The nuclear industry family study: linkage of occupational exposures to reproduction and child health

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Concern about high rates of leukaemia and non-Hodgkin's lymphoma among children and young adults living near certain nuclear establishments in the United Kingdom has led to a series of population based case-control studies. All these studies have investigated the possibility that the excesses were related to parental employment in those establishments, but the statistical power to detect anything other than extreme associations was very low owing to the rarity of employment in the nuclear industry (coupled with the rarity of the outcome). Moreover, if harmful parental occupational exposures were to exist it is unlikely that their effect would be restricted to cancer among workers' children; such exposures might be expected to influence a broader spectrum of reproductive outcomes, including infertility, miscarriage, and congenital malformations. These other aspects of reproduction remain largely unexplored.

The nuclear industry family study was set up to examine the occupational histories of a large cohort of nuclear industry workers in relation to all aspects of their reproduction and children's health. A full report of the methods is available on the BMJ's website.

Subjects, methods, and results

The survey population consisted of all employees of the Atomic Energy Authority, the Atomic Weapons Establishment, and British Nuclear Fuels who were in service at the time of the study, between 1993 and 1996. Also included were past employees of the Atomic Energy Authority and British Nuclear Fuels who were aged under 75 years and who had an active or pensioned employment administration office (9678 and 6458 workers respectively). Of the survey population, 78% were male (36 342 workers).

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6 World Health Organisation. Progress and characterization of venoms of the methods is available on the BMJ's website.
prematurity was indicated) and was known for most incomplete pregnancies.

Information on employment and monitoring for exposure to ionising radiation was obtained from the three authorities and was computer linked to the data on reproduction and child health by using unique personal identification numbers. Parental preconceptional dose was estimated for each pregnancy.

Excluding the 7% (3068) questionnaires that were returned undelivered, the response rate for completed questionnaires was 82% for men and 88% for women. This adjusted response rate was uniformly high across authorities and by employment status. Only 1276 (3%) workers refused to participate.

At the time of survey 67% men and 58% women returning a completed questionnaire had, or had attempted to have, children. Of these, 2% and 3% respectively had never achieved a pregnancy. Just under half had conceived (or attempted to conceive) their first pregnancy after starting work in the industry, and over 70% had been in continuous service at one site until either leaving the industry or date of survey. Characteristics of these workers, and of the 55 672 completed pregnancies they reported, are presented in the table.

**Comment**

This is the first UK study to link detailed data on reproductive history to occupational information held by employers. Its design and conduct resulted in high quality data on a representative population of the workforces of the Atomic Energy Authority, Atomic Weapons Establishment, and British Nuclear Fuels. The response to the survey was extremely good, and a unique relational database has been created. This has enabled infertility, pregnancy, and child health outcomes to be examined with respect to parents’ employment and dosimetry. The methods used in this study have been adapted for use in other important occupational investigations such as the study of reproductive outcome of veterans of the Gulf war.

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