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ASHES, Vol. 18(8) - Any amount of cigarette smoking 3 months before and during pregnancy can lead to birth defects in infants

Globally, about [8 million infants](#) are born with severe congenital anomalies (also known as birth defects) in a given year. Birth defects can be caused by a variety of factors, including [smoking cigarettes during pregnancy](#)^[1]. However, research linking smoking while pregnant to birth defects is [not consistent](#), possibly because the links depend on the timing of the smoking and the type of congenital anomalies. This week, ASHES reviews [a study by Lili Yang and colleagues](#) that closely examined birth congenital anomalies and cigarette smoking during pregnancy.

What were the research questions?

Is smoking cigarettes during pregnancy associated with birth congenital anomalies, and is this association impacted by the timing/intensity of smoking or the type of congenital anomaly?

What did the researchers do?

The researchers gathered U.S. nationwide birth certificate data from the [National Vital Statistics System \(NVSS\)](#) between the years of 2016-2019. They collected information about the mother at the time of delivery, including [retrospective](#) reports of smoking 3 months before pregnancy and during pregnancy at each trimester, as well as medical record data, including infant congenital anomalies. A total of 12,144,972 births were included in the study. The authors used [Poisson regression analysis](#) to examine the association between maternal smoking (before, and/or during pregnancy) and 12 congenital anomalies. They accounted for various [confounding variables](#) (e.g., [eclampsia](#) and [gestational diabetes](#)), as these could potentially be related to both maternal smoking and birth defects.

What did they find?

Out of the 12,144,972 mothers, 9.3% of them smoked 3 months before pregnancy and 7.0%, 6.0%, and 5.7% smoked in the first, second, and third trimesters, respectively. Mothers who smoked any cigarettes before pregnancy or while pregnant (regardless of trimester) were at increased risk for six congenital anomalies, including gastroschisis, limb reduction defect, cleft lip with or without cleft palate, cleft palate alone, congenital diaphragmatic hernia, and hypospadias (see Figure). Intensity of smoking mattered little; babies whose mothers smoked as little as 1-5 cigarettes per day (the lowest category of intensity) were at increased risk for congenital anomalies. Those who smoked before pregnancy but then quit smoking in any trimester did not experience a reduction in risk for congenital anomalies.

There was no association between maternal smoking (at any time during pregnancy) and other congenital anomalies not depicted in the Figure, including Down Syndrome, spina bifida, and anencephaly.

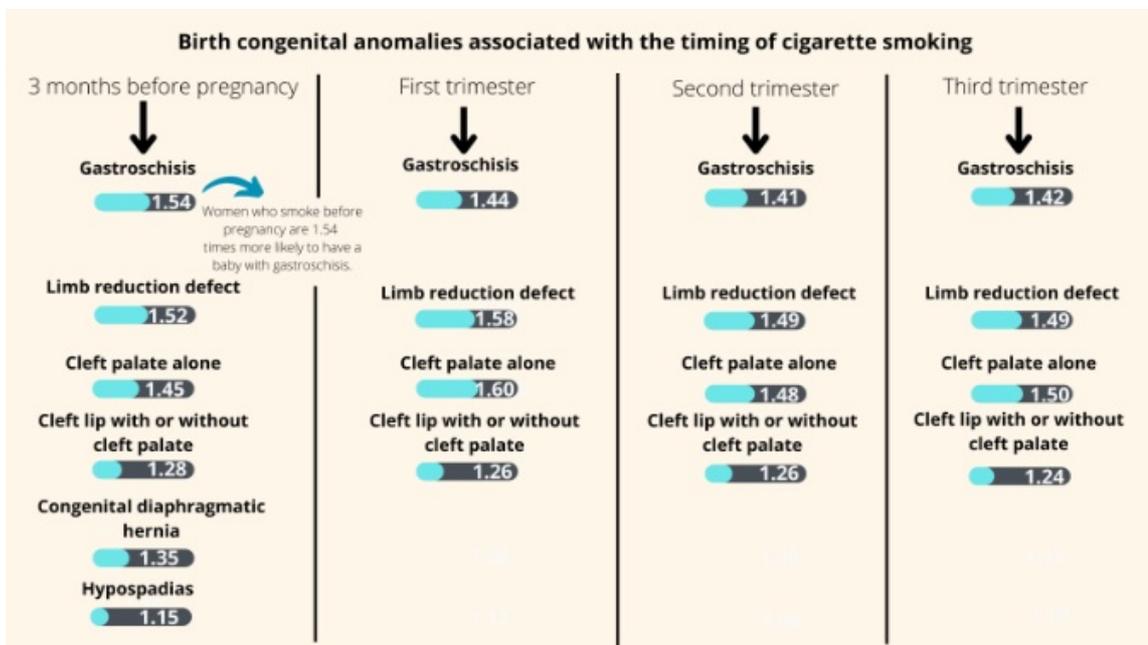


Figure. This Figure depicts the [statistically significant risk ratios](#) of birth congenital anomalies that are associated with any cigarette smoking before pregnancy and each trimester thereafter. Click image to enlarge.

Why do these findings matter?

Many people still believe [smoking before or early in pregnancy is safe](#). However, this study shows that there is no safe time to smoke during, and at least three months before, pregnancy. The risk associated with congenital anomalies persisted even if a person smoked three months before their pregnancy and stopped during pregnancy, suggesting that the [time period to prevent congenital anomalies](#) is potentially sometime before conception. These findings highlight the importance for the healthcare systems to emphasize pre-pregnancy care and knowledge dissemination of the dangers of smoking to all aspiring parents.

Every study has limitations. What are the limitations in this study?

Cigarette smoking was self-reported and could be subject to bias. This study only identified congenital anomalies that were indicated at birth; however, some congenital anomalies do not appear until later on in life. Lastly, researchers adjusted for a variety of confounders, but did not account for [secondhand smoke vulnerability](#), [marijuana use](#), [e-cigarette use](#), or [alcohol consumption](#) which may also impact a developing fetus.

For more information:

[The American Lung Association](#) provides support for those who have a desire to quit smoking. [March of Dimes](#) provides information around the dangers of smoking while pregnant and tips to help you quit smoking. For additional smoking self-help tools, please visit our [Addiction Resources page](#).

--Nakita Sconsoni, MSW

What do you think? Please use the comment link below to provide feedback on this article.

1 We are using this inclusive language rather than "maternal smoking" because we recognize that some trans men, non-binary, and gender non-conforming people give birth. When describing Yang's study in particular, we use the term "maternal smoking" because the researchers only studied mothers. [Click here](#) to learn more about the importance of inclusive language. [Click here](#) to read a study about trans mens' pregnancy experiences.

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