

Is sperm quality deteriorating worldwide? Find out what the experts say.

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Do you know how good the quality of your semen is? Is it as good today as it was 10 years ago? Unless you are getting it tested regularly by a reputable lab, or are fathering babies on a regular basis, you will have no real way of knowing.

In fact it's a complex issue for several reasons. For a start, to measure sperm quality you need to take various things into consideration. It's not just by the number of sperm, but how effectively they swim, whether they look like typical sperm, etc.

But even among fertile men there is a lot of variation in sperm characteristics, so it isn't straightforward to identify what is abnormal for

any particular man. This is unfortunate, because sperm quality is generally considered to be a good [overall measure of health](#), so it's in men's interests to know whether our sperm is in good condition or not.

Sperm quality is not only important to the individual man, but because it has been suggested that men worldwide are experiencing poor sperm quality, this issue has implications for the future of the human race.

Is sperm quality related to fertility rates?

Fertility rates – how many children women have during their life – are in decline worldwide. The 'replacement rate' of 2.1 children on average per woman, is the rate at which a nation can maintain a stable population. In some countries in the developed world, the birth rate is below replacement levels. The implications of birth rates falling below replacement are potentially catastrophic in various ways. For example, with fewer youngsters and more elderly, there is a smaller workforce and therefore fewer people to pay tax towards the care of the elderly.

We know that women are having fewer babies these days, but does this mean men's sperm quality is the cause? A more immediately obvious explanation is that women are choosing to have fewer children or no children, and some women are leaving starting a family too late in life to produce 2.1 or more children.

Sperm quality: as good as ever?

So what do we know about sperm quality today? Well, a debate on this topic was featured in the December 2021 edition of the leading fertility journal in the US, [Fertility & Sterility](#). One side argued that sperm rates are in decline worldwide, and the other side argued there was no real evidence for this. I will review below some of the main points made in this debate.

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Factors that can impact sperm quality

Both sides of the debate agreed on the typical factors that lower sperm. These include: environmental chemicals (e.g. pesticides), smoking, poor diet (especially high-calorie/processed foods), obesity and lack of physical activity. The environmental chemicals implicated in sperm quality are arguably not that common. A pesticide called dibromochloropropane (DBCP) had an impact at one time, but has been banned, and the effects of DBCP on sperm quality in those effected are not permanent.

Smoking cigarettes is an interesting issue. Smoking impacts sperm quality but is not severe, and is reversible upon stopping smoking. However there is “extensive animal and human data” showing that mothers smoking during early pregnancy have a “[strongly negative](#) and irreversible effect” on the sperm quality of their male children in adulthood.

What is the evidence for worldwide sperm crisis?

Although concerns about a worldwide sperm crisis arose in the 1970s, questions about the methodological quality of these studies seemed to allay these concerns. In 1992, a highly influential meta-analysis by [Carlsen and colleagues](#) (cited in other publications 3,800 times) revived the topic, reporting that between the years 1940 and 1990 the average semen volume had decreased by about 20% (from 3.4 to 2.75 mL), and that average sperm concentrations had decreased by about 42% (from 113 to 66 million sperm per millilitre).

Although Carlsen’s meta-analysis attracted a great deal of public and scientific attention, the sceptical side of the debate sees these claims as “[patently false](#)” and that “reliable contemporary data provide a stronger signal that neither semen parameters nor male fertility have changed over the last century.”

Several problems with Carlsen’s conclusions have been highlighted by critics, including the fact that although sperm concentrations are not ‘normally distributed’ statistically, Carlsen had analysed data as if they were. A reanalysis of the data using statistical methods appropriate to ‘non-normal distributions’ did not support Carlsen’s finding of a steady decline in sperm from 1940 to 1990.

