

Health in the Occupied Palestinian Territory 2010

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## White phosphorus burn

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*Lancet* 2010; 376: 68

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In January, 2009, an 18-year-old man presented to the emergency department after suffering an attack with an incendiary shell. He had many painful patches of full-thickness burns, which were surrounded by sloughed tissue. His wounds covered 30% of his body surface area, and were distributed on both upper and lower limbs, and his right shoulder. There were no signs of inhalation burns. After a clinical diagnosis of white phosphorus burns was made, the airway was secured, resuscitation fluid was initiated, and wounds were irrigated with diluted sodium bicarbonate solution before wet dressing.

1 day after admission to the burns unit, white smoke was noticed emanating from the wounds, which now contained extensive necrotic tissue and had extended into the underlying tissue (figure A and B). He was urgently transferred to the operating room for debridement and excision of necrotic tissue, and removal of white phosphorus particles. During debridement, a white phosphorus particle was accidentally dislodged resulting in a superficial burn on a nurse's neck. We transferred our patient to the intensive care unit for monitoring of vital signs, electrolyte disturbance (in particular hypocalcaemia), and electrocardiogram (ECG) changes. After 8 days in hospital, our patient was relatively well, and was discharged without any systemic complications. At 16-month follow-up, our patient was well; however, hypertrophic, mildly tender scars remained on his chest, arm, and thigh (figure C and D).

White phosphorus is a smoke-producing, waxy, yellow transparent combustible solid,<sup>1</sup> which is used mainly in military and industrial settings. In the presence of oxygen, it spontaneously ignites with a yellow flame and produces dense smoke; it extinguishes only when deprived of oxygen or totally consumed.<sup>2</sup> On contact with exposed skin, white phosphorus produces painful chemical burns;<sup>3</sup> these typically appear as yellowish, necrotic, full-thickness lesions due to both chemical and thermal components. Because white phosphorus has high lipid solubility, the injuries often extend deep into underlying tissues with resultant delayed wound healing. White phosphorus can also be absorbed systemically resulting in multiple organ dysfunction syndrome because of its effect on erythrocytes, kidneys, liver, and heart.<sup>2,4</sup> First aid management of white phosphorus burns includes removal of the patient's clothes and application of saline or a water-soaked dressing.<sup>1</sup> On the basis of animal studies and case reports, in the emergency department, continuous irrigation with water is recommended to minimise the complications of the burn,<sup>1,2,4</sup> and large easily identifiable particles of white phosphorus should be debrided. Wood lamp (ultraviolet light) or a solution of 0.5% copper sulphate can be used to facilitate the extinction of embedded particles.<sup>4</sup> In critically ill patients, excision of the necrotic tissue and skin grafting, plus appropriate fluid replacement, and close monitoring of electrolytes and ECG are required to avoid predictable complications like hypocalcaemia, hyperphosphataemia, and cardiac arrhythmia. White phosphorus burns are associated with significant morbidity often necessitating lengthy hospital stays. Extreme cases can be fatal. We cannot give an estimate of the number of such cases in our burns unit because it is in a war situation in which no formal recording was done; these burns are rarely encountered in practice and literature describing cases is limited. According to the UN Convention on Certain Conventional Weapons it is prohibited to make civilians the object of attack by incendiary weapons.

### Contributors

Patient management: NS, SS, LB; writing the report: LB, NB. Written consent to publish was obtained.

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**Figure: White phosphorus burn**

Many lesions, with severe underlying destruction and necrosis in the right shoulder (A) and left leg (B). After 16 months of follow-up (C, D).

# Humanitarian crisis and social suffering in Gaza Strip: an initial analysis of aftermath of latest Israeli war

Niveen M E Abu-Rmeileh, Weeam Hammoudeh, Rita Giacaman

## Abstract

**Background** 1400 people were estimated to have died, and many were injured during the Israeli attack on the Gaza Strip, occupied Palestinian territory, from Dec 27, 2008, to Jan 18, 2009; and the destruction of infrastructure, including homes, was unprecedented. This study was done to assess the extent of insecurity and social suffering of ordinary people who live in the ruined and unreconstructed Gaza Strip; their views of their quality of life in terms of health before and after the invasion, and factors associated with poor quality of life; and the most urgent needs of these people.

**Methods** A cross-sectional survey was done in the Gaza Strip 6 months after the Israeli attack. Households were selected by random cluster sampling that was derived in two stages. The first stage was the selection of a stratified random sample of 63 enumeration areas. Stratification was done by type of location (urban, rural, and camps) and region (North Gaza, Gaza City, Deir al-Balah, Khan Younis, and Rafah). The second stage was the selection of a random sample of 35, 50, or 80 households from each of the enumeration areas that were chosen in the first stage. 3030 of 8431 households were selected in this way. The form used to interview household members consisted of questions in three sections about demographic, socioeconomic, and health information about all members of the household; housing characteristics, amenities, access to basic services, and events taking place during and after the attacks; and quality of life, distress, insecurities, and threats (with focus on adults  $\geq 18$  years). Some questions were specifically about the periods 6 months before the invasion, during the invasion, and 6 months after the invasion. The prevalence of all injuries and disabilities irrespective of the cause were extracted from different questions.

**Findings** A representative sample of 3017 households (1% of total households within the Gaza Strip) were visited, a response rate of 97% of 3102. 5914 (31%) of 18838 individuals in the sample population, which represents about 471877 people in the total population living in the Gaza Strip, were displaced during the war. 1184 (39%) of 3017 homes were completely (1%) or partly (38%) destroyed, and 872 (74%) of 1184 damaged homes had not been repaired. 137 (0.7%) household members had injuries from various causes: 101 (74% [0.54% of total]) of these were caused by the war (from the start of the attack until the time of the survey [July 14 to Aug 29, 2009]); and 14 (4%) of 321 disabilities (2% of total) were caused by the attack. 2170 (72%) of 3017 households relied on food aid. Quality of life was rated as less than good (out of five categories from very good to very poor) by 1512 (50%) respondents at the time of the survey compared with 1166 (39%) during the period before the war; 797 (52%) of 1524 men versus 717 (48%) of 1493 women; 498 (69%) of 719 respondents with no one working at home versus 717 (41%) of 1761 with one or more household members working full-time; 724 (60%) of 1203 respondents with damaged homes versus 777 (43%) of 1792 with intact homes; and 1279 (57%) of 2245 respondents whose families received food aid versus 233 (30%) of 772 whose families did not. 2579 (85%) had moderate or high levels of insecurities, fears, and threats, whereas 1472 (49%) reported moderate or high levels of distress. Human suffering attributable to the siege at the time of the survey (2783 [92%] of 3017 individuals), Israeli occupation (2715 [90%]), latest war (2579 [85%]), and internal Palestinian fighting (2504 [83%]) was rated as 8 or more on a scale of 0–10. Crucial needs were identified: home repair by 689 (58%) households with homes damaged during the war; a source of livelihood by 2249 (75%); and utilities (water, electricity, cooking gas) by 1681 (56%).

**Interpretation** The Israeli attack on the Gaza Strip has had a negative effect on the quality of life of adults in the general population, and has resulted in high levels of reported distress, human insecurity, and social suffering. The siege on this region continues to be the main obstacle for improvement of the living conditions and quality of life of the population, and is a priority for action.

## Funding Medical Aid for Palestinians—UK.

### Contributors

All authors have contributed to the data analysis and preparation of this Abstract.

### Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

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# Women in labour and midwives during Israeli assault on Gaza Strip: between bullets and labour pains

Sahar Hassan, Laura Wick

## Abstract

**Background** We report the personal accounts of childbirth experiences and coping skills of women and midwives during the 23 days of the Israeli assault on the Gaza Strip, occupied Palestinian territory, in December, 2008, and January, 2009.

