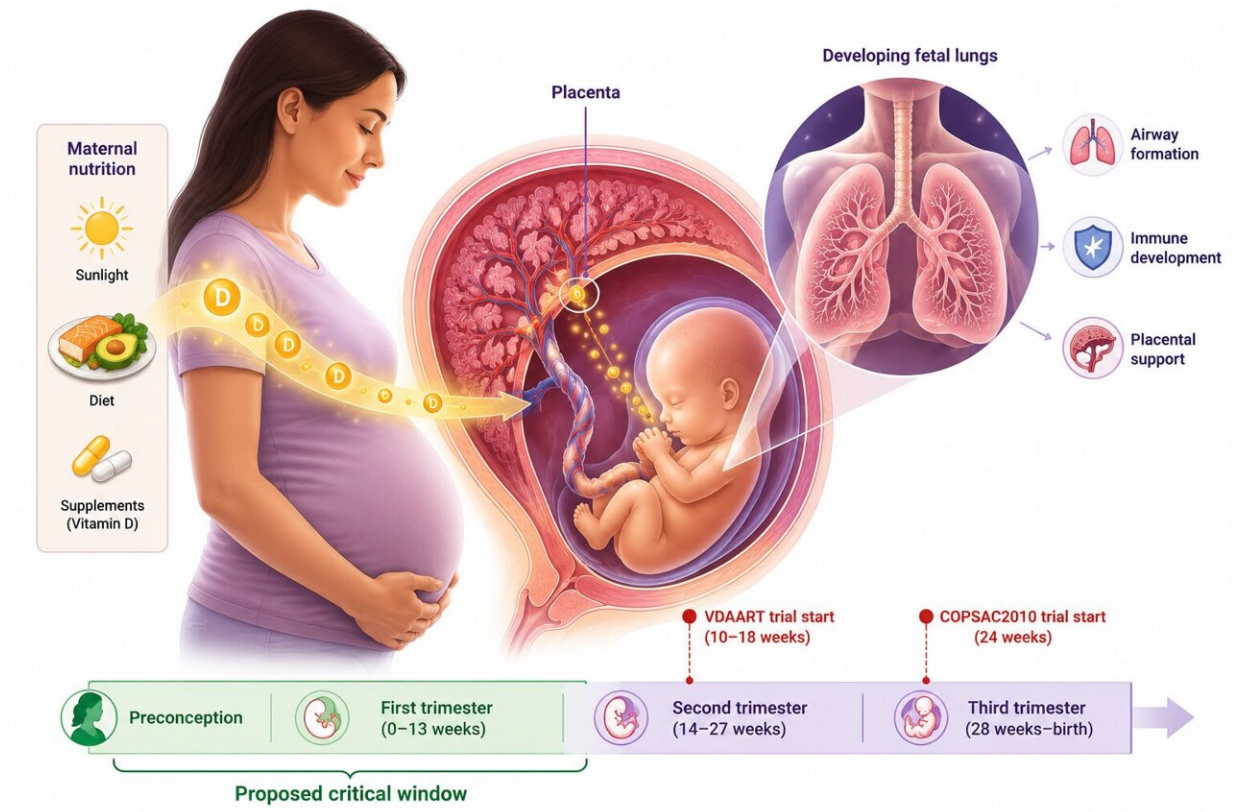
A baby's lungs may begin responding to vitamin D sooner than scientists once thought

August 10 2026, by Sayan Tribedi



The pathway from maternal vitamin D—obtained through sunlight, diet, and supplements—to the placenta and the developing fetus. It highlights the placenta as the bridge between mother and baby and illustrates how vitamin D may support early airway formation, immune development, and placental function during the first trimester. The image reflects the review's central hypothesis that maintaining adequate vitamin D before conception and in early pregnancy could be more important than starting supplementation later, when key stages of lung development have already occurred. Credit: Generated by AI for illustrative

