggest that Palestinians may be a particularly vulnerable to traumatic stress, citing studies finding that individuals who experience discrimination or social inequality, or who live in impoverished conditions with a lack of access to resources and services, are at elevated risk for mental health problems. Contributing to Palestinians' high risk of psychological distress is exposure to a combination of trauma and humiliation. Barber et al. (2016) found that 'persistent humiliation', including verbal abuse and witnessing others being humiliated, over many years, was associated with poorer psychological and social functioning, as compared to more episodic exposure to traumatic events. For most Israelis there is little or no parallel to these experiences. Palestinians also experience psychological distress due to various restrictions and constraints in their environment. Barber et al. (2014) studying feelings of 'not doing well' among 68 adults in Gaza, West Bank and East Jerusalem found a principle role for feelings, perceptions and constraints in the 'political domain', e.g. involving movement restrictions, freedom of expression, political rights, stability of institutions, justice in the courts, government functioning, etc. Political factors had a strong effect on people's psychological functioning and well-being, and often interacted, in a negative way, with social functioning regarding family, employment, religion and personal image. (Barber et al., 2014).

### **Healthcare in oPt and Israel**

The poorer access to health services in oPt compared Israel is compounded by a comparatively weak healthcare system, which is fragmented geographically and administratively, and lacks a viable health information system (Phillimore et al., 2013). In 2014, a collaboration of WHO, the Palestinian Ministry of Health and other health organisations found that:

The Israeli blockade [of Gaza is] severely inhibiting health sector development leading to limited quality of health service provision, severe deterioration of medical equipment and inability to appropriately maintain equipment in the absence of spare parts, and reduced tertiary sector capacity - leading to costly referrals of patients outside of Gaza, lack of training opportunities for medical staff and more.

The situation is further complicated by 'a fragmented health sector with multiple partners, large components depending on long term donor support' (Health Cluster in the Occupied Palestinian Territory, 2014, p. 4).

In contrast, according to the Organisation for Economic Cooperation and Development (OECD), Israel has, among OECD countries, 'one of the most enviable healthcare systems' which is 'particularly good at identifying chronic diseases amongst patients early and supporting those living with a health condition to avoid an unnecessary hospital visit' (OECD, 2012, pp. 15–16). The Israeli health care system provides universal coverage and provides a basket of services, including hospitalisation, drugs, surgery, outpatient therapy, mental health services, etc. which according to law will be provided 'within a reasonable period and at a reasonable distance from the member's home' (State of Israel Ministry of Health, 2019). Included in this system is a 'network of community based primary care and preventive maternal and child health clinics [and] universal school-based health services' (Rubin et al., 2017, p. 2515). Nevertheless, within the Israeli population, there are substantial disparities in health status, according to ethnicity, religion and socioeconomic status (Clarfield et al., 2017). Israeli Jews tend to have better health status compared to Israeli Arabs (who are mostly Palestinian), who comprise approximately 20% of the Israeli population (Muhsen et al., 2017). Because of such disparities within Israel, disparities in health status between Palestinians in oPt and Israeli Jews are generally greater than those described in this paper.

The difference in public health infrastructure between oPt and Israel is seen comparing their programmes in nutrition: In oPt, services, activities and policies regarding child nutrition have been described as ‘not institutionalized and thus not sustainable’, ‘rarely evaluated’ and ‘lack[ing] in material and financial resources’ (State of Palestine Ministry of Health, 2012, p. 17); whereas in Israel there are national policies and programs to improve child and adult nutrition (State of Israel Ministry of Health, 2020).

