



# *The Healthy Eating* **TABLE**

## **NUTRITION** IN PREGNANCY AND EARLY CHILDHOOD

A Food-Forward  
Approach to Health

Nutrient Bioavailability

Critical Nutrients for  
Development

Nutrition Messaging for  
Health Providers

**Translating,  
Amplifying &  
Bridging the  
Latest  
Evidence in nutrition  
and dairy science**

Dairy Council of California's nutrition science team collects, analyzes and communicates the latest research and data on nutrition education and healthy eating patterns. This publication is intended to be a tool to increase knowledge, effectiveness and capacity for collective action in making healthy eating easier.

**About Dairy  
Council of California**

Dairy Council of California is a nutrition organization working together with champions to elevate the health of children and communities through lifelong healthy eating patterns. Focusing on education and advocacy, dairy ag literacy and collaboration, we advance the health benefits of milk and dairy foods as part of the solution to achieving nutrition security and sustainable food systems.

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# nutrition

## in pregnancy and early childhood

Nutrition during pregnancy and early childhood has far-reaching impacts on children's ability to succeed in school and life, and greatly influences their health outcomes as they grow older, including their likelihood of having a diet-related chronic disease.<sup>1</sup> Diet quality during pregnancy and early life also plays a role in microbiome development in the gastrointestinal tract, further supporting optimal immune function and neurodevelopment.<sup>2</sup>

Consistent access to nutritious foods is critical for proper growth and essential nutrients fuel the brain, laying a foundation for cognitive abilities, motor skills and social-emotional development. For children's neurodevelopment, the American Academy of Pediatrics identifies these key nutrients: protein, zinc, iron, choline, folate, iodine and long-chain polyunsaturated fatty acids, as well as vitamins A, D, B6 and B12.<sup>1</sup>

**Consistent access to nutritious foods is critical for proper growth and essential nutrients fuel the brain.**

The 2020–2025 Dietary Guidelines for Americans identifies calcium, potassium and dietary fiber, in addition to iron, choline, folate, iodine and vitamin D, as nutrients of concern for pregnant and lactating people.<sup>3</sup> Health professionals can support optimal nutrition during these critical life stages through consistent, concise and evidence-based information.



# A Food-Forward Approach

## TO IMPROVING DIET QUALITY AND HEALTH

The 2020–2025 Dietary Guidelines for Americans provides food-based dietary guidance across the life span, as people do not eat nutrients in isolation but rather a variety of foods day to day.<sup>3</sup> Dietary patterns that incorporate nutrient-dense and minimally processed foods to meet energy and nutrient needs are foundational to improving diet quality.

Nutrition science and public guidance continue to investigate and define diet quality in relation to food matrices and their health effects. A food matrix refers to the nutrient and non-nutrient components of foods, including vitamins, minerals and bioactive components, as well as physical structure, texture and form.<sup>4</sup> Similar to whole foods such as fruits, vegetables and legumes,

minimally processed dairy foods have complex food matrices and multiple bioactive components, including proteins, lipids, micronutrients and probiotics (in fermented dairy foods such as kefir and yogurt) that work together to impact digestion, absorption and physiological functions important for health.<sup>5</sup>

Environmental and societal factors can also impact diet quality during pregnancy and early childhood. Factors such as nutrition insecurity or nutrition knowledge gaps can decrease consumption of a variety of nutrient-dense foods, and can increase reliance on inexpensive, highly processed foods. Optimizing diet quality during pregnancy and early childhood supports the developing microbiome and supports lifelong health.