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Questions about declining sperm quality went away somewhat until the publication of a new [meta-analysis in 2017](#) in the prestigious *Human Reproduction Update* journal, which added new research to Carlsen’s data set and reanalysed it. Again, there was much public and scientific attention. However, sceptics cited problems with the new meta-analysis. For example, they pointed out that in some cases different laboratories that contributed data to the study gave widely different estimates of sperm quality, even when the sperm sample was from the [same man](#) on the [same day](#).

Supporters of the 2017 meta-analysis claim that there is now sufficient consensus on the topic for everyone to agree that sperm quality has indeed lowered over the preceding 50 years. However not all of their claims are convincing. For example, their claim that consensus on the issue is indicated by a “scarcity of published [challenges](#) to our results”, rings hollow, because lack of published opposition could be interpreted as ‘publication bias’, in other words the result of journal editors simply declining to publish opinions they don’t agree with. Another example of fairly weak evidence for the ‘declining sperm’ view is the claim that consensus is indicated by “statements by official [organizations](#), such as that issued by the United Nations”. This will not impress those who doubt the credibility of the UN, and it’s subsidiary the WHO, especially in relation to views of [men and masculinity](#).

Is it possible to know if sperm quality has declined worldwide?

Sceptics say that the ideal study of worldwide sperm quality is practically impossible to conduct. That’s because it would require thousands of men across the world committed to providing regular semen samples across several decades. In addition, researchers would need to take other relevant variables into account (e.g. changes in diet and exercise), and making sure each laboratory was working to exactly the same high standards of analysis.

Should steps be taken to improve sperm quality?

If there isn't agreement among experts on this topic, then it makes it difficult for the average man to decide what – if anything – they might do to optimise the quality of their sperm. Experts who think that lowered sperm quality is a reality say that men should take reasonable steps that are benign and will be good for them and for the environment: “decreasing unhealthy [lifestyle behaviors](#) such as smoking, poor diet, or lack of physical activity and eliminating toxic environmental chemicals will only serve to improve general health and sustainability.” So men can improve their sperm quality and [the environment](#) at the same time? What's not to like, you might say.

The sceptics note however: “The danger in reporting [inaccurate](#) [findings of lower sperm quality] is the ability for those results to impact how a population is treated, how healthcare is delivered, and how a line of investigation is approached... To preserve the trust of general society, the scientific community cannot jump to conclusions regarding the decline of SCs [semen counts] because the data do not support this conclusion and sensationalized reports will cause undesired harm.” So although it makes sense to have a healthy lifestyle (and help the environment), the sceptics would suggest that this shouldn't be done in the name of improving sperm quality.

The views of the experts on the views of the non-experts

Even though it is recognised that the question of sperm quality impacts “men's self-identity”, the experts don't seem to believe that the general opinion on the topic is well informed. The side who believes sperm quality has fallen, say the issue “has been [largely neglected](#), stemming in part from the traditional assumption that a couples' failure to conceive was the woman's ‘fault’”, with some other types of responses being “emotional, defensive, and nonscientific”. The side who believes sperm quality has not fallen say suggest: “practical concerns regarding male fertility and general health have been stretched by men's rights and alt right groups to fit a [narrative](#) that postulates declining SCs [semen counts] in developed nations is due to the liberalization, feminization, and [decline of Western](#)

[man](#). These erroneous assumptions regarding a decline in semen concentration, therefore, psychologically harm men who view semen parameters as marker of health, fertility, or masculinity.”

It seems to me that until the hard task of high quality international longitudinal research is done, the issue of declining sperm quality remains an open question of legitimate concern to everyone. It is natural that the average man is concerned about this issue, and their views and concerns should not be too quickly dismissed.

Conclusion: stay calm, stay healthy and carry on

The experts don't agree that there is an international problem with sperm quality, and it won't do us much good to presume there is a problem. If you are trying for a baby and having problems, don't leave having your sperm checked until after your partner has been through every possible test. If you find there is a sperm-related problem, there are some simple things you can do to that might help e.g. improve your health by changing your diet, losing weight, or stopping smoking. Take advice from your doctor and fingers crossed all will be ok.

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