



In the Name Of God

Micronutrients

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- (CDC) recommend MMN supplements for pregnant women who do not consume an adequate diet

- in low- and middle-income countries where micronutrient deficiencies are high, **MMN supplements in pregnancy appeared to modestly reduce rates of low birth weight and small for gestational age and possibly preterm birth** compared with iron supplementation with/without folic acid

Macronutrients

- Protein
- Carbohydrate
- Fat

Protein

- —the National Academy of Medicine recommends a dietary reference intake for pregnant women **of 1.1 g/kg/day protein**
- Use of special protein powders or high-protein beverages should be discouraged. In women who are undernourished, protein supplementation does not improve clinically important pregnancy outcomes
- In women who likely have adequate protein intake, there is evidence of possible harm from high-protein supplements

Carbohydrate

- — Carbohydrate requirements increase to 175 g/day in pregnancy
- The focus should be on consuming several servings of **whole foods (fruits, vegetables, and whole grains)**;
- highly processed carbohydrates should be minimized to help manage weight gain
- Fiber intake of 28 g/day is recommended for pregnant women, which, along with adequate fluid intake, may help prevent or reduce constipation

Fat

- —TFA(Trans fatty acids) may have **adverse effects on fetal growth and development** by interfering with essential fatty acid metabolism, by direct effects on membrane structures or metabolism, or by replacing maternal intake of the cis essential fatty acids
-
- **TFA should be minimized or avoided given their adverse effects on cardiovascular outcomes, possible adverse pregnancy effects, and lack of beneficial effects**

Micronutrients

- Well-nourished women may not need MMN supplements to satisfy these daily requirements, but in the absence of a careful evaluation by a nutritionist, we believe that it is prudent to recommend them
- Individual adjustments should be made based upon the woman's specific needs

multiple-micronutrient (MMN) supplementation

At a minimum, the daily supplement should contain key vitamins/minerals that are often not met by diet alone, such as:

- Iron – 27 mg
- Calcium – at least 250 mg (elemental calcium 1000 mg/day)
- Folate – at least 0.4 mg (0.6 mg in the second and third trimesters)
- Iodine – 150 mcg
- Vitamin D – 200 to 600 international units (exact amount is controversial)

Iron

- **Iron is important in fetal brain development** and it has been proposed that screening for and treatment of iron deficiency before anemia develops may benefit **neurodevelopmental** outcome

Iron

- Women with iron deficiency anemia
 - (**first- or third-trimester hemoglobin [Hb] <11 g/dL**
 - second-trimester Hb \leq 10.4 g/dL and low serum ferritin [<40 ng/mL])**should receive an additional iron supplement (30 to 120 mg/day)
- Iron absorption decreases with increasing dose, thus larger supplementation amounts are best split into several doses during the day
- In women who do not tolerate oral iron, iron can be administered intravenously



Calcium

- –The RDA for elemental calcium is 1000 mg/day in pregnant and lactating women 19 to 50 years of age
 - (1300 mg for girls 14 to 18 years old)
 -
- The dietary recommendation for calcium is the same for nonpregnant women of the same age

Calcium (continue)

- For women with **low baseline dietary calcium** intake (high-dose calcium supplementation may **reduce the risk of developing a hypertensive disorder of pregnancy**)
- Calcium supplementation does not appear to reduce this risk in healthy, nulliparous women in whom baseline dietary calcium intake is adequate.

Vitamin D

- –RDA of 600 international units of vitamin D for all reproductive-age women, including during pregnancy and lactation
- In 2011 ACOG recommended routine supplementation with the dose in a standard prenatal vitamin until more evidence is available to support a different dose

Vitamin D (continue)

- The safe upper limit of vitamin D has not been well studied but was conservatively set at 4000 international units in the most recent 2011 guidelines
- Since then, studies have investigated high-dose supplements in pregnant patients. These studies have had relatively small sample sizes and have evaluated potential benefits, such as
 - reduced incidence of autism (up to 5000 international units daily to achieve 25-hydroxyvitamin D levels between 40 and 60 ng/mL)
 - preeclampsia (up to 4000 international units daily to achieve 25-hydroxyvitamin D levels at least 32 ng/mL),
 - and asthma (4400 international units daily to achieve 25-hydroxyvitamin D at least 30 ng/mL)
- Notably, no adverse events have been observed at these high doses of vitamin D