# NUTRIENT BIOAVAILABILITY

A high-quality diet contains a balanced, diverse and appropriate selection of foods eaten throughout the life span.<sup>6</sup> The foods that make up an eating pattern have interactive, synergistic and cumulative relationships that better predict health beyond individual foods or food groups.<sup>2</sup> Eating plant and animal foods together improves overall nutrient absorption and the availability of nutrients for the body to use. When it comes to meeting nutrient recommendations from plant foods alone, bioavailability and nutrient form should be taken into consideration. Many plant foods contain phytates that bind to protein

and certain minerals such as iron, calcium and zinc in the intestine and form an insoluble complex that inhibits absorption, increasing the risk of inadequate intake of these nutrients.<sup>7</sup> Additionally, a diet high in only plant-based proteins can result in inadequate protein absorption and utilization.<sup>8</sup> These findings highlight important dietary considerations and reinforce the value of consuming a variety of nutrient-dense foods to improve absorption and bioavailability, which is particularly important during times of rapid growth such as pregnancy and early childhood.

## IODINE + PREGNANCY

Iodine needs increase by more than 50% during pregnancy and many women of childbearing age are iodine deficient before they even become pregnant, especially those who do not regularly consume dairy foods, eggs or seafood, or use iodized salt. Prenatal iodine deficiency may lead to irreversible neurocognitive congenital conditions, such as congenital hypothyroidism, and these conditions can result in lower childhood IQ. Nearly half of prenatal multivitamin supplements in the US do not contain iodine.

Panth P, Guerin G, DiMarco N. A review of iodine status of women of reproductive age in the USA. *Biological Trace Element Research*. 2019;188:208–220. DOI:10.1007/s12011-018-1606-5

## CHOLINE INTAKE + MEMORY

Choline has been shown to impact neurodevelopment, specifically for infant memory and processing speed. Presently, about 90% of Americans have choline intakes below the basic adequate intake, including most pregnant and breastfeeding people. This indicates that women are at high risk of entering conception with suboptimal choline status.

Derbyshire E, Obeid R. Choline, neurological development and brain function: A systematic review focusing on the first 1000 days. *Nutrients*. 2020; 12(6):1731. DOI: 10.3390/nu12061731

Explore pregnancy and early childhood nutrition resources for professionals, parents and families at [HealthyEating.org/EarlyChildhood](https://HealthyEating.org/EarlyChildhood).

# Critical Nutrients

FOR PREGNANCY, INFANCY AND EARLY CHILDHOOD

## PROTEIN

builds and repairs tissues, including muscle, and helps maintain pH and fluid balance.



Cheese

Yogurt



Beef



Fish



Soy



Legumes

Eggs



Chicken



Milk



Beans



## CALCIUM

makes up the structure of bones and teeth and mediates blood vessel contraction and dilation, muscle function, blood clotting, nerve impulse transmission and hormonal secretion.

Milk



Sardines



Canned Salmon

Spinach



Soybeans



Yogurt



Cheese

Bok Choy



Broccoli



## ZINC

is involved in cellular metabolism, enhancing immune function, protein and DNA synthesis and wound healing.

Beef



Crab



Oatmeal



Shrimp

Milk



Yogurt



Pork

Lentils



Cheese

Pumpkin Seeds



## IRON

a component of hemoglobin in blood, helps transfer oxygen from the lungs to the tissues, supports muscle function, and is necessary for growth and neurological development.



Fortified Cereal



Lentils

Beef



Tofu



Cashews



Spinach



Beans



Oysters (cooked)



Organ Meats



## CHOLINE

plays important roles in modulating gene expression and early brain development.

Beef Liver



Egg Yolks



Chicken



Milk



Yogurt



Ground Beef



Red Potato



Cod



Soybeans



## FOLATE

is important in red blood cell formation and healthy cell growth and function. It is crucial during early pregnancy to reduce the risk of congenital conditions of the brain and spine such as spina bifida.

Spinach



Fortified Cereal

Avocado



Whole Grains



Citrus



Black-eyed Peas

Broccoli





**IODINE** is an essential component of thyroid hormones, which regulate protein synthesis, metabolism and proper skeletal and cognitive development in fetuses and infants.



