

## Mounting evidence that GMO crops can cause infertility and birth defects

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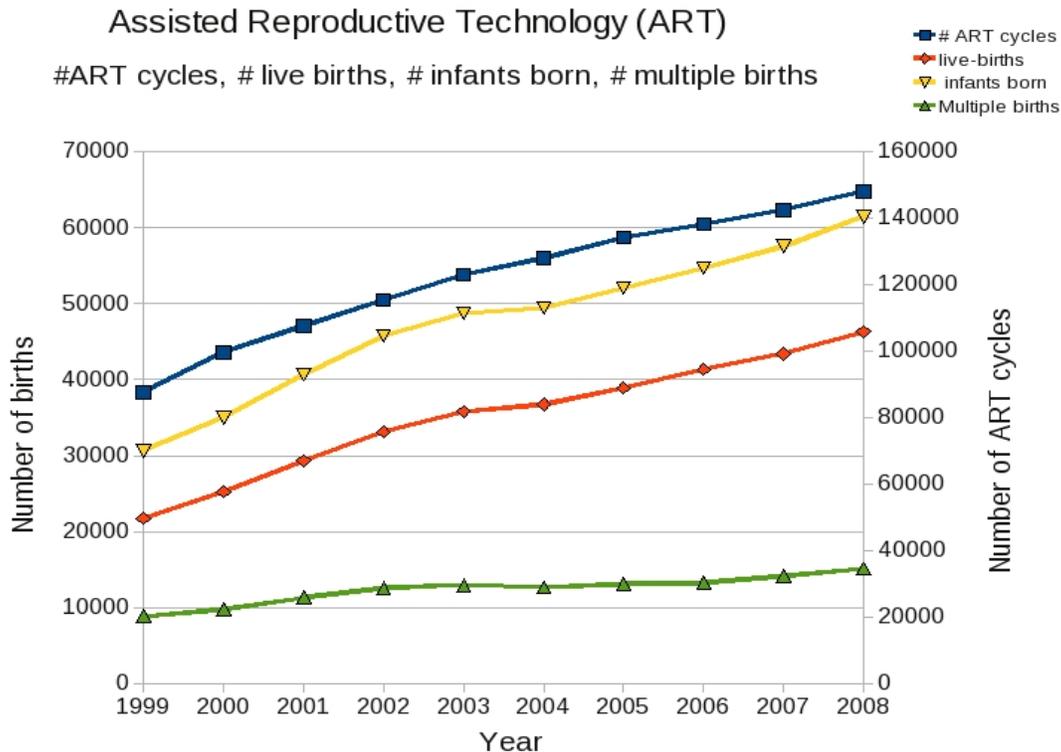
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[The endocrine disrupting](#) properties of glyphosate can lead to [reproductive problems](#): infertility, miscarriage, birth defects, and sexual development (see notes). Fetuses, infants and children are especially susceptible because they are continually experiencing growth and hormonal changes. For optimal growth and development, it is crucial that their hormonal system is functioning properly. There are increasing reports of glyphosates and glyphosate formulations causing sexual dysfunction, low birth weight, fewer births and sterility in laboratory animals, farm animals and humans (see notes). A Russian study found that feeding hamsters GMO soy resulted in [complete sterility](#) after two or three generations.

Glyphosate was first marketed in 1976 and its use has [exploded](#) since the advent of glyphosate-resistant, genetically engineered (GE) crops in 1995. The herbicide-resistant GE crops absorb glyphosate through direct application and from the soil and it cannot be washed off. It is [in the food](#).

### Infertility

According to the Center for Disease Control (CDC), the number of women ages 15-44 with [impaired ability to have children](#) is 6.7 million (10.9%). The number of women ages 15-44 who have ever used infertility services is 7.4 million. According to the graph showing results for Assisted Reproductive Technologies (ART), the number of live births resulting from ART increased 113% from 1999 to 2008. Since ART is expensive and not generally covered by medical insurance, infertility issues affect many more people than this graph shows.