**Methods** Because of the continued closure of the Gaza Strip as a result of the Israeli-Palestinian conflict, we used the snowballing method to identify participants, and gathered data during telephone interviews in Arabic between Feb 17 and March 22, 2009, with women who had given birth and midwives who assisted births during Dec 27, 2008, and Jan 18, 2009. We asked a small group of women to tell us their stories. With the exception of one woman, who declined, all were relieved to recount their experiences. We transcribed, translated, and analysed the interviews according to themes such as lack of protection, imprisonment, and isolation.

**Findings** Seven of 11 women (all multiparas) gave birth in hospitals, one in a clinic, and three at home—ie, seven vaginal deliveries, three caesareans, and one miscarriage. Some of the complications included puerperal sepsis, severe back and neck pain from anaesthesia, hypothermia in the newborn baby, and eclamptic fits. The women (n=11) and midwives (n=5) described childbirth during the bombings, with dead and injured people around them; and how they coped with the violence, fear, uncertainty, and the loneliness and pain of waiting for labour to begin, for the baby to be born, and to be reunited with their loved ones. As one woman said “nights were like ‘ghouls’...I was not thinking like other people in face of death or shelling...but was only thinking of my case! What would happen if I had labour pains at night? How will I manage? They were shelling even ambulances! Nights were like nightmares. Each morning I breathed a sigh of relief that daylight had appeared.” Women felt trapped for fear of death from bombs falling on them or their families in the home, street, or hospital; and from childbirth if a birth attendant was not available or emergency care was not attainable. Midwives expressed their fear of assisting women giving birth under duress, and their lack of preparedness—material and psychological—to attend births outside hospitals. Women came to terms with what they had lived through by focusing on everyday life, as suggested in the writings of Veena Das, and by looking after the survival of their families, which seemed to be essential for reconstructing their fragmented existence.

**Interpretation** Women expressed the severe trauma they had endured, but also their heroic struggles to give or assist birth, and to survive with their families. These women were living a process of healing while surrounded by destruction, and with nowhere else to go, they had begun to remake their lives. “I cannot believe that I did not die. Actually I feel I was sent to life again. Now I try not to think of that time.”

**Funding** None.

## Contributors

SH interviewed the women in Arabic, and transcribed and translated the interviews into English. SH and LW contributed to the design, conceptualisation, analysis, and writing of this Abstract, and have approved the final version.

## Conflicts of interest

We declare that we have no conflicts of interest.

## Acknowledgments

We thank the women and midwives living in the Gaza Strip who were willing to share their stories of birth with us despite the difficult circumstances in which they continue to live.

Published Online  
July 2, 2010

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# Effects of non-fatal injuries during the war on Gaza Strip on quality of life: a cross-sectional study

Nedal Ismael Ghuneim, Yehia Abed

## Abstract

**Background** On Dec 27, 2008, the Israeli Army began the Cast Lead operation against the Gaza Strip, occupied Palestinian territory (oPt), that resulted in the deaths of nearly 1400 people, and injuries to more than 5380. The effects of non-fatal injuries during the war on the Gaza Strip from Dec 27, 2008, to Jan 18, 2009, on the quality of life were assessed.

**Methods** A cross-sectional study was done in the Rafah Governorate, which had been directly affected by the war. All individuals with non-fatal injuries who were given treatment in El-Najjar Hospital were enrolled in this study. A total of 274 injured people completed the self-constructed questionnaire that was based on the short form health survey questionnaire with 36 questions (SF-36), for measurement of eight subscales aggregated to construct two main component summary measures—physical and mental. Demographic information, history of injuries, and other relevant information were also gathered. All individuals completed the questionnaires.

**Findings** Most of the injured individuals were men (221 [81%]) aged 15–49 years. The overall male-to-female ratio was 4:1. The women (mean age 32·6 years [SD 18·9]) were 7·7 years older than the men (24·9 years [11·8]). 143 (52%) injured people were married. 152 (55%) were injured during the first week of war. 100 (36%) individuals were resting at the time of injury. 212 (77%) people were injured as a result of bombing by jet aeroplanes. The Dirty War Index (on a scale of 0–100)—a method for the assessment of public health and human rights, and to monitor the effects of armed conflict on populations—was 19·9 for women and 16·4 for children. For all outcomes, the quality of life was low for the study population compared with other US and Turkish general populations, and was high compared with a Croatian post-war population. The SF-36 scores were for all scales (out of 100) 64·84, physical component summary 66·54, mental component summary 64·43, physical functioning 73·32, physical role 61·86, pain 71·82, general health 59·18, vitality 59·60, social functioning 69·75, emotional role 68·98, and emotional wellbeing 59·40. Quality of life for individuals aged 46–65 years, with little education, who were unmarried, and who were economically disadvantaged was poor. Injuries that were not caused by bombs or shell fragments, and those that were not severe were associated with substantially improved quality of life.

**Interpretation** An increase in the numbers of mental health services and facilities is needed to care for people affected by the Israeli war. The numbers of trained mental health-care professionals and mental health education programmes in psychosocial aspects and social support to assist in the reduction of the effect of injuries should be increased. In accordance with international standards and the plan of the oPt Ministry of Health, individuals should be given first aid in primary health care.

**Funding** None.

### Contributors

Both authors contributed equally.

### Conflicts of interest

We declare that we have no conflicts of interest.

### Acknowledgments

We thank Mohamed Jouada for his support and encouragement.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Health-service use and choice of health-care provider in the Gaza Strip: a household survey

Majdi Ashour

## Abstract

**Background** Populations in the Gaza Strip who have endured a protracted political conflict and economic decline, which have intensified since 2006, use the services of a complex and fragmented health-care delivery system. However, little is known about the pattern of health-service use and changes since 2006. Therefore, the distribution and change of health-service use, and the choice of health-care providers in Palestinian households in the Gaza Strip, were investigated.

**Methods** A house-to-house survey with a stratified cluster random sample of 883 households was undertaken by the Palestinian Medical Relief Society in the Gaza Strip in February, 2009, with a structured questionnaire that was completed by interviewing 94.2% of the targeted sample. The sampling frame was the Gaza Strip and the sampling fraction 0.4%. Households were asked about their use of different categories of health services during the previous year, their chosen health-care provider, and their changes in health provider since 2006. Data analysis was dependent on the frequency distribution of grouped variables of health-service use.  $\chi^2$  tests were done with SPSS (version 11).

**Findings** Population distribution of the surveyed households by refugee status, age group, family type, and other demographic and socioeconomic indicators was similar to the results of the Palestinian Family Health Survey. Use of health-care services was high: 560 (87.4%) patients who had acute illnesses consulted a health provider, all 313 pregnant women used antenatal-care services during their pregnancy, all 280 mothers gave birth at health institutions, 146 (52.1%) mothers who delivered during 2008 received postnatal care, 546 (99.5%) patients with known non-communicable diseases used health services regularly, and 578 (69.5%) households received hospital services. The UN Relief and Works Agency (UNRWA) for Palestine Refugees and the Ministry of Health (MoH) were the most frequently used primary providers of health services, providing 72.7% of services for acute care, 87.2% for antenatal care, and 85.5% of care for non-communicable diseases. Patients' choice of health-care provider differed significantly by refugee status for acute care, antenatal care, and care for non-communicable diseases (all  $p < 0.0001$ ), for which refugees used the UNRWA services more frequently than they did MoH services; by health insurance coverage for acute care ( $p = 0.001$ ), antenatal care ( $p < 0.0001$ ), and care for non-communicable diseases ( $p = 0.024$ ), for which people who were insured used MoH services more frequently than did those who were uninsured; and by income for acute care ( $p = 0.001$ ) and care for non-communicable diseases ( $p = 0.0001$ ), for which the poorest people used private services less frequently and the UNRWA services more frequently than did those who were better off. Many patients used services from different providers simultaneously. 200 (63.9%) pregnant women and 294 (53.3%) patients with non-communicable diseases used the services of other providers in addition to those regarded as their primary providers. For some categories of health services, patients had changed their primary provider since 2006. 68 (24.3%) mothers changed their provider of childbirth services, mainly from private institutions to MoH hospitals. 120 (21.7%) patients with non-communicable diseases changed their primary provider of care, mainly from private physicians and the Police Medical Services' facilities to MoH and UNRWA services.

