when health begins

what you need to know

When Health and Disease Begin

A steady stream of research has shown that diseases such as diabetes,[1] heart disease,[2] stroke,[3] osteoporosis,[4] and high blood pressure[5] originate from impaired growth during pregnancy and infancy.[6] Prenatal factors contributing to premature birth,[7] obesity,[8] ADHD,[9] conduct disorder,[10] asthma,[11] lung disease,[12] and other conditions are also emerging.

Nutrition before and during pregnancy and during infancy greatly influences how babies grow. Babies who grow normally are relatively protected from future disease[13] while low birth weight babies and babies born thin or short are at risk.[14]

Prenatal Conditions Determine Risk

During early development, body systems go through critical phases when rapid growth occurs and vital functions are established.[15] An embryo or fetus lacking essential nutrients or oxygen, or exposed to harmful substances such as tobacco and alcohol, may have to adapt by limiting the size and altering the function of some organs. These adaptations may increase the risk of certain diseases later in life.[16]

For example, the filtration units of the kidneys, called nephrons, stop forming around 33 weeks after fertilization.[17] Undernutrition prior to that time may limit the number of nephrons and increase the future risk of high blood pressure.[18]

Lifelong Nutrition Matters!

A pregnant woman's ability to provide a healthy prenatal environment for her baby depends in part on her overall health, whether she uses harmful substances such as tobacco and alcohol, and of course, her diet during pregnancy.[19] It also depends on her lifelong nutritional history, which helps determine her muscle mass, bone mass, and vital stores of fat, vitamins, and minerals.[20] All of these elements are crucial for the growing embryo and fetus—and the breastfeeding infant.

Prevention Begins with Prenatal Education

This research is revolutionizing our understanding about the ways a woman's lifelong health and nutrition influence prenatal growth, and shape every child's lifelong health and cognitive ability.

The way to dramatically enhance public health is now clear. Improve the health and nutrition of girls and young women before, during, and after pregnancy. Protect the embryo, fetus, and infant from harmful substances. Encourage breastfeeding. Improve infant and child nutrition.

Shaping the future begins with prenatal education.

> **"If we protect the health and nutrition of girls and young women, we can make an end of heart disease and diabetes."**
> David J. P. Barker, M.D., Ph.D.
> From *Nutrition in the Womb*,
> The Barker Foundation, 2008

Barker's Theory of Fetal Programming

English epidemiologist David Barker and his associates at the University of Southampton discovered much of what is known about the lifelong impact of early growth and development. Their pioneering work has ushered in a new field of medicine and a whole new way of promoting health and preventing disease.

"Fetal programming" is the phrase often used to describe permanent changes resulting from the prenatal environment.[21]

Associations Between Prenatal Factors and Lifelong Health

Before and/or during pregnancy…

When a mother lacks:	…Then her baby is more likely to develop:
Folic acid	Spina bifida,[22] preterm birth[23]
Iodine	Brain damage,[24] hypothyroidism[25]
Vitamin D	Osteoporosis[26]
Vitamin E	Asthma[27]

During pregnancy…

When a mother:	…Then her baby is more likely to develop:
Experiences excess stress and anxiety	Attention Deficit Hyperactivity Disorder (ADHD) and anxiety[28]
Smokes cigarettes	ADHD,[29] conduct disorder,[30] obesity,[31] diabetes,[32] heart disease,[33] preterm birth,[34] stillbirth,[35] SIDS*[36]
Drinks alcohol	Fetal Alcohol Syndrome,[37] alcohol abuse,[38] conduct disorder,[39] ADHD,[40] preterm birth[41]

*Sudden Infant Death Syndrome

Hope for the Future

It is important to keep in mind that, although these prenatal factors increase the risk of certain complications, they in no way guarantee that *any* complication will occur.

Anyone who experienced a less-than-ideal pregnancy should not panic or lose hope. Even if a problem develops, most are treatable and many have other risk factors that can be modified to minimize risk. The good news is that new ways to minimize long-term consequences have already been discovered.[42]

Nevertheless, given the many associations between prenatal events and lifelong health that have been reported worldwide, it is imperative to do all we can to improve women's health and nutrition starting long before pregnancy, and during pregnancy and breastfeeding.

Shaping the Future Through Prenatal Education

If everyone better understood early human development and the many ways in which a mother's health and nutrition influence the lifelong health of her baby, many people—women and men—would behave differently toward pregnancy and pregnant women. Additionally, improving the health and nutrition of girls of all ages would become the high priority it should be.

Effective prenatal education has the unique potential to improve the health and save the lives of millions of people worldwide. Education is also the key to sharply reducing medical and special education costs—and human suffering.

