



## **Nutrition for pregnancy**

creating a  
*balanced diet*



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# TOPPOINT

**Vitamin A Toxicity**



# Vitamin A is one exception

- Although most micronutrients have a wide safety margin with little concern for teratogenic effects, **vitamin A is one exception.**
- Excessive doses of Vitamin A (**>10,000 IU/day**) have been associated with **cranial-facial (face, palate, ears) and cardiac birth defects.**



# Vitamin A recommendation

- **2800 - 3300 IU** daily retionl
- **1,000 retinol equivalents (RE)**
- **770 mcg/day**

<b>Nutrient</b>	<b>Non-Pregnant</b>	<b>Pregnant<sup>*</sup></b>	<b>Lactation<sup>*</sup></b>
Vitamin A (µg/d)	700	770	1300
Vitamin D (µg/d)	5	15	15
Vitamin E (mg/d)	15	15	19
Vitamin K (µg/d)	90	90	90

**Vitamin A:** 1 IU is the biological equivalent of 0.3 mcg retinol, or of 0.6 mcg beta-carotene



- An **average balanced diet contains approximately 7,000-8,000 IU** of vitamin A derived from different sources.
- Therefore, **women who are at risk for becoming pregnant should consider their dietary intake** of vitamin A before taking supplements



## Retinol form = Teratogenic effects

- It is the retinol form of Vitamin A that is associated with teratogenic effects, **not the carotenoid version found in food sources such as carrots.**

Lamb Liver	Amount	% Daily Value
4 oz (113 g) serving	8352 mcg RAE	928 %
Per 100 grams	7391 mcg RAE	821 %



# TOPPOINT

**Mercury Toxicity**



## Fish =Omega-3 fatty acids

- **Studies** regarding the risks and benefits of fish during pregnancy can often seem **contradictory**.
  - ❖ Omega-3 fatty acids are critical for fetal **brain development**
  - ❖ Higher mercury levels in children, however, have been associated with **deficits in memory, learning, and behavior**.





## Seafood, as part of a healthy eating pattern

- Protein
- Healthy omega-3 fats (called DHA and EPA)
- More vitamin **B<sub>12</sub>** and **vitamin D** than any other type of food
- Source of other minerals like **selenium, zinc, iodine and Iron**



# The Federal Drug Administration (FDA) and the Environmental Protection Agency (EPA) websites offer

Best Choices <small>EAT 2 TO 3 SERVINGS A WEEK</small>			OR	Good Choices <small>EAT 1 SERVING A WEEK</small>		
Anchovy	Herring	Scallop		Bluefish	Monkfish	Tilefish (Atlantic Ocean)
Atlantic croaker	Lobster, American and spiny	Shad		Buffalofish	Rockfish	Tuna, albacore/white tuna, canned and fresh/frozen
Atlantic mackerel	Mullet	Shrimp		Carp	Sablefish	Tuna, yellowfin
Black sea bass	Oyster	Skate		Chilean sea bass/Patagonian toothfish	Sheepshead	Weakfish/seatrout
Butterfish	Pacific chub mackerel	Smelt		Grouper	Snapper	White croaker/Pacific croaker
Catfish	Perch, freshwater and ocean	Sole		Halibut	Spanish mackerel	
Clam	Pickrel	Squid		Mahi mahi/dolphinfish	Striped bass (ocean)	
Cod	Plaice	Tilapia				
Crab	Pollock	Trout, freshwater				
Crawfish	Salmon	Tuna, canned light (includes skipjack)				
Flounder	Sardine	Whitefish				
Haddock		Whiting				
Hake						
<b>Choices to Avoid</b> <small>HIGHEST MERCURY LEVELS</small>						
				King mackerel	Shark	Tilefish (Gulf of Mexico)
				Marlin	Swordfish	Tuna, bigeye
				Orange roughy		

\*Some fish caught by family and friends, such as larger carp, catfish, trout and perch, are more likely to have fish advisories due to mercury or other contaminants. State advisories will tell you how often you can safely eat those fish.