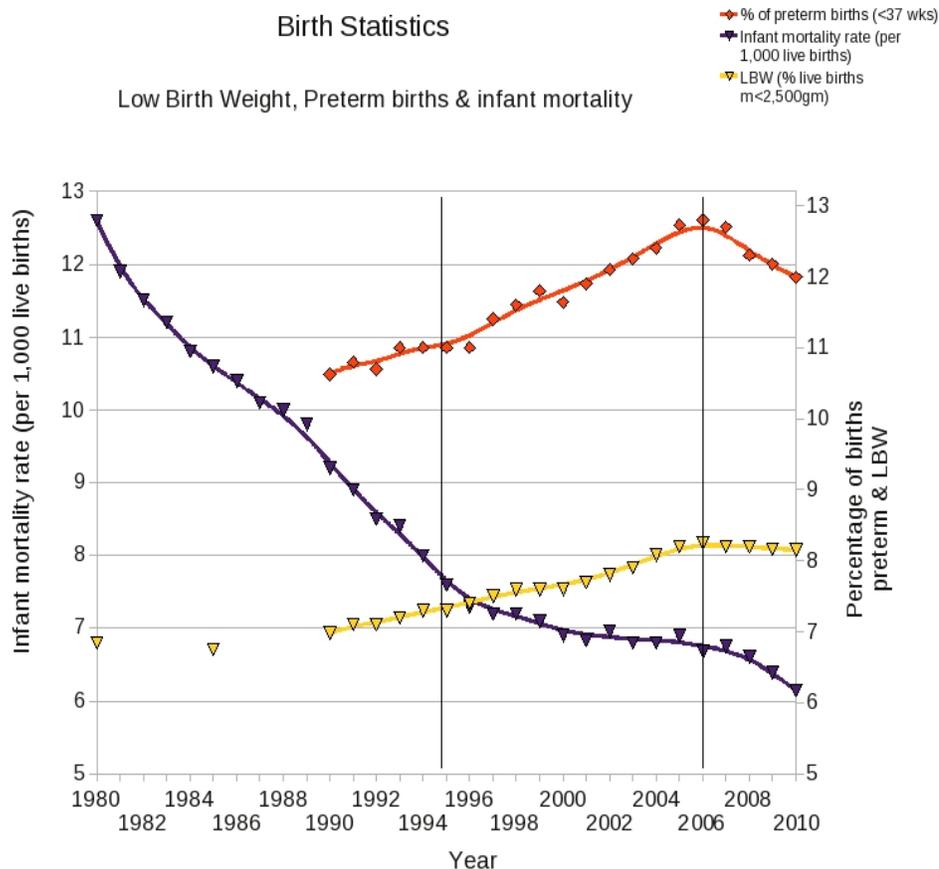


### Birth Statistics

In the U.S., both the percentage of [preterm births](#) and babies born with low birth weight have been slowly increasing since 1990, more steeply increasing from 1995 to 2006 and declining slightly since then (see slide show). The percentage of preterm births (less than 37 weeks of gestation) rose 21%

from 1990 through 2006 (16% from 1995-2006) and has since declined but is still 10% higher than in 1990. The percentage of babies born with low birth weight (LBW, less than 5lb 8oz.) rose 19% from 1990-2006 (14% from 1995-2006) and have also declined slightly since then but are still 17% higher than in 1990.

Interestingly, a report by [Hamilton](#) et al. for the Center for Disease Control (CDC) shows a drop in both the fertility and birth rates in the U.S. since 2007. Perhaps the women at highest risk are no longer able to become pregnant.



The infant mortality rate in the U.S. has been steadily dropping for decades, until 2000. According to the CDC, the infant mortality rate dropped 40% from 1980 to 1995 and 19% from 1995-2010 with no drop in the period from 2000-2005. It has dropped less than half as much in the last 15 years as in the previous 15 years.

The second highest cause of infant mortality is complications due to [preterm birth or low birth weight](#). This, along with maternal complications of pregnancy were both increasing, along with the increase in preterm births and LBW in live births. There has been conjecture that LBW and preterm births may be due to the increase in ART births, since multiple births are more likely to result and these problems are more common in multiple births. This cannot be the case because the ART graph shows that the number of multiple births did not change from 2002 to 2006, during the period of steepest increase.

The slight drop in these statistics since 2006 may be because of growing awareness at that time of endocrine disrupting BPA (bisphenol-A) & phthalates in plastics. The U.S. Consumer Product Safety Improvement Act, passed in 2008, banned the use of phthalates in children's products.

Only one generation has passed since the introduction of GE crops so it may be a bit early for the full effects to become apparent but the data trends are showing that strange things are happening.

### **Birth defects**

The leading cause of infant mortality in the U.S. is congenital birth defects. There have been reports that glyphosate is toxic to placental, umbilical and embryonic cells (see notes). The placenta, via the umbilical chord, is responsible for delivering vital nutrients and eliminating waste products to and from the fetus. Once the placenta and/or umbilical has been damaged or destroyed, the result can be miscarriage or birth defects. Birth defects due to exposure to glyphosate and glyphosate formulations have been reported for [amphibians](#) and for [humans](#) (see notes).

[Research at Johns Hopkins University](#) shows that women with thyroid disease are at a high risk of delivering infants with birth defects. [Strong correlation](#) was shown between cancer of the thyroid and glyphosate use on corn and soy crops and that thyroid cancer affects women more than men.