**Interpretation** The use of UNRWA and MoH as the primary providers of health services indicates the populations' preference of using services that are free or low cost. The simultaneous use of health services from different providers suggests that the provided services did not meet the users' needs and expectations, and low coordination between different components of the health-care delivery system. Since 2006, patients' change in health providers was mainly attributed to financial difficulties, which resulted from the tightly imposed closure on the Gaza Strip, and to disrupted provision of health services after the internal political and administrative rift.

**Funding** WHO Eastern Mediterranean Regional Office.

### Conflicts of interest

I declare that I have no conflicts of interest.

### Acknowledgments

UNRWA did not contribute to the study conduct or analysis and interpretation of the data. I thank the Palestinian Medical Relief Society for making the data of the survey available; several individuals and health experts, including Rita Giacaman from Birzeit University and Yehia Abed from Al Quds University, for their invaluable comments on the first version of the survey questionnaire; members of the field work team; all households that so generously spent time with the interviewers while providing information about their use of health services; and two anonymous reviewers for their comments on the first draft.

Published Online  
July 2, 2010

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# Nutritional status in Palestinian schoolchildren living in West Bank and Gaza Strip: a cross-sectional survey

Kholoud Nasser, Faisal Awartani, Jamal Hasan

## Abstract

**Background** Because of the long-term political and economic challenges in the occupied Palestinian territory (oPt), poverty is spreading at an alarming rate, and children are affected the most. In 2006, 10% of children (<5 years) had chronic malnutrition (stunting—ie, low height for age), 1% had acute malnutrition (wasting—ie, low weight for height), and 3% were underweight (low weight for age). Iron-deficiency anaemia is a public health problem, affecting 23% of children. Although children younger than 5 years are prioritised by different programmes, those older than 5 years remain neglected. We assessed the nutritional status in Palestinian children (9–16 years), and their knowledge, attitudes, and practices to establish a baseline for improvement in their nutritional status and behavioural patterns after application of a school feeding programme.

**Methods** We did a cross-sectional study in March, 2008. We used a computer-generated randomisation sequence to select a representative sample of 2000 students (aged 9–11 years [young children] and 14–16 years [adolescents]) from the target population living in different districts in the West Bank and Gaza Strip, oPt. Weight and height were measured for assessment of anthropometric indices. Haemoglobin concentration was measured to assess the degree of iron-deficiency anaemia. Information about knowledge, attitudes, and practices was mainly gathered during verbal interviews with young children, and by use of a self-administered questionnaire (written) for adolescents.

**Findings** 6% of 1883 children who were assessed were stunted (8% of 930 boys vs 3% of 950 girls,  $p=0.01$ ), less than 1% had wasting, 2% were underweight, 11% were anaemic (7% of boys vs 14% of girls), and 15% were overweight and obese (11% of boys vs 20% of girls; 11% were overweight, and 4% were obese). Young children scored 46.9% in tests of knowledge, 86.4% in tests of attitudes, and 45.8% in tests of practices, whereas adolescents scored 49.9%, 70.3%, and 23.1%, respectively. 26% of children did not eat breakfast (the main indicator of healthy eating habits)—32% of 1082 adolescents versus 18% of 801 young children. Lack of appetite was the main reason for adolescents skipping breakfast, whereas in young children the reason was waking up late. 76% of young children showed a willingness to change their behaviours and accept advice about healthy eating habits compared with 31% of adolescents.

**Interpretation** The higher prevalence of anaemia in girls than in boys could be associated with menstruation, which is not compensated for with the lack of a good diet. More boys were stunted, either because of late onset of puberty or poor health since early childhood. Undernutrition, and high proportions of overweight and obesity might be attributable to children's poor eating habits and consumption of unhealthy food and snacks. Undernutrition and overweight represent the double burden of malnutrition in the oPt. Young children had poor knowledge about nutrition compared with adolescents; however, adolescents were worse in terms of their practices, which could be related to a peer effect. Despite the health benefits of breakfast, it is the meal that is most often skipped, resulting in short-term hunger that affects children's concentration and performance at school. Comprehensive and effective school nutrition programmes that are targeted at all age groups, with special attention to adolescents and girls, are needed because the data for overweight and iron-deficiency anaemia are alarming.

**Funding** World Food Programme.

## Contributors

KN did the literature search and all the writing, and participated in the data interpretation and analysis; FA participated in the study design and sampling; and JH participated in the data gathering and analysis.

## Conflicts of interests

We declare that we have no conflicts of interests.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Development of a disability programme in West Bank and Gaza Strip

Ghada Harami, David Henley, Cindy Greer

## Abstract

**Background** In situations of conflict, individuals with disabilities are often the least visible and sustain disproportionately higher rates of morbidity and mortality than do those who are not disabled. The long-term conflict in the occupied Palestinian territory (oPt) is a major factor affecting the health and quality of life of Palestinians, especially those who are disabled. A developmental approach was used to create a rehabilitation programme in the oPt. Traditionally, people with disabilities were largely neglected and discriminated against in the oPt, particularly with respect to long-term development programmes, even if a few interventions were available, most implemented by charities. A systematic approach to disability began in the early 1990s, in response to the effects on disability of the harsh conditions in the oPt and the first intifada that resulted in a substantial increase in the number of individuals with disabilities. Most were young people, who were celebrated as national heroes. This increase caused concern in many countries, leading to support for tertiary-care interventions. However, these interventions did not provide the holistic approach that was needed. The challenges encountered in the development of a rehabilitation programme in the oPt have been the diminished visibility of individuals with disabilities during long-term conflict; increased poverty in the oPt; restricted movement and access of the population, more so for people with disabilities; increasing mental health problems in people with disabilities; restricted opportunities for continuation of the education of rehabilitation staff; and increasing numbers of people with disabilities because of Israeli military incursions. The development of a rehabilitation programme in the oPt is presented here.

**Methods** To meet the needs of people with disabilities, a community-based rehabilitation (CBR) programme was established and supported with financial and technical assistance from Diakonia/Swedish International Development and Cooperation Agency (Sida), Stockholm, Sweden, and the Norwegian Association of Disabled/Norwegian Agency for Development and Cooperation (NORAD), Oslo, Norway, because the Palestinian Government had shown little interest in individuals with disability. Consortiums of local non-governmental organisations implement and own the programme, creating a close coordination between a few national referral centres, two intermediate-level resources, and a cadre of local CBR workers. The approach is a shift from institutional, long-term care to the dissemination of knowledge and skills to the support network—eg, families and teachers—for people with disabilities so that the training can be done at home and in the community by non-professionals who are trained by professionals, and is functional because it makes use of activities of daily living. Inclusive education is also an important goal of the programme. CBR workers network with community resources, support training, advocate and raise awareness about the rights of disabled people, lobby, and arrange for activities about issues relating to gender, disability prevention, and community empowerment. Quality development of the professionals in the programme has been supported by visiting international rehabilitation teams.