Three Guidelines for Effective Prenatal Education

- **Make pregnancy real** – Use the best prenatal imagery available to showcase the embryo's surprisingly rapid growth and amazing complexity—in spite of its small size and young age. Let people see the fetus in action. For many people, early development is an "out of sight, out of mind" process. Seeing development unfold transforms pregnancy into a reality. **Images plus words trump words alone.**

  To quickly and easily "make pregnancy real," show everyone *The Biology of Prenatal Development* DVD. Doing so provides viewers with a visual and scientific framework in which to place related health information.

- **Make pregnancy relevant** – Clearly explain how a mother's health and nutrition before and during pregnancy profoundly influence the lifelong health of her baby. Cite examples such as the long-term benefits of preconception folic acid and the dangers of tobacco and alcohol use during pregnancy. Motivate behavior change by helping everyone appreciate the lifelong consequences of preconception and prenatal events.

- **"Start early, include everyone possible, and…don't ever stop"*** – Apply this strategy common to many successful public health initiatives. Educate those already pregnant as well as young adults at risk of pregnancy and their families. Include all students starting at age 12—hopefully well before they are involved in pregnancy-related issues.

*Quote by Catherine D. DeAngelis, M.D. (editor), from *Arch Pediatr Adolesc Med,* 1999, 153(3):226

"Until I saw the video [4-D ultrasound] of Katy at 20 weeks old, I could not relate to this lump growing inside me enough to want to give up my cigarettes.

But as soon as I saw the beautiful pictures of my daughter, it felt criminal to do anything which might cause her harm.

I stopped smoking straight away, gave up my glasses of wine and concentrated on making myself as healthy as possible to give Katy the best possible start in life."

From "Womb View Boost for Expectant Parents," BBC News, July 6, 2001

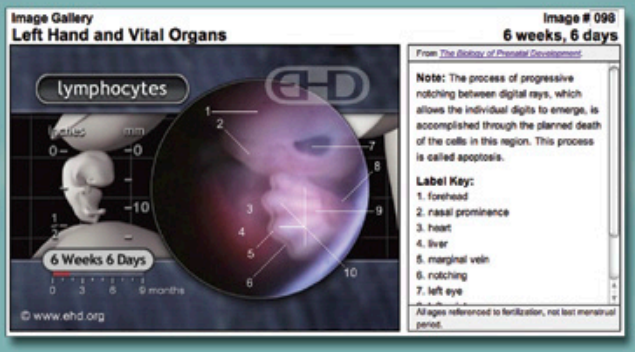
Conclusion

Making pregnancy real and relevant to an entire generation is an exciting new strategy to prevent birth defects, learning disabilities, and chronic disease and to improve lifelong health for everyone.

As an educator, medical professional, parent, grandparent and/or concerned citizen, you are uniquely positioned to educate students, patients, colleagues, families, and countless others in your community. Help give the gift of health to current and future generations.

For more information and to learn how you can help, visit www.ehd.org/learn-more.

