



Just the Facts: Biological Sex

The National Institutes of Health defines biological sex (“assigned sex”) as “a multidimensional biological construct based on anatomy, physiology, genetics, and hormones,” also referred to by some as “sex traits.” All animals, including humans, have a sex.

Ideologically Driven Attempts to Redefine Biological Sex

Ideologically driven policymakers have introduced or enacted legislation and policies defining legal sex based on biological characteristics at birth, such as genitalia, chromosomes, or reproductive anatomy.

For example, a 2023 Kansas law defines males and females based on reproductive anatomy at birth, stating that females are individuals whose reproductive systems are developed to produce ovaries, and males are those whose systems are developed to “fertilize the ova” of a female. A 2023 Tennessee statute defines sex as a person’s immutable biological sex as determined by anatomy and genetics at birth.

Such proposals to define sex into two easily determined categories are unsupported by science and oversimplify the intricate nature of human biology. It is crucial to understand that biological sex is determined by biology, not politics.

Medical and Scientific Facts About Biological Sex

- Biological sex is a label assigned by a medical professional at birth based on physical characteristics (genitalia) and other biological determinants. Gender, a sociological and legal construct that varies by culture, is a complex topic that goes beyond the scope of this resource.
- Sexual differentiation occurs during fetal development and is driven by genetic and hormonal factors. This process determines the development of male or female physical traits but can result in a spectrum of outcomes due to variations in genetic and hormonal influences.
- Chromosomal and genetic factors matter. While XX and XY chromosomes are often associated with female and male sexes, variations such as XXY, XYY, and others also occur in an estimated 1 in 1,500 to 1 in 2,000 live births, which amounts to approximately 200,000 to 330,000 Americans based on the current population.
- Primary sex characteristics (genitalia and reproductive organs) and secondary characteristics (e.g., body hair and breast development) are shaped by genetics and hormones. These traits can vary widely among individuals, even within the same chromosomal sex.
- It is not uncommon for individuals to have atypical combinations of chromosomes (e.g., those with Klinefelter syndrome, a common condition that results when a person assigned male at birth has an extra copy of the X chromosome instead of the typical XY), hormones, or anatomy that challenge the binary model of sex assignment. Such natural variation, which is neither a disease nor a disorder requiring medical intervention, illustrates the complexity of biological sex.