**Findings** The rehabilitation programme covers 60% of the Palestinian population in the oPt (in 320 communities), is mainly implemented in poor rural areas, and has reached more than 33 000 people with disabilities (60% children, 53% male) and their families since its inception. Commonly noted disabilities result from cerebral palsy; congenital disorders; cognitive dysfunction, sight disorders, and hearing disorders; accidents; trauma; and sequelae of infectious diseases. The diverse activities implemented for the targeted population with disabilities include client identification and assessment, training, referrals for technical aids, and support of inclusive education and integrated summer camps. The summer camps have been very successful and a means of integration of children with disabilities into community recreational activities. The CBR programme was started two decades ago, to target mainly the poor rural areas of the oPt where about two-thirds of the population lived. Despite the challenges, the conclusions drawn from several studies are that the CBR programme has had a major effect in the oPt. The programme has greatly improved the previously inadequate health care of people with disabilities through increased access to health services and improvement in the quality of interventions for rehabilitation at all levels. The model that has developed is described as decentralised, dynamic, and well organised, with high participation by the community. In an assessment done in 2005 from the perspective of people with disabilities, the programme “has empowered individuals and parents, improved basic daily living skills and coping mechanisms, reduced stigma and isolation and increased social inclusion.”

**Interpretation** There is no blueprint for a CBR strategy even if the principles can be the same for different programmes. The struggles associated with the development of a disability programme in the oPt has had much to do with the responses taken to address the effects of the occupation.

Published Online  
July 2, 2010

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**Funding Sida and NORAD.**

**Contributors**

All authors have contributed to the writing of this Abstract.

**Conflicts of interest**

We declare that we have no conflicts of interest.

# Parity and risk factors for coronary heart disease in Palestinian women in two refugee camps in the West Bank: a population based cross-sectional survey

Najwa Odeh Rizkallah, Tom Marshall, Donna Kritz-Silverstein

## Abstract

**Background** Evidence from the USA and Europe suggests that women who have given birth many times have a 50–80% increased risk of developing coronary heart disease. The mechanisms underlying this association are unclear, but plausible biological pathways exist—eg, changes in adiposity and blood glucose and lipid concentrations that are associated with pregnancy can persist after completion of reproductive years. Previous studies of the association between parity and coronary heart disease have been restricted by inclusion of few women who had given birth more than six times; the high parity of Palestinian women therefore provides an unusual and interesting opportunity for further study of this association, and might help to elucidate underlying mechanisms. We aimed to examine the relation between parity and risk factors for coronary heart disease in a sample of women with high parity.

**Methods** We undertook a population-based cross-sectional survey of women in the Aamaari and Kalandia refugee camps in the occupied Palestinian territory. On the basis of UN Relief and Works Agency registration records, we selected a random sample of 515 of all 587 women living in the two camps who were aged 40–65 years at the time of the study (March to May, 2001). We sent letters to these women explaining the purpose of the project and inviting them to participate. The 15 women who did not attend a clinical visit to have their blood drawn were excluded. In the remaining 500 participants, we measured lipids and lipoproteins (total, HDL, and LDL cholesterol, triglycerides) and fasting blood glucose concentrations and assessed obesity, diabetes, hypertension, and metabolic syndrome.

**Findings** Mean parity of the 500 women that we assessed was 7·3 (SD 3·7, range 0–21). 355 (69%) women were obese (body-mass index  $\geq 30$  kg/m<sup>2</sup>), 432 (84%) had central obesity (waist circumference  $\geq 88$  cm), and 266 (52%) had abdominal obesity (waist-to-hip ratio  $\geq 0\cdot 85$ ). Frequency of diabetes was 22% (n=115 women) and of hypertension was 43% (n=220). After adjustment for age, own education, husband's education, and marital status, regression analyses showed that every additional birth was associated with an increase in body-mass index of 0·30 kg/m<sup>2</sup> (p<0·0001), a 0·58 cm rise in waist circumference (p=0·001), and an increase of 0·036 mmol/L in triglyceride concentration (p=0·033). Gravidity, but not parity, was significantly associated with fasting blood glucose concentration; after adjustment, each additional pregnancy was associated with an increase of 0·14 mmol/L (95% CI 0·05–0·23, p=0·002). Overall, 289 (58%) women presented with metabolic syndrome, and these participants had significantly higher parity (p=0·003) and gravidity (p=0·024) than did women without metabolic syndrome. Every additional birth was associated with a 7% increase in prevalence of metabolic syndrome (p=0·042). Parity was not significantly associated with systolic and diastolic blood pressure or total, HDL, and LDL cholesterol.

**Interpretation** In Palestinian women, high parity was significantly associated with obesity, triglyceride concentration, and increased risk of metabolic syndrome. Any of these risk factors, alone or in combination, could result in increased incidence of coronary heart disease. Future studies should investigate the effect of birth spacing and intervals.

**Funding** Ford Foundation, The British Council, MEAwards, Population Council Research Grant, the Palestinian American Research Council.

## Contributors

NOR was responsible for the literature search, data analysis, data interpretation, and writing up of the thesis, including this Abstract. TM supervised the work and provided scientific guidance and statistical advice. He contributed to the review and writing of the Abstract and to writing up of comments. DKS reviewed parts of the draft thesis and provided valuable comments throughout the process. She contributed to the review and writing of the Abstract, and contributed to writing up of comments.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Effect of emergency health insurance scheme on place of birth in the West Bank during conflict: a retrospective analysis

Rika Fujiya, Niveen M E Abu-Rmeileh, Masamine Jimba

## Abstract

**Background** Security of Palestinians in the occupied Palestinian territory has been under threat, especially since the beginning of the second Palestinian uprising in September, 2000. In particular, pregnant mothers were denied access to hospitals for birth care, and homebirths have reportedly increased in the West Bank. The Palestinian Ministry of Health introduced an emergency health insurance scheme for birth-care services in 2001, which provided free access to government hospitals. We aimed to explore the effect of an emergency insurance scheme on proportion of livebirths and place of birth in the West Bank.

**Methods** The study area for our retrospective analysis was the West Bank, excluding Jerusalem district. The target population was women who gave birth between Jan 1, 1999, and Dec 31, 2005. We used yearly reports of the Ministry of Health to obtain data for reported livebirths by place of birth, also from Jan 1, 1999, to Dec 31, 2005. Data for stillbirths by place of birth could not be obtained from these reports. We used Palestinian Demographic and Health Survey 2004 (DHS) data to obtain women's reasons for choosing particular places of birth. We compared proportions of births by place of birth and assessed the relation between place of birth and reason for choosing the location.

**Findings** 51 306 livebirths were recorded in 1999, and this number then fluctuated from 54 442 in 2000, to 51 840 in 2001, 41 618 in 2002, 57 040 in 2003, 56 469 in 2004, and 54 146 in 2005. The proportion of livebirths taking place in government hospitals increased from 37% (n=19 906) in 2000, to 46% (n=23 625) in 2001, after emergency health insurance was introduced. The proportion slightly decreased to 43% (n=18 002) in 2002, but again increased from 46% (n=26 487) in 2003, to 53% (n=28 666) in 2005. DHS data were available for 571 women who gave birth in government hospitals, of whom 389 (68%) gave birth in this location because of either existing or new health insurance. Ministry of Health data showed an initial decrease in the proportion of livebirths occurring in non-government hospitals, from 51% (n=27 934) in 2000, to 43% (n=22 512) in 2001, and 37% (n=15 273) in 2002. This proportion then increased to 42% (n=23 997) in 2003, and remained constant at 41% (n=23 356) in 2004, and 42% (n=22 515) in 2005. DHS data were available for 457 women who gave birth in non-government hospitals. 298 (65%) of these women chose to deliver in a non-government hospital because of the better services available in this location compared with government hospitals. Ministry of Health reports showed that the proportion of livebirths at home remained constant between 2000 (n=4500, 8%) and 2001 (n=4261, 8%). In 2002, after the Israeli military invasion of the main cities of the West Bank in April, the proportion of livebirths taking place at home rapidly increased to 15% (n=6062). This proportion fell to 8% (n=4619) in 2003, 5% (n=2957) in 2004, and 6% (n=2965) in 2005. DHS data were available for 71 women who delivered at home, of whom 31 (44%) responded that they gave birth at home because their freedom of movement was restricted.