Folic acid

- For neural tube defect prevention — The United States Preventive Services Task Force recommends that women take a supplement containing **0.4 to 0.8 mg of folic acid one month before and for the first two to three months after** conception to reduce their risk of having a child with a neural tube defect
- An RDA of **0.6 mg is recommended thereafter to meet the growth needs of the fetus and placenta** Continuing folic acid supplementation after the first trimester prevents the decline in serum folate and rise in homocysteine concentrations that occur when supplementation is discontinued

Folic acid

- If history of NTD in past pregnancy :
- take a supplement containing 4 mg folic acid daily one month before pregnancy and for the first three months after conception (reduce their risk of having a child with a neural tube defect(2-5%) up to 70%
-

Choline

- — Choline is an essential nutrient that is transported at high rates from mother to fetus. **Choline availability is crucial for the development of the central nervous system**, with evidence of effects on cognitive function in infants
- Most United States women consume far less choline (mean intake 260 mg/day) than the 450 mg/day that is recommended
- Pregnant women should consume adequate choline from food and supplemental sources, although choline is often absent or low in prenatal vitamins
- . Eggs, meats, fish, and dairy are good sources of choline; plant sources, such as navy beans, Brussels sprouts, broccoli, and spinach also contain choline

Zinc

- — Zinc is essential for normal growth, severe **zinc deficiency** has been associated with **growth restriction**
- observational studies have suggested that zinc supplements can increase birth weight

Zinc

- RDA: 12 mg.

☐ Vegetarians have lower zinc intakes

☐ supplementation:

- zinc-deficient women in poor-resource countries
- women with poor GIT function

Iodine

- – Iodine deficiency has potentially harmful effects, such as maternal and fetal/neonatal hypothyroidism
- the World Health Organization (WHO) recommends iodine intake of 250 mcg for both pregnant and lactating women
- Pregnant women should use iodized salt (contains 95 mcg iodine per one-quarter teaspoon) and/or consume seafood that is naturally rich in iodine to attain adequate intake
- the American Thyroid Association recommends that **women who are planning pregnancy, are pregnant, or are lactating supplement their diet with a daily oral multivitamin supplement that contains 150 mcg of iodine in the form of potassium iodide**
- it should be noted that many prenatal vitamins contain no iodine

Vitamin A

- — Vitamin A requirements increase to 3300 international units (1000 retinol equivalents) per day in pregnant women, because of its role in **cell division, fetal organ and skeletal growth, maintenance of the immune system, and development of vision in the fetus as well as maintenance of maternal vision**
- **moderate deficiency :**
 - night blindness, particularly in the third trimester when fetal growth is accelerated, because the fetus will obtain sufficient vitamin A at the expense of maternal stores
- In some developing countries, vitamin A deficiency is a concern; in addition to maternal night blindness, deficiency puts women at risk of maternal **xerophthalmia, anemia, and susceptibility to infection**
- By contrast, in developed countries, excessive intake of vitamin A is the primary concern

Vitamin A (continue)

- Where vitamin A deficiency is endemic :
- daily supplement less than 10,000 international units (3000 retinol equivalents) or a weekly supplement less than 25,000 international units (8500 retinol equivalents) appears to have some maternal and fetal/neonatal health benefits (eg, **reduction in maternal anemia and night blindness**) with no evidence of teratogenicity

Vitamin B12

- [?] Fish, meat, poultry, eggs, milk, and dairy products;
- vegetarians and vegans need supplements

Vitamin B6

- [?] Fish, beef liver, potatoes,
- other starchy vegetables, fruit

- [?] No clear evidence of effects for supplementation

daily supplement should contain key vitamins/minerals that are often not met by diet alone, such as:

Iron – 27 mg

- Calcium – at least 250 mg (elemental calcium 1000 mg/day)
- Folate – at least 0.4 mg (0.6 mg in the second and third trimesters)
- Iodine – 150 mcg
- Vitamin D – 200 to 600 international units (exact amount is controversial)

Adverse effects from excessive supplementation and dietary intake

—●Vitamin A—

- Consumption of vitamin supplements containing high doses of vitamin A greater than 10,000 international units per day appears to be teratogenic
- Most supplements contain **beta-carotene rather than retinol**, and high beta-carotene intakes have not been related to birth defects
- Some foods are fortified with vitamin A and others are rich in vitamin A (eg, liver). For this reason, recommend **avoiding liver consumption during pregnancy**

Adverse effects from excessive supplementation and dietary intake (continue)

- **Iodine** – Excessive intake of iodine can cause fetal goiter but the safe upper limit of iodine intake in pregnancy is unclear

Excessive dietary iodine intake has been reported in Japanese women whose diets contain large amounts of seaweed

Supplements that lack beneficial effects

- ● **Vitamin E** – A Cochrane review showed that vitamin E supplementation during pregnancy in combination with vitamin C or other supplements or drugs **does not improve outcomes of stillbirth, preterm birth, preeclampsia or low birth weight**
- **Some evidence suggested that vitamin E increased self-reported abdominal pain and prelabor rupture of membranes at term; however, preterm prelabor rupture of membranes was not increased**
- ● **Vitamin C** – In a Cochrane review, vitamin C supplementation during pregnancy either alone or in combination with other supplements **had no beneficial or harmful effects**

وزن گیری در بارداری تک قلو

افزایش وزن از ابتدای هفته 13 به بعد (کیلوگرم / هفته)	افزایش وزن پیشنهادی	BMI	گروه BMI
0/5	12.5-18	کمتر از 18.5	کم وزن
0/4	11.5-16	18.5-24.9	طبیعی
0/3	7-11.5	25-29.9	اضافه وزن
0/2	5-9	بالای 30	چاق

Title:

Recommended dietary allowances, or adequate intakes, and tolerable upper limits for adult pregnant and lactating women

Recommended dietary allowances, or adequate intakes, and tolerable upper limits for adult pregnant and lactating women

	RDAs		ULs for pregnant and lactating women
	Pregnant women*	Lactating women*	
Fat-soluble vitamins			
Vitamin A	770 mcg	1300 mcg	3000 mcg
Vitamin D	600 international units (15 mcg)	600 international units (15 mcg)	4000 international units (100 mcg)
Vitamin E	15 mg	19 mg	1000 mg
Vitamin K [†]	90 mcg	90 mcg	ND
Water-soluble vitamins			
Vitamin C	85 mg	120 mg	2000 mg
Thiamin	1.4 mg	1.4 mg	ND
Riboflavin	1.4 mg	1.6 mg	ND
Niacin	18 mg	17 mg	35 mg
Vitamin B6	1.9 mg	2 mg	100 mg
Folate	600 mcg	500 mcg	1000 mcg
Vitamin B12	2.6 mcg	2.8 mcg	ND
Minerals			
Calcium	1000 mg	1000 mg	2500 mg
Phosphorus	700 mg	700 mg	4000 mg
Iron	27 mg	9 mg	45 mg
Zinc	11 mg	12 mg	40 mg
Iodine	220 mcg	290 mcg	1100 mcg
Selenium	60 mcg	70 mcg	400 mcg

RDA: recommended dietary allowance; AI: adequate intake; UL: (tolerable) upper limit; ND: not determinable, due to lack of data of adverse effects and concern with regard to lack of ability to handle excess amounts.

* Females over 18 years old.

[†] The requirement for vitamin K is given as an AI rather than an RDA because there was insufficient scientific evidence to calculate the RDA.

Adapted from: *Guidelines for Perinatal Care, sixth edition (2007)*; and *Institute of Medicine Dietary Reference Intakes for Calcium and Vitamin D (2011)*, which can be accessed via www.nap.edu.

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