The health infrastructures of oPt and Israel can also be compared regarding medical education and research. In oPt there are several medical schools, university health science departments, a Ministry of Health and a National Institute of Public Health, where research is done. However, there is little coordination of these efforts. According to a survey of experts and policymakers, the health research system in oPt is ‘ineffective and inefficient’, with ‘unsupportive leadership’ (AlKhalidi et al., 2018a, p. 8, 9) and without an overall strategy (AlKhalidi et al., 2018b). In contrast, Israel has a highly developed research infrastructure with several institutes, and a Ministry of Health ‘that provides national leadership in a broad range of public health domains including food safety, control of communicable diseases, screening, health promotion, environmental health and epidemiological monitoring’ (Rosen et al., 2015, p. 107).

The military occupation of oPt hinders efforts to develop the health care and health research systems in oPt by stunting economic development, limiting local autonomy, creating an uncertain environment for planning, making it difficult to obtain equipment and supplies, limiting opportunities for training staff and students (International Federation of Medical Student Associations, 2017; Shahawy & Diamond, 2016; WHOROEM, 2019) and blocking professional staff recruitment (Feder et al., 2019). In addition, the ‘absence of any of control by the Palestinian National Authority over water, land, and environment, has made a public-health approach to health-system development difficult, if not impossible’ (Giacaman et al., 2009, p. 846).

### ***Health disparities in the context of military occupation***

The health situation in oPt bares similarities to other low-income and underdeveloped regions where factors such as income, nutrition, housing, environmental degradation, access to health care, are major social determinants of health, intersecting and reinforcing each other. The military occupation superimposes other specific health-related factors e.g. movement restrictions, fragmentation of healthcare and public health systems, traumatic exposure to political violence, stress and humiliation.

According to an analysis by WHOROEM of conflicts in the Middle East, the Social Determinants of Health of most importance arising out of conflicts are: (1) The loss of human rights (including losses of freedom of expression, dignity and livelihood), and (2) breaches of medical neutrality (leaving one of the groups in the conflict disadvantaged with respect to healthcare). Both aspects strongly apply to the situation in oPt (WHOROEM, 2008).

In recent years the concept of ‘Social Determinants of Health’ has been critiqued as focusing on behavioural and biological factors, rather than examining the underlying structural and political antecedents of them (Geiger, 2017; Marmot, 2017). From this perspective, many of the risk factors and determinants which drive health disparities between Israel and oPt, can be looked at as intermediary factors between the occupation and colonisation of oPt on the one hand, and the health outcomes in the population on the other.

### ***Limitations of this study***

The comparison of health outcomes between Israel and Palestine relies on data collecting by different organisations which have different procedures including those for data checking and quality control. Mortality data from oPt has been reported to be inaccurate compared to other countries (Massad

et al., 2019). Some of the comparisons of social determinants utilise studies of small sample populations, which may not represent the larger regions.

The estimates PAF are inexact because of uncertainties in the inputs required for its calculation: the distribution of exposures in the population and the relative risk as a function of exposure. Because of this many of the differences in PAF between Israel and oPt are not statistically significant. In addition, as discussed in the introduction, no estimates of PAF are provided for many causes of death.

## Summary and conclusion

Key health indicators are generally much worse in oPt compared to Israel. Disparities are seen in life expectancy, infant, child and maternal mortality, age standardised mortality rates for leading causes of death, and measures of psychological and social well-being. The reasons for these disparities are a complex mix of economic, nutritional, environmental, psychosocial factors as well as differences in the quality of and access to health services. The military occupation of oPt creates, sustains and contributes to the disparities directly by causing psychological distress, environmental hazards, and obstructing access to medical providers and indirectly by retarding economic growth, disrupting social functioning and hindering efforts to improve healthcare and public health.

## Notes

1. The oPt in this paper refers to the West Bank, including East Jerusalem, and the Gaza strip. In 2005, Israel evacuated all Israeli settlers and its soldiers from the Gaza strip. However, despite the Israeli government's claims to the contrary, the United Nations and other international organizations still consider Gaza 'occupied' because Israel controls six of Gaza's seven land borders, its territorial waters and its airspace.
2. Statistics and conditions described for oPt do not include the Israeli settlements.

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