**Interpretation** Although intensified violence and restrictions in the West Bank have contributed to changes in childbirth location, the Ministry of Health's insurance scheme has offset major change. During conflict, the Palestinian health policy allowed pregnant women to avoid danger during delivery by selecting more appropriate places to give birth. Place of birth could be a useful indicator for monitoring of the effects of conflict on health.

**Funding** None.

## Contributors

RF and MJ designed the study. RF and NMEAR analysed data. All authors contributed to interpretation of the data. RF and MJ wrote the report with contributions from NMEAR. MJ supervised the study.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online

July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Fecundability in newly married couples in agricultural villages in the occupied Palestinian territory: a prospective study

Yaser Younes Issa, Markku Sallmén, Khaldoun Nijem, Espen Bjertness, Petter Kristensen

## Abstract

**Background** Estimates of fecundability have varied from 0·15 to 0·30 in prospective studies undertaken in high-income countries. The validity of these studies has been questioned, and the complexity of societal and cultural factors in high-income settings makes dissection of biological effects difficult. Prospective study of newly married couples in the Palestinian population provided a good opportunity to obtain an unbiased estimate of fecundability, since premarital sex is taboo in this Muslim population. We aimed to assess couple fecundability, which was defined as probability of becoming pregnant during one menstrual cycle, in a rural Palestinian population that is to a large extent unaffected by the sociocultural factors seen in high-income populations.

**Methods** Complete identification of newly married couples is possible in the occupied Palestinian territory because all couples planning to marry are obliged to register at the regional thalassaemia centre. We undertook a prospective study of time to pregnancy in all newly married couples in two Palestinian agricultural villages between May, 2005, and August, 2007. We achieved complete participation and almost complete follow-up (only four couples were censored). The couples had not had premarital sex and all planned to become pregnant. Follow-up consisted of monthly interviews from the date of marriage until pregnancy that was recognised by a pregnancy test or a maximum 12 months. We estimated group mean fecundability as number of cycles leading to pregnancy divided by the total number of cycles.

**Findings** 207 newly married couples were identified; we excluded two couples because the wife had been previously married. Of the 205 couples who we assessed, 76 (37%) included teenage wives, and only 34 (17%) wives and 147 (72%) husbands were older than 24 years. On average, women were educated for longer (13·2 years, SD 2·4) than were their husbands (12·1 years, 3·1). None of the wives smoked; 122 (60%) of husbands smoked. Overall fecundability was 0·17 (95% CI 0·14–0·19). Altogether, 33 (16%) wives became pregnant during the first cycle and 175 (71%) within six cycles. 27 couples (13%) did not conceive within 1 year. The mean time to pregnancy was 5·1 cycles (SD 3·8). Age older than 24 years in women and older than 29 years in men was related to increased time to pregnancy, whereas well educated women seemed to be highly fertile. High fecundability was associated with high coital frequency. Unexpectedly, cycle fecundability increased during the first cycles from 0·16 (cycle 1) to 0·25 (cycle 5), after which the expected decrease started. This initial increase was restricted to couples with teenage brides.

**Interpretation** Our estimate of fecundability was fairly low by comparison with findings for high-income countries. This result is hard to account for, but could be attributable to agricultural exposures or mental stress caused by the difficult political situation and the occupation. The increase in fecundability during the first months of marriage is difficult to interpret, but was restricted to teenage brides and could thus be related to either behavioural or biological effects.

**Funding** Norwegian Programme for Development, Research and Education (NUFU pro X1 50/2002 and NUFUSM-2008/10232).

## Contributors

All authors participated in the conceptualisation and writing of the report, and have seen, reviewed, and approved the final version. YYI, KN, EB, and PK designed the study. YYI and KN participated in data collection. YYI, KN, and MS wrote the first draft and participated in primary analysis. YYI, MS, KN, EB, and PK participated in data analysis and interpretation.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Dietary habits of Palestinian adolescents in three major governorates in the West Bank: a cross-sectional survey

Nahed Mikki, Hanan F Abdul-Rahim, Zumin Shi, Gerd Holmboe-Ottesen

## Abstract

**Background** The Palestinian society is undergoing changes in their dietary habits and in the prevalence of obesity and overweight. Palestinian adolescents (aged 10–19 years) make up 24% of the population. Their dietary habits are important, yet understudied. The 2004 survey of health behaviour in school-aged children in the West Bank and Gaza Strip identified missing of breakfast and low intake of milk, fruits, and vegetables as the main problems. We investigated food habits in Palestinian adolescents in three main governorates (administrative divisions) in the West Bank (Ramallah, Nablus, and Hebron) and the relation between food habits and sociodemographic factors (region, sex, urban or rural residence, standard of living index, and parents' education).

**Methods** We undertook a cross-sectional survey in the three governorates between March 19 and May 8, 2005, in 96 school classes (34 in Ramallah, 31 in Hebron, and 31 in Nablus) that were selected to be representative of the eighth and ninth grade classes (students aged 13–15 years). A list including the number of students per classroom in 2004–05 was provided by the Palestinian Ministry of Education and Higher Education. The classes were divided into nine strata by sex (boys, girls, and coeducational) and school type (public, UN Relief and Works Agency [UNRWA], and private). The sample was selected with the single-stage probability proportional-to-size sampling procedure, from each of the nine strata within each governorate, with the class as the primary sampling unit. All students in the selected classes were invited to participate in the study. Self-administered questionnaires for students and their parents were used. The students' questionnaire contained questions about age, residence, household amenities, meal patterns, and a food frequency list of 42 items without portion sizes. The parents' questionnaire gathered household information, including family size and parents' education. Both questionnaires were piloted and adjusted before the survey. Data analysis was done with Stata (version 10.1) and adjusted for design effect. The sample was weighted according to sample and population size in each governorate (inverse of sampling probability; percentages are weighted and numbers are unweighted), and the analysis was adjusted for possible dependencies due to cluster design. We used  $\chi^2$  tests to compare frequencies, and *t* tests or ANOVA to compare means. We did multivariate linear regression analysis to model the association between food scores and sociodemographic factors.

**Findings** Of the 3271 students invited, 3071 (94%) consented to participate. 2952 students (1364 boys and 1588 girls) aged 13–15 years were included in the analysis, excluding 119 who were older or younger than this age group. Only 765 (26%) students had three meals daily; 382 (26%) boys and 814 (51%) girls had breakfast only once or twice per week or less ( $p < 0.0001$ ). As few as 758 (25%) drank milk daily (462 [33%] boys vs 296 [18%] girls;  $p < 0.0001$ ). Around three-quarters ate vegetables daily (984 [73%] boys vs 1174 [74%] girls;  $p = 0.67$ ). Daily fruit consumption was equally common in boys and girls (841 [59%] vs 915 [55%];  $p = 0.27$ ). Daily intake of salty snacks was more common in girls than in boys (1022 [62%] vs 716 [50%];  $p = 0.0016$ ) whereas daily intake of regular soft drinks was more common in boys (575 [40%] vs 464 [28%];  $p = 0.0001$ ). Daily intake of sweets was more common in girls than in boys (816 [49%] vs 609 [42%];  $p = 0.0634$ ). Results of multivariate regression analysis showed that residence in Hebron and low standard of living (based on 16 household amenities) were negatively associated with frequency of intake of animal foods, foods commonly eaten in highly industrialised countries, dairy products, fruits and vegetables, and sweets and salty snacks, after adjustment for other sociodemographic factors such as age, sex, parents' education, and family size.