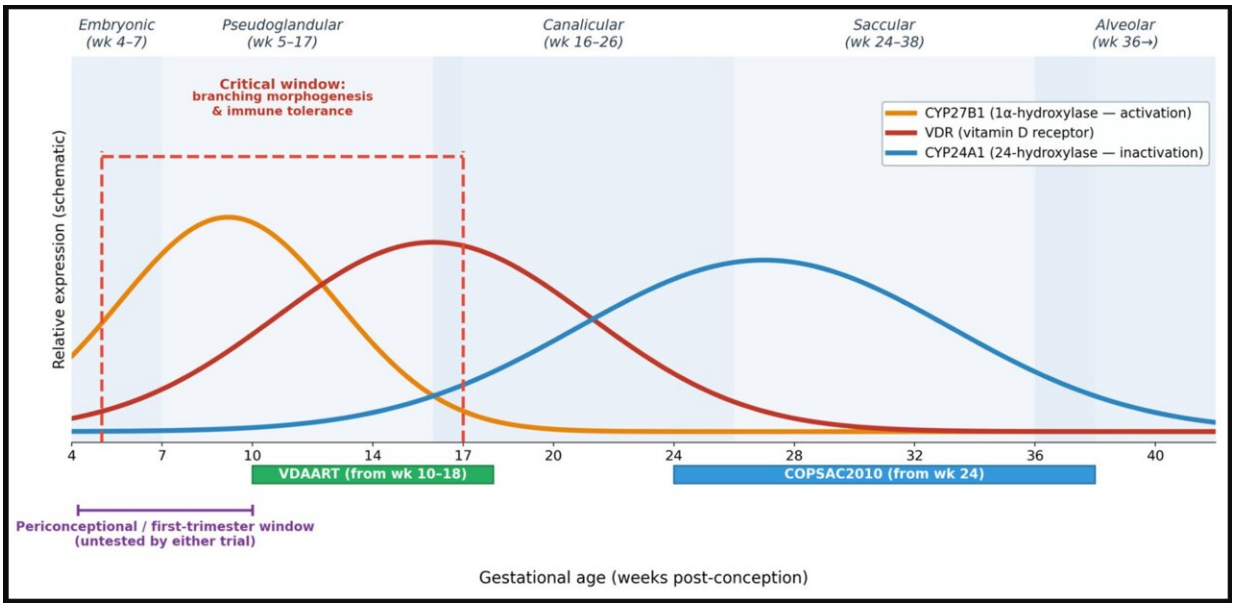
Many pregnant women around the world are low in vitamin D. This is a very common issue that has prompted inquiries over the years. It is believed that low levels in pregnant women can cause harm to fetal development. Currently, scientists are asking a controversial question. What if the key time for vitamin D effects is before a woman knows that she's pregnant? By week 16 of pregnancy, the structural makeup of their developing airways—that is, the blueprint of breathing—is complete.

This timing begs an interesting question. According to a recent review published in *Nutrients*, it is not the amount of the nutrient that is important. Rather, it is the timing of the availability of vitamin D.

In short, this is the most important factor that would help us understand childhood asthma. New research suggests that there should be more focus on supplementation during the initial weeks, even before conception. The bulk of the early lung development generally occurs by the time clinical trials first start taking place.

Trials started late, and findings were modest

All vitamin D studies were conducted after conception, never before. In one study (COPSAC), children aged 3 years had nearly 20 to 25% less risk of wheezing if mothers took a vitamin D supplement; however, it was not statistically significant. A similar trial in America (VDAART) showed a small decrease in asthma symptoms at the start of the trial, but it declined later on. Both trials indicated that there is reduced wheezing, but without definite results outside the trial.



This timeline highlights a potential gap in previous vitamin D trials. Much of the fetal airway's branching occurs in the earliest weeks of pregnancy, while the largest supplementation trials started later. The review proposes that vitamin D status before conception or during the first trimester may be more important than previously recognized for influencing a child's future respiratory health. Credit: Oana Raluca Temneanu et al, Timing over Dose: Maternal Vitamin D, Periconceptional Window, and Early-Life Respiratory Programming, *Nutrients* (2026). DOI: 10.3390/nu18142333

A 2025 Cochrane review affirms this trend. The research found that giving a high dose of vitamin D during pregnancy probably protects against wheezing in childhood, though it probably makes "little to no difference" to doctor-diagnosed asthma. Giving more vitamin D to pregnant women lowered wheezing in toddlers on average but did not convincingly prevent an asthma diagnosis.

Notably, these studies pointed out that all these trials started quite late and usually measured vitamin D only once. The writers say that these

designs yield only "weak evidence against the periconceptional hypothesis because they were not designed to test it."