[www.FDA.gov/fishadvice](http://www.FDA.gov/fishadvice)

[www.EPA.gov/fishadvice](http://www.EPA.gov/fishadvice)



Available data suggest that **fish-oil supplements** do not confer the same health benefits as consumption of the actual fish.



# TOPPOINT

**Gestational weight gain  
recommendation**



## Gestational weight gain recommendations

<b>Pre-pregnancy BMI</b>	<b>Total weight gain at term</b>	<b>Rate of weight gain in the 2<sup>nd</sup> and 3<sup>rd</sup> trimester; Mean (range)</b>
Underweight ( $<18.5 \text{ kg/m}^2$ )	12.5-18 kg 28-40 lbs.	0.51 (0.44-0.58) kg/week 1 (1-1.3) lbs./week
Normal weight ( $18.5-24.9 \text{ kg/m}^2$ )	11.5-16 kg 25-35 lbs.	0.42 (0.35-0.50) kg/week 1 (0.8-1) lbs./week
Overweight ( $25.0-29.9 \text{ kg/m}^2$ )	7-11.5 kg 15-25 lbs.	0.28 (0.23-0.33) kg/week 0.6 (0.5-0.7) lbs./week
Obesity ( $\geq 30.0 \text{ kg/m}^2$ )	5-9 kg 11-20 lbs.	0.22 (0.17-0.27) kg/week 0.5 (0.4-0.6) lbs./week



## Gestational weight gain recommendations for twins

<b>Pre-pregnancy BMI</b>	<b>Total weight gain at term</b>
Underweight ( $<18.5 \text{ kg/m}^2$ )	17-25 kg 37-54 lbs.
Normal weight ( $18.5-24.9 \text{ kg/m}^2$ )	17-25 kg 37-54 lbs.
Overweight ( $25.0-29.9 \text{ kg/m}^2$ )	14-23 kg 31-50 lbs.
Obesity ( $\geq 30.0 \text{ kg/m}^2$ )	11-19 kg 25-42 lbs.



## Risks of Obesity in Pregnancy

<b>During Pregnancy</b>	<b>During Labor &amp; Delivery</b>	<b>Postpartum complications</b>
Spontaneous miscarriage	Difficult fetal monitoring	Postpartum hemorrhage
Birth defects	Cesarean delivery	Wound infection
Limitations to ultrasound	Decreased success of a vaginal birth after cesarean delivery	Obesity in offspring
Gestational diabetes	Difficult anesthesia	
Hypertensive disease		
Stillbirth		
Fetal growth abnormalities		



# Meta analysis, 32 studies, 2018

- Although a few studies have shown a reduction in gestational weight gain for women with obesity after exposure to a health behavior intervention, the **majority have found no benefit**.
- For example, in one study in which women were randomized to a low **glycemic index diet**, the majority of women with obesity exceeded the gestational weight gain goals regardless of the study arm (57% control vs. 60% intervention, **p=0.8**)
- in meta-analyses, the interventions for women who are overweight or obese have been shown to have **moderate or no influence at all on gestational weight gain or other perinatal outcomes**.

What characteristics of nutrition and physical activity interventions are key to effectively reducing weight gain in obese or overweight pregnant women?

A systematic review and meta-analysis- 2018



## Dietary interventions on pregnancy outcomes a systematic review and meta-analysis - 2018

- There is evidence that dietary intervention during pregnancy can reduce maternal **BP** and the incidence of **preterm delivery**.





# Which diet recommended

- Weight management **before pregnancy**
- **Very low calorie diet** is harmful.
- **Low glycemic diet and high protein diet is recommend**



# TOPPOINT

**Healthy food  
pyramid pregnancy**



# Nutrient Needs

- **Energy (kcalories)**

- Additional **340** in 2<sup>nd</sup> trimester
- Additional **450** in 3<sup>rd</sup> trimester
- Select nutrient-dense foods

- **Carbohydrates**

- Additional **175 g**
- Fiber for constipation

- **Protein**

- Additional **25 g**
- Protein supplements are discouraged

- **Fats**

- **Little** room for oil, margarine, & butter
- Need essential fatty acids



## What food groups and calorie amounts do pregnant women need to increase?

- Grains =2 more
- Fruits =1 more
- Vegetables=1 more
- Dairy=1 more
- Meat=1 more
- Calories ----- 300 more a day