**Interpretation** Irregular meal patterns and a low intake of fruits, vegetables, and milk were common in Palestinian adolescents, especially in groups with low standard of living and those in Hebron. Effective interventions are needed to establish healthy dietary habits, with an emphasis on vulnerable groups.

**Funding** Norwegian Programme for Development, Research and Education.

## Contributors

NM, HFA-R, and GH-O contributed to the conception, design, analysis, and interpretation of data; drafting of the report; and have given approval of the final version for publication. NM contributed to data collection. ZS contributed to analysis and interpretation of the data, commented on the report, and has given approval of the final version for publication.

## Conflicts of interest

We declare that we have no conflicts of interest.

## Acknowledgments

The Norwegian Programme for Development, Research and Education (pro XI 50/2002) funded the fieldwork and equipment for this study, and funded meetings to discuss the work.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

The full text of this article has been published in *Public Health Nutr* (in press). Reproduced with permission from Cambridge University Press.

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# Lung function and respiratory symptoms in male Palestinian farmers: a cross-sectional survey

Farid Kamel Abu Sham'a, Marit Skogstad, Khaldoun Nijem, Espen Bjertness, Petter Kristensen

## Abstract

**Background** Exposure of agricultural populations to pesticides tends to be a bigger concern for developing countries than for more developed nations. This increased exposure can be attributed to climate and scarcity of personal protective equipment, safety training, and legal control, and poor regulation of pesticides. Agricultural production in the occupied Palestinian territory (oPt) comes mainly from small family farms. We measured lung function and respiratory symptoms in male Palestinian farmers and estimated associations with exposures to pesticides and dust.

**Methods** We obtained data for 250 farmers from Beit-U'mmar village, West Bank, oPt, in 2006, from the 3000 men on the municipality registry of farmers. We systematically selected farmers in the municipality from an alphabetical list, although ten farmers refused to participate and so ten others were included. All participants answered questions about sociodemographic characteristics, and factors such as work conditions, exposure to pesticides at work, use of personal protective equipment, and respiratory symptoms in the past 12 months. 207 (83%) participants then agreed to have a lung function test at a local clinic; 195 (94%) of whom had acceptable manoeuvres (defective blows were repeated and results with possible cough and blows <6 s were excluded) according to the standardisation of the European Coal and Steel Community. Frequency distributions of independent variables and respiratory symptoms were computed. Associations between exposure indicators and respiratory symptoms were estimated in crude and adjusted models for all 250 participants with Cox regression with constant time equals 1 and robust variances. Associations between indices of lung function and exposure indicators for the 195 participants who had a lung function test were estimated as crude and adjusted additive differences (adjusted for age, smoking status, and body-mass index) in linear regression models.

**Findings** Participants were aged 22–77 years and 91 (36%) were smokers. Mean forced vital capacity was 4·20 L (SD 0·93), or 95·5% of that predicted from European standards. Mean forced expiratory volume in 1 s (FEV<sub>1</sub>) was 3·28 L (0·80), or 91·1% of the predicted volume. We reported high symptom frequencies of 14·0% for chronic cough, 26·4% for wheeze, and 55·2% for breathlessness. No significant association was noted in multivariate models between lung function and exposure to pesticides or dust, or between such exposure and respiratory symptoms. However, keeping of animals and poultry was associated with increased FEV<sub>1</sub> (adjusted difference 0·20 L, 95% CI 0·00–0·39, *p*=0·043).

**Interpretation** Absence of the expected effect of pesticide exposure on lung function might be due to study limitations such as the cross-sectional design, misclassification of exposures, and confounding effects by environmental or behavioural factors, or to increased use of personal protective equipment and strict new regulations on pesticide imports. The possible protective effect of keeping animals on lung function should be examined.

**Funding** Norwegian Programme for Development, Research and Education (NUFU pro X1 50/2002 and NUFUSM-2008/10232).

## Contributors

All authors participated in the conceptualisation and writing of the report, and have seen, reviewed, and approved the final version. All authors helped to design the study. FKAS and KN did the data collection. FKAS, KN, and PK wrote the first draft and did the preliminary analysis. FKAS, MS, KN, and PK did the data analysis and interpretation.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Lung function, respiratory symptoms, skin problems, and chemical exposures in female hairdressers in Hebron City, occupied Palestinian territory: a cross-sectional study

Maysaa Nemer, Marit Skogstad, Khaldoun Nijem, Petter Kristensen, Espen Bjertness

## Abstract

**Background** Hairdressers are exposed to chemicals and work tasks that can cause asthma and skin problems. Data for the occurrence of respiratory and skin symptoms caused by chemicals used in hairdressing salons are mainly from studies in developed countries. A study of occupational exposures and health effects in hairdressing salons in the occupied Palestinian territory (oPt) would provide information about occurrence of these symptoms in developing countries. We aimed to assess lung function, respiratory symptoms, and skin disorders in female hairdressers in Hebron City, oPt. Additionally, we planned to describe working conditions in the salons and inform hairdressers about exposures and potential adverse health effects.

**Methods** We undertook a cross-sectional study in female hairdressers working in 56 salons in Hebron City. The total number of hairdressers working in these salons was 406. We selected a random sample of 200 women by taking every even number from the list of 406 until we reached 200 participants. 23 women refused to participate, and seven were excluded, so 170 participants were included in the study. Reasons for exclusion were pregnancy, age younger than 18 years, and smoking. The participants filled in a questionnaire including items relating to working history, health status (respiratory and skin symptoms), and knowledge about chemicals used. Lung function tests were done with spirometers (with USB connections to computers), and a checklist was filled out for every salon, describing the conditions and chemicals used. SPSS (version 16.0) was used for statistical analyses. Descriptive data were presented with means and corresponding SDs for lung function and prevalences for symptoms.

**Findings** Salon sizes varied widely (3–60 m<sup>2</sup>). Few salons had proper ventilation. Gloves were used in most salons during dyeing and bleaching tasks, but not when washing hair. Although the salons used products from different manufacturers, they contained almost the same active ingredients. The most common chemicals were ammonia, which is a basic ingredient of hair dyes and some straightening creams, hydrogen peroxide, and persulphates, which are the most important ingredients of the bleaches. Mean forced vital capacity was 3.31 L (SD 0.44), which was 96.5% of the capacity predicted on the basis of European standard values. Mean forced expiratory volume in 1 s was 2.74 L (0.60), which was 92.4% of the predicted value. The frequencies of respiratory symptoms were 19% (n=32) for wheezing, 31% (n=53) for chest tightness, 17% (n=29) for coughing, and 22% (n=37) for phlegm. Asthma frequency (based on self-reports of asthma diagnosed by a doctor) was 6% (n=10), and hand dermatitis affected 14% (n=23) of participants. The participants had only scarce knowledge about the chemicals that they used and their potential harmful effects on health.

**Interpretation** Female hairdressers in Hebron City were exposed to chemicals that might have adverse effects on their health. Awareness of occupational health hazards needs to be raised. Our estimates were unlikely to have been affected by the healthy worker effect. High unemployment rates and the absence of a social security system might force hairdressers into keeping their jobs even if they have health issues. Follow-up studies would be useful to investigate the effect of exposure on health of this group of workers.