Seaweed



Iodized Table Salt

Yogurt



Cod



Milk



Cheese



Oysters (cooked)



**VITAMIN A** plays a critical role in the formation and maintenance of epithelial surfaces across the body, including the heart, lungs and eyes, and it helps support immune function.

Sweet Potato



Mangos



Ricotta Cheese



Cantaloupe



Carrots



Red Bell Peppers



Spinach



Milk



**VITAMIN D** promotes calcium absorption in the gut and supports proper bone growth and neuromuscular and immune function. It also helps with glucose metabolism.



Mushrooms



Salmon

Sardines



Tuna



Fortified Cereal

Milk



Egg Yolks



**VITAMIN B6** is involved in more than 100 enzyme reactions. It also plays a role in cognitive development through the biosynthesis of neurotransmitters.

Potatoes



Chickpeas

Turkey



Cottage Cheese

Bananas



Beef Liver



Chicken



Salmon



**VITAMIN B12** is required for the development and function of the central nervous system, as well as healthy red blood cell formation.



Seafood



Kefir

Poultry



Milk



Yogurt



Fortified Cereal



Cheese



Egg Yolks



Beef



**OMEGA-3 FATTY ACIDS**, specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), play an important role in cell membrane structure. DHA is present in the retina and brain.



Trout



Mackerel

Sardines



Salmon



Herring



# Promoting Community Health through Nutrition



Health professionals have a unique window of opportunity to share evidence-based information about nutrient-dense foods to support children and families in reaching their full potential.

Whole and minimally processed plant and animal source foods should not be thought of as competing entities but rather as synergistic food sources that

can improve how nutrients are absorbed, promote optimal diet quality, support a healthy microbiome and contribute to adequate intake of critical nutrients for growth and development. Additionally, both plant and animal source foods provide complementary nutritional, social, economic and environmental benefits that meet the needs of diverse patient populations. Through food-based dietary guidance, health professionals can alleviate confusion, reduce barriers and reinforce evidence-based recommendations that build lifelong healthy eating patterns and support optimal health and well-being across the life span.

Join the Let's Eat Healthy Initiative  
at [HealthyEating.org/Join](https://HealthyEating.org/Join) to  
collaborate and access nutrition  
information, resources and tools.



## CULTURALLY RELEVANT FOODS

Dietary recommendations are most effective when they consider individual, family and cultural food preferences. A wide variety of high-quality plant and animal source foods support nutritious dietary patterns. Asking about a person's current dietary preferences and habits, in addition to identifying any misconceptions, can help build trust, support positive education efforts and identify areas of opportunity to improve nutrition knowledge and guide healthier food choices.

## ACCESS TO NUTRITIOUS FOOD AND NUTRITION EDUCATION

Federal nutrition programs—including the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); the Child and Adult Care Food Program; the Supplemental Nutrition Assistance Program (SNAP); and others—improve nutrition security by providing access to a variety of nutritious foods. Health professionals can refer clients to these important nutrition programs, which serve as a valuable resource, especially during pregnancy, infancy and childhood. In addition to accessing healthy food, nutrition security also depends on credentialed health professionals providing consistent nutrition education.





## NUTRITION MESSAGING FOR HEALTH PROVIDERS

### DURING PREGNANCY

- To best meet nutrient needs during pregnancy, focus on incorporating foods from USDA's MyPlate food groups into meals and snacks. The five food groups include Dairy, Vegetables, Fruits, Grains and Protein.
- The need for iron increases during pregnancy, so it's crucial to focus on iron-rich foods such as meat, poultry, seafood, leafy greens, beans, dried fruit and nuts.
- Dairy products such as milk, yogurt and cheese provide high-quality protein and key nutrients that support a healthy pregnancy and baby's development. Include 3 servings of dairy throughout the day.
- If you are lactose-intolerant, opt for lactose-free milk. For those diagnosed with a milk allergy, calcium fortified soy milk provides the closest nutritional alternative to milk.