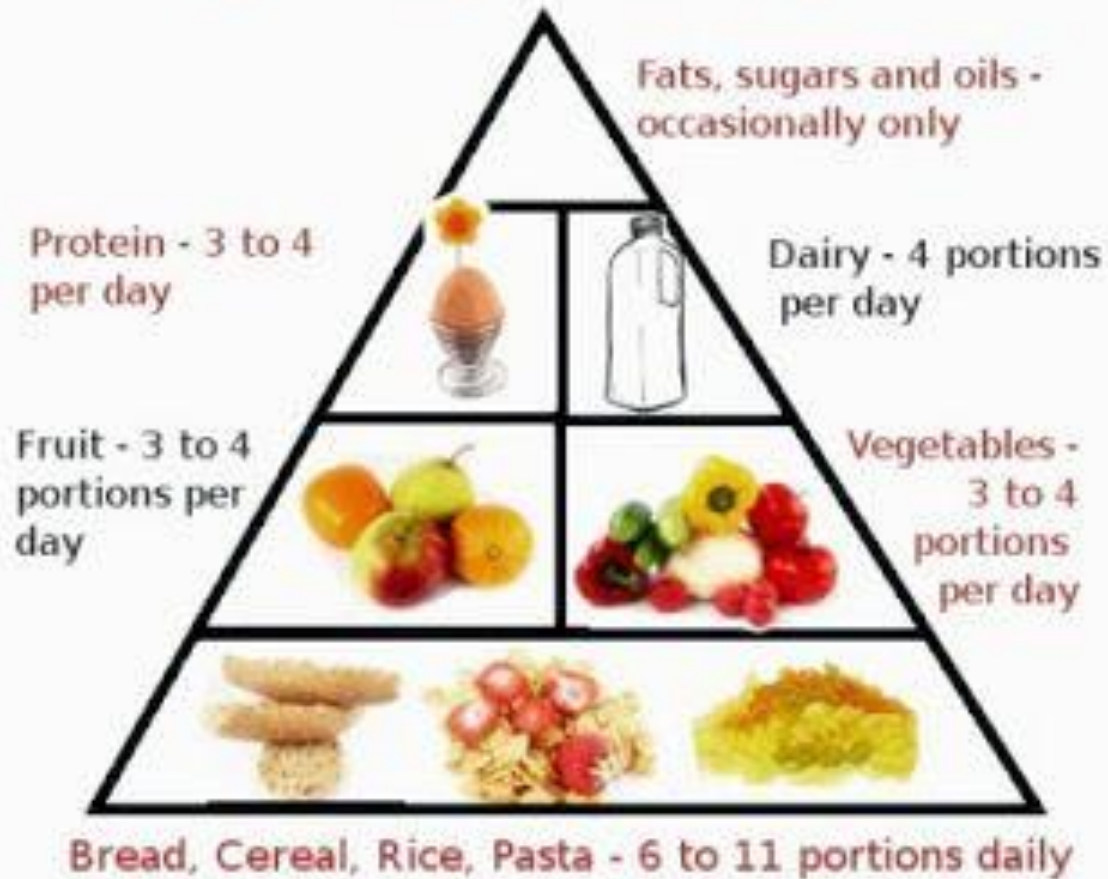


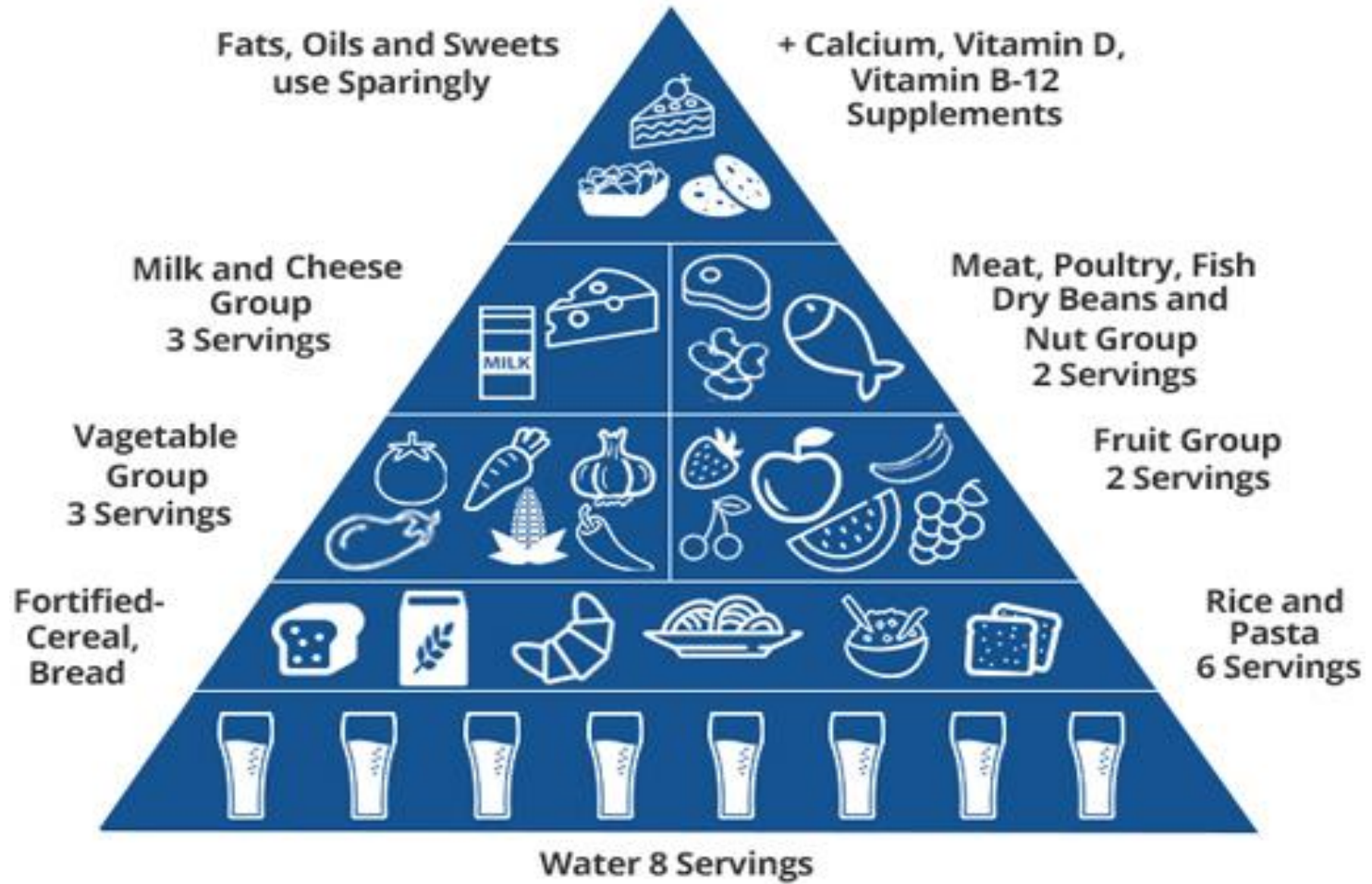
# Individualized approach to nutritional counseling

- woman's access to food,
  - socioeconomic status,
  - race-ethnicity and
  - cultural food choices, and
  - body mass index (BMI)
- 
- In addition, many of the recommendations are geared for uncomplicated pregnancies,
  - so adjustments need to be made when complications, such as **gestational diabetes**



# Pregnancy Food Pyramid







## Pregnancy Diet

نام و نام خانواده گی:

توجه: توصیه های رژیم غذایی زیر فقط متناسب با شرایط ویژه بیمار برای مدت مشخص است

<ul style="list-style-type: none"><li>• اجرای یک برنامه غذایی متعادل و متنوع با استفاده از پنج گروه غذایی اصلی همه مادران باردار ضروری است.</li><li>• وعده های غذایی با حجم کم و منظم ( ۵ یا ۶ وعده غذایی هر ۲ تا ۳ ساعت) بر اساس کالری محاسبه شده مصرف کنید.</li><li>• مصرف صبحانه بسیار مهم است.</li><li>• در سه ماه اول بارداری، نیاز چندانی به افزایش دریافت مواد غذایی نیست. دریافت مواد غذایی زیادتر از نیاز باعث افزایش وزن نامناسب می گردد.</li><li>• مصرف غذای تازه بسیار اهمیت دارد. کمتر از غذای فریزی استفاده گردد.</li><li>• روزانه مصرف کافی آب مهم است توصیه می گردد که یک لیوان آب نیم ساعت قبل از خواب میل گردد.</li></ul>	<p>برنامه غذایی متعادل و متنوع داشته باشید</p>
<ul style="list-style-type: none"><li>• مصرف ۷ تا ۱۱ سهم روزانه از منابع نان سبوس دار و غلات توصیه میگردد. ۳۰ گرم نان و یک لیوان غلات پخته یک سهم است.</li></ul>	<p>گروه نان و غلات</p>
<ul style="list-style-type: none"><li>• مصرف ۳ سهم سبزی روزانه در دوران حاملگی مهم است . سبزی های برگ تیره مانند اسفناج ارجح است. فلفل سبز ، گوجه فرنگی، کلم بروکلی، کاهو ، خیار و... منابع خوب گروه سبزیها هستند</li><li>• توصیه میگردد روزانه یک یا دو لیوان ازجوانه ماش و یا گندم در سوپ یا سالاد و یا ماست و... استفاده گردد.</li></ul>	<p>گروه سبزیها</p>





<p>ر.ب.ب.</p> <ul style="list-style-type: none"><li>• مصرف ۴ میوه روزانه مهم است. میوه هایی که بیشتر توصیه می گردد سیب، گلابی به، موز، پرتقال و...</li><li>• برای جلوگیری از یبوست و سلامتی بیشتر مصرف روزانه ۲۰ گرم فیبر مهم است. مصرف میوه و سبزیجات نان های حاوی غلات کامل و سبوس دار، انواع پاستا و برنج که دارای سبوس کامل می باشند منابع خوب فیبر هستند.</li></ul>	<p>گروه میوه ها</p>
<ul style="list-style-type: none"><li>• گروه گوشت و حبوبات باعث افزایش وزن زمان تولد نوزاد می شود. مصرف ۳ سهم روزانه از از این گروه توصیه می گردد.</li><li>• لذا یک روز در میان ۳۰ تا ۵۰ گرم گوشت قرمز، و مصرف روزانه حبوبات و دانه مغزها استفاده گردد.</li><li>• مصرف دوبار در هفته ماهی چرب ( کپور، ازون برون و ماهی آزاد ) توصیه می گردد.</li><li>• مصرف روزانه مغزها برای رسیدن منیزم و روی و اسید چرب ضروری به بدن کمک کننده است.</li><li>• مصرف تخم مرغ هفته ای دو تا سه بار توصیه می گردد.</li></ul>	<p>گروه گوشت و ماهی حبوبات، تخم مرغ و مغزها</p>
<ul style="list-style-type: none"><li>• روزانه حداقل ۳ واحد از لبنیات را به وسیله خوردن و یا آشامیدن محصولات لبنی و یا غذاهای غنی از کلسیم دریافت گردد.</li></ul>	<p>گروه شیر و لبنیات</p>