**Funding** Norwegian Programme for Development, Research and Education (NUFU pro X1 50/2002 and NUFUSM-2008/10232).

## Contributors

All authors contributed to production of the report, and have seen, reviewed, and approved the final version. The study design and methods were prepared by MN, KN, EB, MS, and PK. MN and KN participated in data collection. MN, MS, EB, KN, and PK participated in data analysis.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online

July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Storage, use, and cost of drug products for Palestinian households: a cross-sectional survey

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## Abstract

**Background** Appropriate household storage and use of drug products can reduce drug wastage and unnecessary hazard. We investigated storage, patterns of use, and cost of drug products for households in the occupied Palestinian territory (oPt).

**Methods** We obtained data from a cross-sectional survey of households in northern oPt. All senior pharmacy students at An-Najah National University, West Bank, oPt, completed written questionnaires about their household and four neighbouring households. Types and quantities of drug products in every household were reported, and family members were interviewed in person about use of drug products, and where drug products were stored.

**Findings** 465 households were assessed, although 50 households were excluded because they did not cooperate fully with the researchers. 5505 (mean 13·3 [SD 7·8]) drug products were recorded from the 415 houses. A significant positive correlation was noted between the number of drug products in a household and high education of the father ( $r=0\cdot127$ ,  $p=0\cdot01$ ), and large family size ( $r=0\cdot17$ ,  $p=0\cdot001$ ). Presence of chronic disease in any family member was significantly associated with a higher number of drug products than was reported in households without chronic disease (mean 14·4 [SD 8·4] vs 12·5 [SD 7·2],  $p=0\cdot019$ ). Presence of private insurance coverage was also significantly associated with an increase in the number of stored drug products with one-way ANOVA analysis ( $p=0\cdot01$ ). 175 (42%) households had at least one child younger than 6 years of age, and 1894 (34%) drug products were stored in unsafe places in the houses, within the reach of children. 1789 (32%) drug products were not in their original container, 1800 (33%) were unused, 975 (18%) were expired, and 606 (11%) had no clear expiry date. We estimated that the cost of drug wastage in the 415 households was US\$16 100, and \$19 million nationwide. The most common drug classes in households were for alimentary, musculoskeletal, and anti-infective disorders. Paracetamol (468 [9%]), ibuprofen (270 [5%]), and diclofenac (204 [4%]) were the most commonly reported individual drugs.

**Interpretation** Drug products are stored in large quantities in Palestinian households, and many of them are not used. This stockpiling of drug products might be attributable to Israeli curfews or movement restrictions for Palestinians, leading to concern among families about access to potentially useful or life-saving drugs. Assessment of patterns of drug use and national drug policies are needed to address the issue of stockpiling of drug products among households in the oPt.

**Funding** None.

## Contributors

WMS and AFS contributed equally. SHZ, SWA-J, FFBS, and HSK contributed to the literature review, data entry, and data analysis.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

The full text of this article has been published in *Int J Clin Pharmacol Ther* 2010; 48: 59–67

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# Effect of shift work on mental health of Palestinian nurses: a comparative study

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## Abstract

**Background** Rotating shift work has been linked to health problems such as sleeping disturbances, cardiovascular diseases, and mental health disorders. We are not aware of any previous study examining the effects of shift work on mental health in Palestinian nurses. We aimed to assess the mental health status of nurses on fixed day shifts versus rotating shifts in Hebron district, and to compare the effect of shift work on mental health between female and male nurses.

**Methods** In this cross-sectional study undertaken between Aug 8, and Oct 15, 2008, registered nurses in all health sectors in Hebron district were assessed unless they had practised for less than 1 year or were on leave. The general health questionnaire (GHQ-30) was used to measure self-reported mental distress, and we also recorded lifestyle behaviour (health risk behaviours scale) and job satisfaction (generic job satisfaction scale). Mental distress data were analysed by linear regression, with adjustment for sex, age, and job title for comparison between shift types, and with adjustment for age and job title for comparison between sexes. We analysed lifestyle behaviour by  $\chi^2$  test. We used a Likert scoring procedure to analyse job satisfaction, and then assessed the interaction of job satisfaction with rotating shift work. Lifestyle behaviour and job satisfaction were used as mediators not confounders. All analyses were done with SPSS (version 15) and STATA (version 10). The study was approved by the Ministry of Health, written informed consent was provided, and participation was voluntary.

**Findings** Nurses with less than 1 year of practice ( $n=70$ ) or those on leave ( $n=18$ ) were excluded. 454 nurses were eligible for the study, of whom 444 (98%) completed questionnaires, and ten refused to participate. We excluded nurses working fixed evening or night shifts ( $n=21$ ) and those with incomplete data ( $n=1$ ). 422 nurses were included in analyses, of whom 261 (62%) were women and 161 (38%) were men. Mean GHQ-30 values showed that symptoms of mental distress were significantly more prevalent in nurses on rotating shifts (29.1 units [SD 10.5]) than in those on fixed shifts (25.1 units [10.4]; difference 4.0 units, 95% CI 1.6 to 6.6,  $p=0.002$ ). For nurses on any shifts, men reported lower mental distress than did women (26.5 units [SD 10.8] vs 27.6 units [SD 10.5]; difference -1.1 units, 95% CI -4.31 to -0.08,  $p=0.04$ ). The increase in mental distress associated with rotating shifts compared with fixed shifts, was higher for men (6.8 units, 95% CI 3.0 to 10.6) than for women (2.7 units, -0.2 to 5.6; difference 4.1 units, 95% CI -0.19 to 8.43,  $p=0.06$ ). Negative effects of rotating shift work on mental health were affected by job satisfaction: nurses reporting high job satisfaction did not report increased mental distress related to rotating shift work. Men reported significantly more cigarette smoking than did women, but this lifestyle behaviour did not significantly affect mental distress; we did not record significant differences between any other lifestyle behaviours.

**Interpretation** Male nurses show lower mental distress than do female nurses, but seem to be more sensitive to mental distress associated with rotating shift work. High job satisfaction relieves the mental distress related to rotating shift work. The results are unlikely to be generalisable for all districts in the occupied Palestinian territory, especially districts in which the occupation affects the population's insecurity, fear, helplessness, and unemployment, such as in the Gaza Strip. Further studies should investigate whether rotating shift work affects the quality of patients' care in hospitals.

**Funding** Norwegian Programme for Development, Research and Education (NUFU pro x1 50/2002 and NUFUSM-2008/10232).

## Contributors

YJ, KN, and EB designed the study. YJ and KN participated in the data collection and monitoring. YJ, KN, HS, RB-P, EB, and LL prepared the datasets, wrote the first draft of the report, and did the preliminary analysis. All authors participated in the data analysis and interpretation of the results. All authors participated in the conceptualisation and writing of the report, and have seen, reviewed, and approved the final version.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

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# 15 years of cooperation in research and higher education between the Faculty of Medicine, University of Oslo, and Palestinian institutions



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## Abstract

**Background** In 1994, a delegation organised by the Council for Higher Education, occupied Palestinian territory (oPt), and the University of Oslo, Norway, resulted in continued (1995–2009) cooperation between the Department of General Practice and Community Medicine, University of Oslo, Institute of Community and Public Health (ICPH), Birzeit University, and Hebron University. Funding support reached NOK13 459 000 (US\$2 224 000) for running costs and scholarships. We discuss the cooperation and the contribution to health equity in oPt, and suggest ways forward for continued cooperation. Webappendix gives supplementary information.

**Methods** Research and training were about public health and occupational health challenges in oPt, with epidemiological research methods as a fundamental component of public health research. We applied the principles of action presented by WHO Commission on Social Determinants of Health to discuss a possible contribution to health equity in oPt.