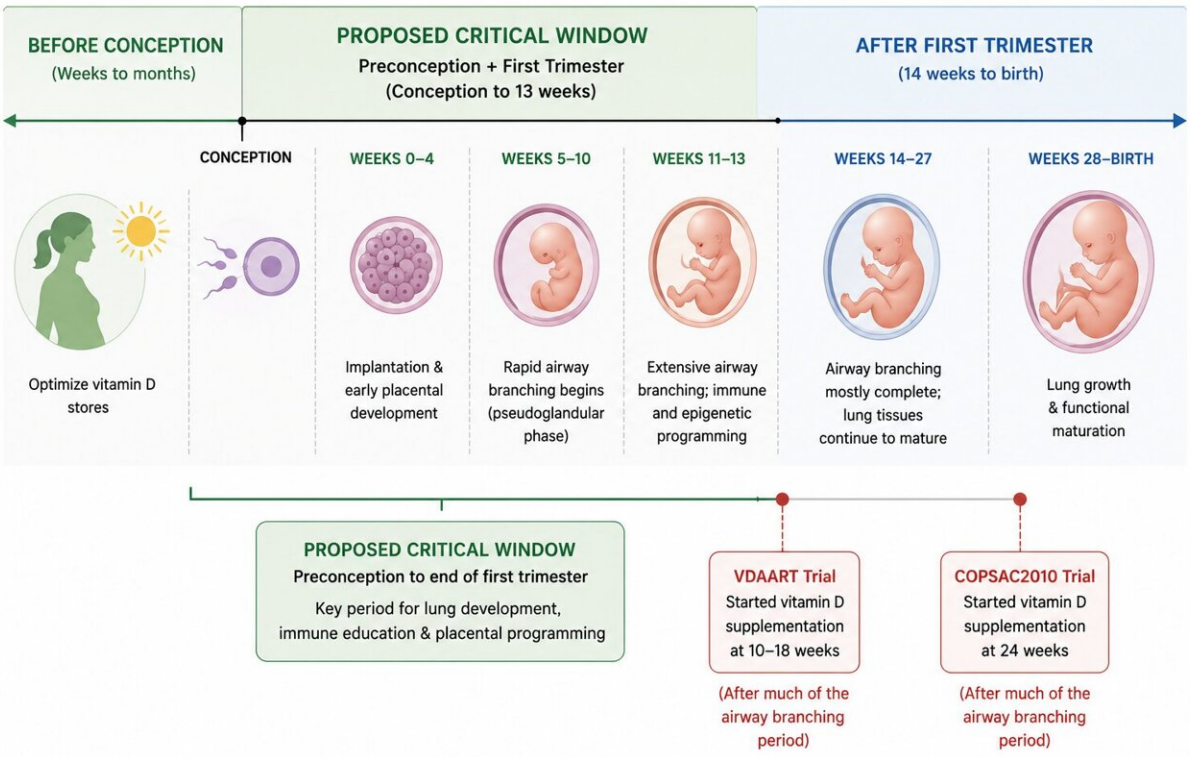
Clues from data and subgroups

Why were the results of the trials inconclusive? First of all, the effects differed based on baseline vitamin D levels and other variables. In various secondary analyses, the effects of vitamin D supplementation on respiratory outcomes were found to be stronger in the subgroups of mothers whose baseline vitamin D levels were sufficient and in subgroups with certain genetic markers or lower body weight.

Additionally, a recent meta-analysis of the trial data has shown that the mothers' level of vitamin D throughout their pregnancy (accounting for weight and baseline vitamin D levels) was related to better respiratory outcomes of their children and a lower incidence of asthma. In the study, high levels of vitamin D throughout pregnancy (calculated using the area under the curve) correlated strongly with lower asthma in children aged 6.

However, these clues are insufficient evidence. Post-hoc subgroup analyses only generate hypotheses but cannot confirm who truly benefits. The different trials also used different vitamin D doses, definitions of asthma, and ages at follow-up. This made it hard to compare.

Several studies took place in Europe and North America, making the results difficult to apply to places that experience more extreme vitamin D deficiency.



The illustration highlights the period from preconception through the first trimester as the stage when vitamin D may have the greatest influence on fetal lung and immune development. Markers show that the two largest vitamin D supplementation trials began later in pregnancy—around 10–18 weeks (VDAART) and 24 weeks (COPSAC2010)—after much of the earliest airway development had already occurred. The figure summarizes the review's central hypothesis: that when vitamin D is available, rather than simply how much is given, may be key to understanding its potential role in reducing childhood wheeze and asthma. Credit: Generated by AI for illustrative purposes

Timing might outweigh dose

The main takeaway is this: taking vitamin D before pregnancy might matter more than taking huge doses afterwards.

In the early weeks, when the fundamental branches of the lungs are established, it is likely that vitamin D benefits airway programming the most.

The review noted that none of the large trials, in fact, tested giving vitamin D pre-conception or in the first trimester. If timing matters, starting the supplements after 20 weeks may have been too late. The authors argue that focusing on a higher dose in late pregnancy won't uncover an asthma-prevention effect if it was needed earlier.

Looking to the future, the researchers call for new trials that begin several weeks before conception and continue through early pregnancy. They also suggest measuring vitamin D repeatedly (not just once) and following children longer, with objective lung tests. Such studies could identify if a "vitamin D vacuum" in early pregnancy leaves lungs more vulnerable to asthma.

A cautious conclusion

For now, while there are some hints, the proof isn't conclusive. "Trials performed are weak evidence against the periconceptional hypothesis," the authors write—meaning that although trials haven't proven the hypothesis that preconception vitamin D levels matter, they've also done nothing to disprove it; they weren't designed to answer that specific question.

Women who are pregnant or plan on becoming pregnant should have adequate vitamin D for established reasons (bone formation, immune function, etc.) regardless of whether it will help prevent asthma later. However, a claim like "vitamin D prevents childhood asthma" would be jumping the gun.

An interesting public health problem comes up in thinking about the

results of this research: because women often only discover that they are pregnant after their fetus has developed lungs, can adequate vitamin D levels beforehand be the tipping point? This points to the importance of "preconception care"—optimizing health and nutrient levels even before pregnancy begins.

More information: Oana Raluca Temneanu et al, Timing over Dose: Maternal Vitamin D, Periconceptional Window, and Early-Life Respiratory Programming, *Nutrients* (2026). DOI: 10.3390/nu18142333

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