

Prevalence of birth defects in the Gaza Strip, occupied Palestinian territory, from 1997 to 2010: a pedigree analysis

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Background There are no reliable records of the prevalence of birth defects from 1997 to 2010 in the Gaza Strip, occupied Palestinian territory. We therefore estimated the prevalence of birth defects for these years, using data from the first pilot registration of births in 2011.

Methods During the pilot registration of births at Al-Shifa Hospital, Gaza Strip, in 2011, using face-to-face interviews, we obtained the full reproductive histories and pedigrees of the mothers ($n=4027$), data about the health of first-degree and second-degree relatives of both parents of the newborn baby, and exposure to attacks in 2008–09. 58 mothers with healthy neonates born in 2011, and at least one older child with a birth defect were identified and included in the study. Data for the pedigrees and dates of births of the children born to these 58 couples from 1997 to 2010 were pooled for 2-year intervals to calculate the proportions of children with birth defects. The linear trends in the proportions of birth defects were assessed with the Cochran-Armitage test, and differences in birth defects in families with fewer or not fewer than four children were assessed with the χ^2 exact test. Statistical analysis was done with Cytel Studio (version 9.0.0). The study was approved by the Ministry of Health, Gaza Strip. Participants provided written informed consent.

Findings 58 couples had 226 children, of whom 69 had birth defects. Inheritance of disease was suggested in eight couples who had two children with the same birth (familiar) defect and six who had the familiar defect in their first-degree relatives; 45 couples had one child each with a birth defect, suggesting that it was sporadic. The frequencies of children with birth defects showed a significant increase from 2005 ($p=0.0003$)—four (20%) of 20, four (18%) of 22, four (15%) of 27, six (17%) of 35, 17 (40%) of 43, 18 (38%) of 48, and 16 (52%) of 31 children born during 1997–98, 1999–2000, 2001–02, 2003–04, 2005–06, 2007–08, and 2009–10, respectively (appendix). A significant linear trend was noted for sporadic birth defects ($p<0.0001$), but not for familiar birth defects ($p=0.95$). There was no difference in the prevalence of birth defects over time between couples who had fewer or not fewer than four children ($p=0.13$). 25 (66%) of 38 mothers answered questions about exposure to attacks in 2008–09: two were exposed to white phosphorus, seven to bombs, and 15 to both, and one was wounded.

Interpretation Use of pedigrees of large families enables the retrospective detection of changes in the prevalence of birth defects and can enable the gathering of relevant information in the absence of previous records. This method can also enable the investigation of correlations of the birth defects with major documented environmental changes or exposures. A limitation of this method is its applicability to couples with several children. In the Gaza Strip, the trend in the increase in prevalence of birth defects began in 2005. The first documented use of air-delivered weaponry on the Gaza Strip started in 2001, and since then use of this weaponry has been a major environmental stress. Our data, in agreement with results obtained with other methods, reinforce our concern that toxic remnants of war could be source of long-term effects on reproductive health. Further studies are warranted to ascertain the association between the accumulation of the toxic remnants and the prevalence of birth defects.

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Contributors

PM designed and undertook the study with AN. RM contributed to the study design. SS did the statistical analysis. PM wrote the Abstract with contributions from all authors. All authors have seen and approved the final version of the Abstract.

Conflicts of interest

We declare that we have no conflicts of interest.

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See Online for appendix