Register at www.ehd.org
to access all of our free educational resources



Pregnancy Calendar and Journal

Image Gallery

Movie Theater

Slide Shows

Timelines

Quizzes

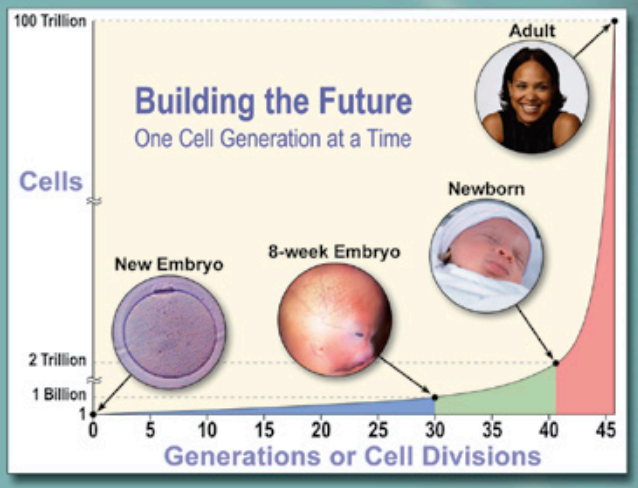
Fact Sheets

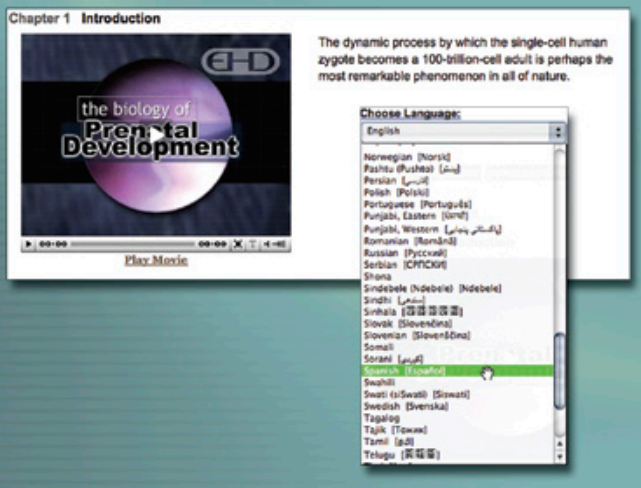
Articles

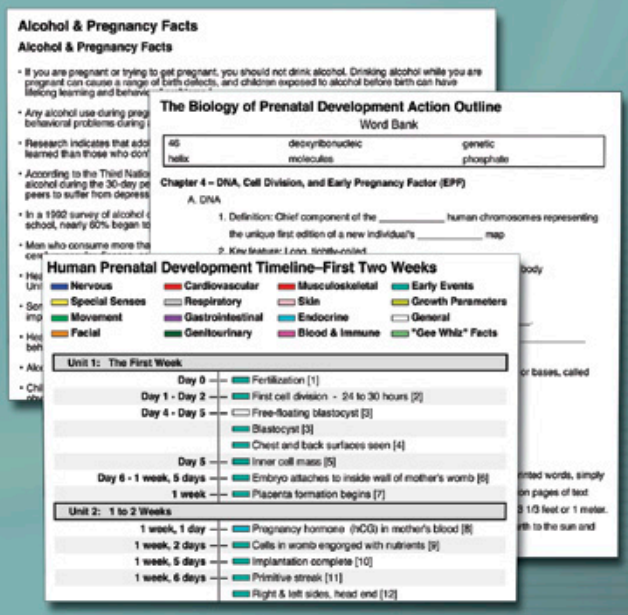
Data & Statistics

Study Aids

...and more!







Understanding the "When Does Health Begin?" Poster (inside)

Find out when various aspects of lifelong health are established.

Health begins long before pregnancy

A pregnant woman's ability to supply her developing child's nutritional needs is shaped, in large measure, by the adequacy of her own stores of fat, muscle, calcium, iron, folic acid, etc.[43] Her stores are determined, in part, by her health, growth pattern, and nutrition starting from the time of her own conception.[44]

Good nutrition and health over a lifetime are the best preparation for delivering healthy children!

Health begins at conception

Around the time of conception, folic acid deficiency may lead to birth defects of the spine and brain, the most common of which is spina bifida.[45] Taking daily folic acid supplements starting at least one month prior to conception prevents up to 70% of these defects.[46]

Good nutrition helps prevent birth defects and prematurity.

A recent study found that taking folic acid daily for one year prior to conception reduced severe premature birth by 70% and moderately severe premature birth by 50%.[47]

Health begins in early pregnancy

All body systems develop during the first eight weeks after conception[48]—before many pregnant women are even aware that they are pregnant!

Undernutrition starting early in pregnancy tends to produce babies proportionally reduced in overall size and with internal organs containing fewer cells and altered function.[49] These babies may be more prone to future disease[50] and their internal organs may start to wear out before old age.[51]

Good nutrition slows the aging process. Avoiding tobacco promotes lifelong health!

Prenatal tobacco use reduces delivery of nutrients and oxygen (to mother and baby)[52] throughout pregnancy and increases the child's risk of obesity,[53] type II diabetes,[54] and lung disease.[55]

Health begins in middle and late pregnancy

Undernutrition later in pregnancy may selectively impair rapidly growing organs with significant long-term consequences.[56]

Good nutrition helps prevent chronic disease.

Undernutrition of the:	May lead to future:
Kidneys	High blood pressure,*[57] renal insufficiency[58]
Muscles	Insulin resistance* and type II diabetes,*[59] sarcopenia[60]
Liver	Hyperlipidemia,*[61] abnormal clotting*[62]
Pancreas	Impaired insulin production, type II diabetes*[63]

*Elevates risk of cardiovascular disease (heart attack, stroke, and peripheral vascular disease)

Health begins in infancy

Nutrition and growth during infancy helps establish each individual's lifetime risk of conditions such as type I diabetes,[64] osteoporosis.[65] It is best for most babies when well-nourished mothers breastfeed exclusively for the first six months.[66]

Good nutrition pays dividends for life!

So, when does health begin?

Lifelong health begins long before pregnancy, during pregnancy, and during infancy.

Please visit www.health-begins.org for more information and full scientific references.

When does health begin?

14-year-old teen

a. long before pregnancy

b. conception

1-cell embryo

7½-week embryo

c. early pregnancy

29-week fetus

d. middle & late pregnancy

9½-week infant

e. infancy

f. All of the above

Find out why at:

www.health-begins.org