<ul style="list-style-type: none"><li>• بعد از باردار شدن دریافت مواد غنی از اسید فولیک اهمیت دارد. هر روز حداقل یکی از منابع خوب اسید فولیک را دریافت نمایید برای مثال :سبزیجات با برگ های سبز تیره، گوشت و حبوبات (از جمله عدس، لوبیاهای و نخود و نخودفرنگی)</li></ul>	منابع اسید فولیک
<ul style="list-style-type: none"><li>• نیاز به آهن در این دوران چیزی حدود ۱۰۰۰ میلی گرم روزانه است اما با توجه به جذب مشکل این ماده معدنی، باید روزانه ۳۰ میلی گرم از آن مخصوصا از هفته شانزدهم به بعد به شکل مکمل استفاده شود و شب ها قبل از خواب مصرف گردد.از پایان ماه چهارم تا ۴ ماه پس از زایمان روزانه ۱ عدد قرص آهن مصرف کنند.</li></ul>	منابع آهن
<ul style="list-style-type: none"><li>• مصرف ویتامین B6 در اکثر مادرانی که مشکل تهوع دارند مفید است</li></ul>	ویتامین B6
<ul style="list-style-type: none"><li>• استفاده از نمک یددار به میزان لازم- نمک ید دار استفاده گردد</li></ul>	نمک ید دار
<ul style="list-style-type: none"><li>• ۵ بار در هفته، هر بار ۱۰ تا ۳۰ دقیقه در زمانی که اشعه آفتاب مستقیم نباشد پوست در معرض نور خورشید قرار بگیرد. ماهی چرب ( کپور، ازون برون و ماهی آزاد ) و تخم مرغ از منابع ویتامین D هستند. در صورت کمبود سطح ویتامین سرم، نیاز است بصورت مکمل غذایی ویتامین تامین گردد.</li></ul>	ویتامین D



# TOPPOINT

**Risk of micronutrient  
overload and toxicity.**



## **Micronutrient deficiencies** during pregnancy are a global public health concern

- Micronutrient deficiencies have been linked to compromised conception, **length of gestation, and fetal development and growth**, which can lead to pregnancy loss, preterm delivery, small birth size, birth defects and long-term metabolic disturbances
- **Antenatal supplementation with multiple micronutrients can improve birth outcomes** and merits policy and program consideration in low-income settings



## Recommended daily dietary allowances for pregnant and lactating women

<b>Nutrient</b>	<b>Non-Pregnant</b>	<b>Pregnant</b> <sup>*</sup>	<b>Lactation</b> <sup>*</sup>
Vitamin A (µg/d)	700	770	1300
Vitamin D (µg/d)	5	15	15
Vitamin E (mg/d)	15	15	19
Vitamin K (µg/d)	90	90	90



# Recommended daily dietary allowances for pregnant and lactating women

Nutrient	Non-Pregnant	Pregnant <sup>*</sup>	Lactation <sup>*</sup>
Folate ( $\mu\text{g}/\text{d}$ )	400	600	500
Niacin ( $\text{mg}/\text{d}$ )	14	18	17
Riboflavin ( $\text{mg}/\text{d}$ )	1.1	1.4	1.6
Thiamin ( $\text{mg}/\text{d}$ )	1.1	1.4	1.4
Vitamin B <sub>6</sub> ( $\text{mg}/\text{d}$ )	1.3	1.9	2
Vitamin B <sub>12</sub> ( $\mu\text{g}/\text{d}$ )	2.4	2.6	2.8
Vitamin C ( $\text{mg}/\text{d}$ )	75	85	120



## Recommended daily dietary allowances for pregnant and lactating women

<b>Nutrient</b>	<b>Non-Pregnant</b>	<b>Pregnant<sup>*</sup></b>	<b>Lactation<sup>*</sup></b>
Calcium (mg/d)	1,000	1,000	1,000
Iron (mg/d)	18	27	9
Phosphorus (mg/d)	700	700	700
Selenium ( $\mu$ g/d)	55	60	70
Zinc (mg/d)	8	11	12



# Special Interest

- *Folate*

- Role in cell reproduction
- Increased from 400-600 mcg/day
- Prevents neural tube deficits
  - Spina bifida
  - Anencephaly
- Supplements, fortified foods or both

- *Vitamin B<sub>12</sub>*

- Needed to assist folate in manufacture of new cells
- Found in animal products
- Vegans need fortified foods or supplements





# Multiple micronutrient supplements YES OR NO

- Multiple micronutrient supplements reduce the **risks of being born with low birth weight, small for gestational age or stillborn in undernourished settings.**





# Risk of micronutrient overload

- Risk of micronutrient overload **Limited data** are available on micronutrient overload and toxicity.
- However at very **high doses vitamins and minerals can be potentially toxic**, thus representing a crucial topic in high-income countries.