Birth defects have not been increasing in the U.S., but in the soy-producing regions of Argentina, they have been skyrocketing. In 2010 the [University of Cordoba](#) released a report showing that the incidence rate of birth defects in South America has increased by 347% from 1997 to 2008, which they claim is linked to areal spraying of glyphosate on soy crops. People in Argentina began reporting problems in 2002, two years after the first big harvests of GM Roundup Ready soy. “San Jorge in Santa Fe, San Nicolás in [Buenos Aires](#), Ituzaingó neighborhood in Córdoba, and La Leonesa in Chaco, are only some of the places where the increased number of cancer cases, birth defects, reproductive and endocrine disorders, have been suffered and detected ever since systematic pesticide spraying has become commonplace.”

There are many endocrine disrupting chemicals in our environment and in our food. The huge increase in the amount of glyphosate applied to GE food and feed crops has significantly increased our exposure to endocrine disrupting chemicals. Much more research is needed to study the effects.

### **Notes:**

#### ***Infertility and low birth rates:***

##### **Laboratory animals:**

In 1995 [Yousef](#) et al. reported on toxic effects of glyphosate on semen characteristics in rabbits, “Pesticide treatment resulted in a decline in body weight, libido, ejaculate volume, sperm concentration, semen initial fructose and semen osmolality. This was accompanied with increases in the abnormal and dead sperm.”

In 2002 [Markaverich](#) et al. found that, “Housing adult rats on ground corncob bedding impedes male and female mating behavior and causes acyclicity in females.”

In 2008, [Austrian researchers](#) found that mice fed GM corn produced fewer and smaller babies than those fed a non-GM diet.

In April 2010, a [Russian study](#) found that after feeding hamsters GM soy for two years over three generations, most were sterile by the third generation.

2011 [Siepmann](#) et al. reported, “Hypogonadism and erectile dysfunction associated with soy product consumption,” in a 19-year old male (who was also diabetic). Unfortunately, they didn't make the connection that the soy was almost certainly GE.

In 2012 [Antoniou](#) et al. published a review of the evidence of the reproductive toxicity of glyphosate herbicides and concluded that a new and transparent risk assessment needs to be conducted.

In 2012 [Irina Ermakova](#) reported low birth weight and a 55.6% mortality rate in the babies of rats fed GMO soy compared to 6.8% in the control group.

#### **Farm animals:**

[An Iowa pig farmer](#) reports sterility and false pregnancies in pigs fed GMO corn.

[ADanish pig farmer](#) reports birth defects, infertility and low birth rate in pigs fed GMO corn. ([English version](#)).

#### **Humans:**

In 2001 [Arbuckle](#) et al, reported on the effect of pesticide exposure on the risk of spontaneous abortion in Ontario. “For late abortions, preconception exposure to glyphosate ... was associated with elevated risks. Postconception exposures were generally associated with late spontaneous abortions. Older maternal age (> 34 years of age) was the strongest risk factor for spontaneous abortions, and we observed several interactions between pesticides in the older age group.”

#### **Birth defects:**

##### **Cells:**

In 2005, [Richard](#) et al. reported that “glyphosate is toxic to human placental JEG3 cells within 18 hr with concentrations lower than those found with agricultural use, and this effect increases with concentration and time or in the presence of Roundup adjuvants.”

In 2009, [Benachour](#) et al. evaluated the toxicity of four glyphosate (G)-based herbicides in Roundup formulations on three different human cell types using a dilution far below agricultural recommendations and corresponds to low levels of residues in food or feed. They reported that glyphosate formulations induce apoptosis and necrosis in human umbilical, embryonic, and placental cells.

##### **Amphibians:**

In 2010, [Paganelli](#) et al. injected low doses (lower than levels used in fumigating) of glyphosate into amphibian embryos and recorded brain, intestinal and heart defects in the fetuses. Effects included reduced head size, genetic alterations in the central nervous system, increased death of cells that help form the skull, deformed cartilage, eye defects, and undeveloped kidneys. In addition, the glyphosate was not breaking down in the cells, but was accumulating. According to the authors these results are “completely comparable to what would happen in the development of the human embryo.”

##### **Humans:**

[In 2009, Mesnage](#) et al. reported two cases of birth defects in the same family in France after multiple pesticide exposure. “Many pesticides were used by this family around pregnancies. The father sprayed, without protection, more than 1.3 tons of pesticides per year including 300 liters of glyphosate based herbicides.”

In 2009, [Winchester](#) et al., reported, “Elevated concentrations of agrichemicals in surface water in April–July coincided with higher risk of birth defects in live births with LMPs [last menstrual periods] April–July.”

**Data sources:**

ART data: [CDC](#)

Infant mortality data: [CDC](#)

LBW and preterm birth data: [CDC](#) and [CDC Interactive tables](#)