### INFANTS AGES 6 M TO 1 YR

- Around 6 months of age, introduction of nutrient-dense complementary foods can begin. These include fruits, vegetables, protein and dairy foods such as yogurt and cheese to familiarize babies with a variety of new tastes and textures.
- Proper nutrition that includes foods from the 5 food groups, including Dairy, Vegetables, Fruits, Grains and Protein, support brain, bone and immune health.
- Pair colorful fruits, vegetables or whole-grain cereals with protein-rich yogurt or cheese to make nutritious snacks.



### CHILDREN AGES 1 TO 2 YRS

- Proper nutrition from an early age that includes a variety of foods from the 5 food groups, including Dairy, Vegetables, Fruits, Grains and Protein, support brain, bone and immune health.
- Milk and water are recommended as the go-to drinks for children ages 1 to 5 years. Milk provides 13 essential nutrients like calcium and protein, and water provides hydration. Whole milk is recommended for children ages 1 to 2 years to provide energy, fat and other important nutrients during this critical growth and development period.
- Pair fruit, vegetables or whole-grain crackers with protein-rich yogurt or cheese to make nutritious snacks.
- Serving milk with meals can safeguard picky eaters because milk provides a rich nutrient package and is highly palatable.



WHITE HOUSE  
CONFERENCE ON  
**HUNGER,  
NUTRITION,  
& HEALTH**

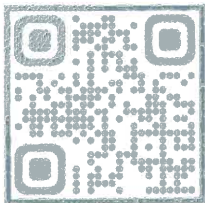
# The Role of Food as Medicine

For tools, resources and support to promote healthy eating, visit [HealthyEating.org](https://HealthyEating.org).

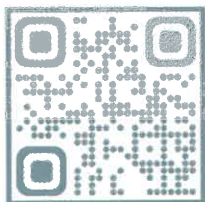
For the first time in over 50 years the White House convened a Conference on Hunger, Nutrition and Health and released a national strategy that lays out a vision for ending hunger and reducing diet-related disease by 2030. The national strategy encourages a whole-of-society approach and outlines 5 pillars that provide an actionable path to achieve nutrition security goals in the United States. One of these pillars identifies the need to integrate nutrition and health and ensure that guidance and nutrition education efforts are aligned with the Dietary Guidelines for Americans. The role of food as medicine is being expanded to affirm that food and nutrition should play a role in sustaining health and preventing disease.<sup>10</sup> Clear nutrition information from trusted, credentialed health professionals will play an important role in a whole society approach to improve nutrition security, particularly during critical life stages.



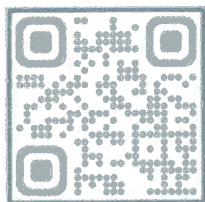
# Additional Resources



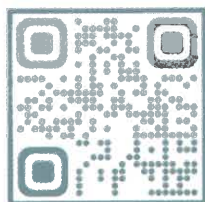
Advocacy for Improving Nutrition in the First 1000 Days to Support Childhood Development and Adult Health



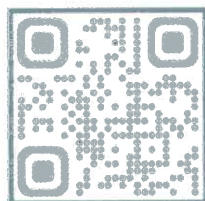
FAQ: Healthy Beverages for Children 0-5 Years



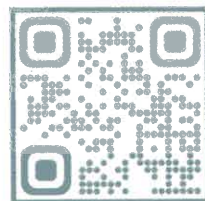
Pediatric Care Specialist Backgrounder



The Importance of Iodine in Prenatal Brain Development



Estimated Micronutrient Shortfalls of the EAT-Lancet Planetary Health Diet



Pregnancy and Early Childhood Webpage

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**Pregnancy and early childhood  
are critical life stages to prioritize  
nutrient-dense dietary patterns.**

[PG 4 A FOOD-FORWARD APPROACH TO IMPROVING DIET QUALITY AND HEALTH]