

Factsheet on environmental exposure and male reproductive health

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Key facts

- Reproductive health problems in human males are increasing, including genital abnormalities, infertility linked to poor semen quality and testicular germ cell cancer in young adulthood.
- Genital abnormalities of the testicles, poor semen quality and testicular germ cell cancer may all be linked to a testicular dysgenesis syndrome caused by genetic factors and/or foetal environmental exposures.
- The worsening of male reproductive health has occurred over a relatively short period (a few decades), in line with the hypothesis that environmental factors are at play.
- Industrialised regions have the lowest birth rates in the world, suggesting that, in addition to social factors (education, contraception), exposures to endocrine disrupting chemicals (EDCs) and pollutants are contributing to a decline in reproductive health.
- These chemicals are present in food, drinking water and cosmetics, at the workplace and in indoor and outdoor air pollution.
- The human male is more susceptible to environmental exposures in comparison with other mammals including rodents, rabbits, bulls, boars, and primates.
- Other cases of male infertility may be due to numerous factors, including genetic mutations causing altered function of the adult reproductive system, infections, cancer, chemotherapy and other drugs, accidents, lifestyle factors, and environmental, including workplace, exposures.

Background information

In recent decades, birth rates across Europe and various other regions have sharply declined to a level below the population replacement threshold of 2.1 children per woman. This trend has resulted in aging societies characterised by shrinking populations of younger individuals and reduced workforce. Although the precise causes behind these reproductive trends remain elusive, it is theoretically conceivable that a combination of socio-economic and biological factors, such as infertility and reduced fecundity, could be contributing to the phenomenon. Below, we outline some key biological factors warranting attention [1-3].

Possible link between environmental exposures and reproductive health

- It has been hypothesised that declines in fertility rates might be linked to environmental exposures causing human reproductive problems and cancer. Exposure to human-made chemicals in foetal life may be of particular relevance [1, 4, 5].

- Several observations suggest that occupational exposures (agricultural, production, transport and labourer occupations) are associated with an increased risk of testicular cancer, significant semen parameters and/or fecundity impairment [6-8].

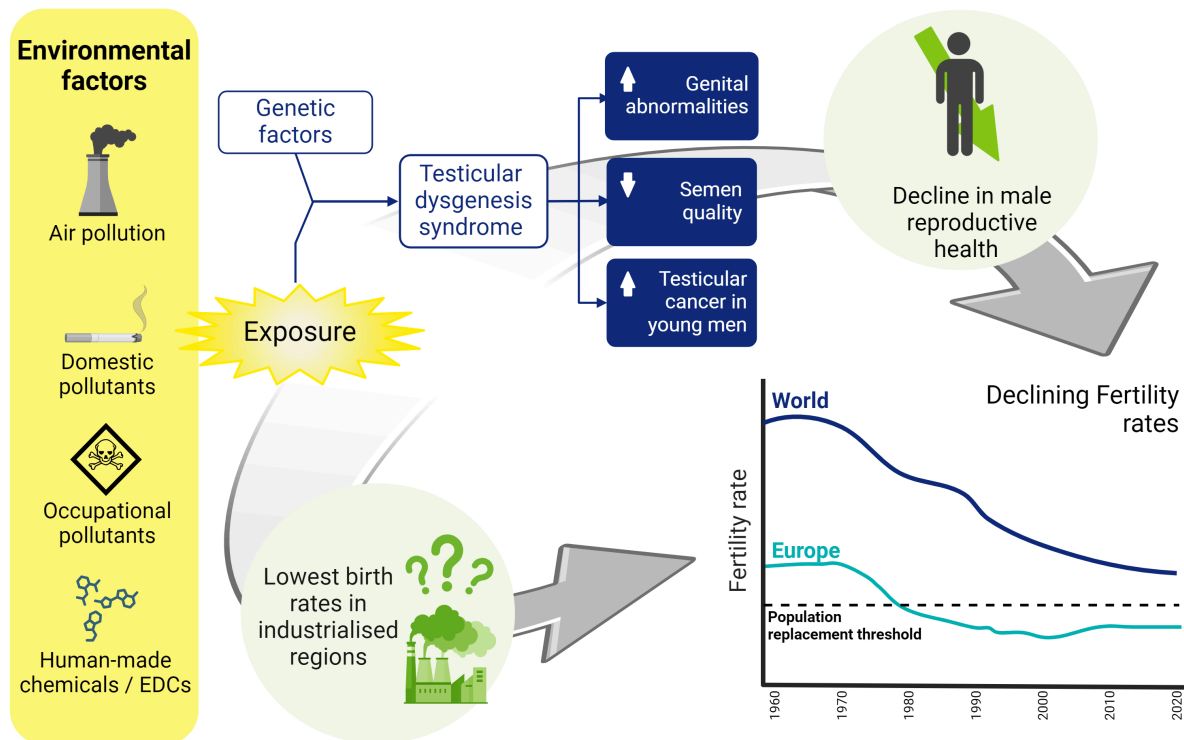


Figure 1: Potential effects of exposure to environmental factors on declining fertility rates (Created with BioRender.com). More detailed information is available in [4].

Clinical management of male reproductive health problems

In certain European and other regions, there are small andrology centres specialising in male reproduction. However, the majority of clinics are not staffed to conduct comprehensive evaluations of male infertility. Consequently, diagnosing the underlying causes of poor semen quality in male partners of couples seeking assistance for infertility can be challenging, if not impossible, for busy clinicians. Often, there is no multidisciplinary team available to investigate past exposures or provide up-to-date endocrine evaluations. Additionally, many infertile couples turn to private clinics that may lack possibilities, ambitions, or tradition for research.

Fortunately, medically assisted reproduction techniques such as IVF, ICSI, and intrauterine insemination using partner or donor semen can provide solutions for many, though not all, infertile couples. Nonetheless, the causes of male infertility and poor semen quality often remain elusive in most cases, even after successful fertility treatments.

Time for action: policies to prevent male reproductive health problems.

The drastic worldwide decline in fertility rates and a parallel increase in male reproductive health problems calls for quick action.

Facilitate Research

- ✓ Induce research strategies to delineate the role of voluntary and involuntary childlessness with a focus on environmental, genetic and social factors linked to infertility, including male genital abnormalities, semen quality, and testicular cancer.
- ✓ Increase funding for multidisciplinary research that involves andrological, gynaecological, social and environmental researchers working with fertility changes. Such research teams should focus on all aspects of childlessness, including the role of environmental chemical exposures and other biological factors in the dramatic shifts in reproductive trends.

Promote Awareness

- ✓ Educate the public about the potential risks posed by environmental contaminants.

Support Prevention

- ✓ Introduce policies, based on emerging knowledge, to limit exposures to the many substances that have already been identified in humans as potential EDCs. Many of these are of concern as potentially harmful for reproduction, although solid evidence is lacking for most chemicals.

References¹

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¹ Only key papers were included. Further detailed references on individual studies can be requested from ESHRE by contacting guidelines@eshre.eu

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