# Multivitamins , **yes or no**

## Supplement Facts

Serving Size: 1 Tablet  
Servings Per Container: 60

Amount Per Serving	% Daily Value†
Vitamin A (as beta carotene) 5000 IU	63%
Vitamin C (as ascorbic acid) 60 mg	100%
Vitamin D (as cholecalciferol) 400 IU	100%
Vitamin E (as d-alpha tocopheryl succinate) 30 IU	100%
Thiamin (as thiamine HCl) 1.7 mg	100%
Riboflavin 2.0 mg	100%
Niacin (as niacinamide) 20 mg	100%
Vitamin B6 (as pyridoxine HCl) 2.5 mg	100%
Folic Acid 800 mcg	100%
Vitamin B12 (as cyanocobalamin) 8 mcg	100%
Biotin 300 mcg	100%
Pantothenic Acid (as d-calcium pantothenate) 10 mg	100%
Iron (as iron fumarate) 27 mg	150%
Iodine (kelp) 150 mcg	100%
Zinc (as monomethionine & gluconate) 15 mg	100%
Copper (as copper sulfate) 2 mg	100%

†Daily Value for pregnant women 19-50 years of age

Other Ingredients: Microcrystalline cellulose, magnesium stearate, vegetable coating, stearic acid, silicon dioxide, natural vanilla flavor, croscarmellose sodium.

Contains no gluten, soy, artificial colors, artificial flavors, or artificial preservatives.

Single		
Serving Size	1 Tablet	
Serving Per Container	250	
	Amount per Serving	%DV
Vitamin A	4000IU	50%
Vitamin C	100mg	167%
Vitamin D	400IU	100%
Vitamin E	11IU	37%
Thiamin (B1)	1.5mg	88%
Riboflavin (B2)	1.7mg	85%
Niacin (B3)	18mg	90%
Vitamin B6	2.6mg	104%
Folate,Folic Acid,Folacin	800mcg	100%
Vitamin B12	4mcg	50%
Calcium	250mg	19%
Iron	27mg	150%
Zinc	25mg	167%



Do not take vitamin A supplements, or **any supplements containing vitamin A (retinol)**, as too much could harm your baby. Always check the label.



# Iron

- They are **not routinely** offered to all pregnant women due to the potential for side effects.
- Excessive **iron** intake is associated with **increased risk of type 2 diabetes** through increased oxidative stress associated with increased **insulin resistance**.
  - ❑ In addition, serum **ferritin concentrations** have been positively associated with **inflammation, hypertension, metabolic syndrome and higher cardiovascular risk profile**.
  - ❑ In pregnancy, excessive **iron supplements** might expose women to increased oxidative stress, lipid peroxidation, and **pregnancy induced hypertensive disorders**.



# iron

- Two recent meta-analysis suggested that high iron status might contribute to increase the risk of **gestational diabetes, possibly mediated by iron oxidative stress.**
  - The overproduction of **reactive oxygen** species can represent an Obstetric Medicine important mediator of damage to cell structures, including lipids, proteins and **DNA.**
- Furthermore, high iron status could lead to increased **platelet aggregation and higher thrombotic risk**





# iodine supplementation

- Daily iodine supplementation in mildly iodine-deficient pregnant women had no effect on child neurodevelopment at age 5–6 years.



## WHO-recommended dosages of daily and annual iodine supplementation

Population group	Daily dose of iodine supplement ( $\mu\text{g}/\text{d}$ )	Single annual dose of iodized oil supplement (mg/y)
Pregnant women	250	400
Lactating women	250	400
Women of reproductive age (15-49 yrs)	150	400
Children < 2=""> <sup>a,b</sup>	90	200





- American Academy of Pediatrics (AAP) issued new iodine recommendations in 2014 for pregnant and breastfeeding women.
- The AAP now recommends pregnant and lactating women cook with iodized salt and take a daily supplement with **150 mcg of iodine to reach a total of 290 mcg per day.**