**Findings** The main cooperation resulted in training of 11 Palestinian PhD students, nine Masters students, and more than 250 Palestinian and Norwegian researchers; publication of more than 40 scientific articles and 21 reports written by Norwegian exchange students; and creation of sustainable centres for Occupational Epidemiology (Hebron University) and Epidemiology (Birzeit University). One of the most important achievements in Palestinian science was the publication of five reports from the ICPH in *The Lancet* 2009 Series Health in the Occupied Palestinian Territory. This Series showed that Palestinian right to health was compromised because of Israeli occupation (squeezed economy, movement restrictions, spread of fear, uncertainty, insecurity), and confirmed adverse health effects due to occupation and systematic and avoidable differences in health implying health inequity. Our contribution to health equity includes: measure of occurrence of health problems and associated factors; expansion of knowledge base; development of a workforce trained in social determinants of health; and enhanced public awareness of these determinants.

**Interpretation** Gradual postgraduate training of staff at Hebron and Birzeit universities secured the ability to produce valid research for policy formulation and planning, and achieved legitimacy locally. This cooperation has been sustained over years, with academic support, engaging staff at all levels, both in the oPt and in Norway. Further support to Palestinian institutions by education of new PhD candidates is needed. Two staff trained at PhD level from the present cooperation have moved abroad. One important way to reduce brain drain is to provide investigators with time to undertake research, which would, however, demand commitments from universities and from the Palestinian Ministry of Education. Research in the next cooperation phases should expand medical, occupational, and public health research to strengthen local knowledge to solve local problems. This effort includes assessment of interventions, which was extensively discussed in *The Lancet* 2009 Series, and focus on social determinants of health, as recommended by WHO. ICPH operates a Master programme in public health. Through continued cooperation with University of Oslo, ICPH will probably soon develop a PhD programme, perhaps with a shared degree between Birzeit University and University of Oslo. Development of a new Master programme in public health and foreign policy at University of Oslo should also be considered and could attract the best students and teachers recruited from low-income, high-income, and conflict-ridden countries. The programme could bridge the gap between global health efforts and the economic, political, and national security contexts in which policy is formulated and implemented.

**Funding** Norwegian Programme for Development, Research and Education (NUFU pro 65/96, NUFU pro 63/96, NUFU pro X1 50/2002, NUFUSM-2008/10232) and Quota scheme, University of Oslo, Norway.

## Contributors

All authors participated in the conceptualisation and writing of the report, and have seen, reviewed, and approved the final version. EB wrote the first draft.

## Conflicts of interest

We declare that we have no conflicts of interest.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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# Qaderoon youth mental health promotion programme in the Burj El Barajneh Palestinian refugee camp, Beirut, Lebanon: a community-intervention analysis

Rema Afifi, Rima Nakkash, Taghreed El Hajj, Ziyad Mahfoud, Suad Hammad, Judy Makhoul, Sawsan Abdulrahim, Mayada Kanj, Pascale Haddad

## Abstract

**Background** One in five young people will have a mental health event, and low-income urban populations and refugees are at especially high risk. A shift in emphasis of mental health research has taken place, to the importance of positive mental health and social skills. Our investigation was done in the Burj El Barajneh Palestinian refugee camp (Beirut, Lebanon), the sixth largest of 12 official camps established in Lebanon for Palestinian refugees after the establishment of Israel in 1948. Palestinian refugees in Lebanon live in dire environmental and social conditions—the camp has 14 000–18 000 residents and is 1.6 km<sup>2</sup>. Conditions are thought to be the worst for Palestinian refugees in the region, because of the scarcity of employment opportunities, economic resources, and access to basic health and social services, which are exacerbated by state-imposed restrictions on employment and education opportunities. Health and social services are provided by various international, governmental, and non-governmental organisations. The UN Relief and Works Agency was set up in 1948 to provide educational and health services to Palestinian refugees. However, because of the growing number of refugees, and local and international politics, schools have become unable to accommodate the number of children in the camp. The Qaderoon (literally: we are capable) intervention to promote mental health in young people was implemented for children aged 11–14 years living in the Burj El Barajneh camp in 2008–09. The programme's aims were to enhance mental health as a primary outcome, and to improve social skills as a secondary outcome.

**Methods** Our intervention programme was evidence informed and guided by a Community Youth Coalition. A logic model was developed and guided implementation and assessment. The six elementary schools in the camp were randomly assigned by computer-generated sequence, three to the intervention group and three to the control group. All students (n=687) in grades five and six in the schools were included in the study. The sample size of 580 (290 in each group) was estimated to detect a size effect of 0.40 with a power of 80%, and a significance of p=0.05, on the assumption of an average cluster size of 60 children and an intraclass correlation coefficient of 0.02. The intervention group received 45 afterschool sessions, their parents received 13 sessions, and their teachers six half-day workshops. On the basis of previous evidence-based interventions for promotion of youth mental health, the 45 sessions included interactive sessions about problem-solving; communication; self esteem; self responsibility; relationships with peers, parents, and teachers; violence prevention; and other topics. The intervention was intended to teach individual skills and create group norms of non-violence, problem-solving, conflict resolution, and communication. Participants completed a survey at initiation of the intervention (baseline), immediately after (postintervention), and after 6 months (follow-up), and a scale of mental health—the Arab Youth Mental Health scale—was developed and validated. Changes in mental health scores were assessed with a modified *t* test that accounted for effects of clustering, and a thorough process assessment measured extent of implementation. Programme reach was monitored through the pupils' attendance. Children rated their satisfaction with each session by drawing smiling, neutral, or unsmiling faces, with investigators masked to responses.

**Findings** Although participation varied (113 [39%] children attended >50% of sessions), the intervention was implemented with a high degree of fidelity, and satisfaction of children, parents, and teachers was high. The combined children's satisfaction score for all sessions was more than 90%. Children, parents, teachers, and community coalition members reported positive changes in children's behaviour with the intensive intervention, but quantitative results did not report significant difference from the control group. Despite the scope of the intervention, the intervention and comparisons groups had equivalent mean mental health scores at all measurement timepoints. The mean mental health score (scale 21–63; high numbers suggest great distress) was 32.15 (SD 8.47) for 299 children in the intervention group at baseline, 33.25 (8.29) for 280 (94%) children at postintervention, and 30.99 (6.76) for 140 (47%) children at follow-up. Mean scores for the control group were 31.53 (8.06) for 247 children at baseline, 31.87 (8.11) for 229 (93%) children at postintervention, and 31.69 (6.98) for 118 (48%) children at follow-up. Intervention assessment (number of children at every session and their ratings) was done on the basis of the baseline and postintervention scores, with less than 10% in both groups lost to follow-up.

Published Online  
July 2, 2010

For all Palestine Abstracts and accompanying Comments see <http://www.thelancet.com/health-in-the-occupied-palestinian-territory-2010>

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**Interpretation** Quantitative measures might not be able to capture intangible effects of mental health interventions. Intervention studies that are larger and longer than the current intervention should be done to establish the quantitative effects of group intervention on mental health and potentially create a cohort effect. Whether high rates of poverty, stress, and disadvantage in refugee camps such as Burj El Barajneh restrict the effect of intervention should be investigated, since determinants of mental health for children might be more structural than individual or interpersonal.

**Funding** Wellcome Trust.

**Contributors**

RA, RN, TEH were involved in all aspects of development, implementation and evaluation of the intervention. JM, SA, and MK were involved in all aspects of the development of the intervention, and in implementation and evaluation of specific components. ZM was responsible for sample size estimation, randomisation procedures, and all data management, entry, and analysis procedures. PH was involved in data cleaning, entry, and analysis. SH was the field coordinator for this project and was involved in various aspects of development and evaluation of the intervention, and all aspects of implementation.

**Conflicts of interest**

We declare that we have no conflicts of interest.