

# Vegetarian Diets During Pregnancy

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## Introduction

Pregnancy is a time of increased nutritional needs, both to support the rapidly growing fetus and to allow for the changes occurring in the pregnant woman's body. Throughout pregnancy, recommended intakes of vitamins and minerals are higher than for the non-pregnant state. For example, the recommendation for folic acid is 50 percent higher (1) and the recommendation for iron is doubled (2) in pregnancy. Vegetarian and vegan diets can easily meet these nutrient needs (3).

## Weight Gain.

It is important that all pregnant women have adequate weight gain. Weight gain recommendations vary depending on the prepregnancy weight and needs of the woman, therefore energy needs vary as well. A general trend is to have little weight gain (less than 5 pounds) for the first 12 weeks. Then, in the second and third trimesters, a weight gain of a pound or two a week is suggested. Current weight gain recommendations (4) are applicable to vegetarians. The recommendations for weight gain are listed in Table 1.

**Table 1. Recommended Weight Gain During Pregnancy\***

Weight status (prior to pregnancy)	Recommended weight gain (lbs.)
Average weight	25-35
Underweight	28-40
Overweight	15-25
Adolescents	30-45
Average weight, twins	35-45

\*Adapted from (4).

Most pregnant vegetarians, both lacto-ovo and vegan, gain an adequate amount of weight (5-7). Birth weights of infants of vegetarian women have

frequently been shown to be similar to those of infants of non-vegetarians and to birth weight norms (5,7-12). For example, a small study by King et al found that infants born to vegetarian women had a mean birth weight 200 grams higher than infants born to omnivorous women (5). A study examining vegan women found that the average birth weight was 3342 grams (about 7 pounds, 5 ounces). Interestingly, for each additional year these women were vegan, birth weight increased by 42 grams (6).

Some studies done outside the US reported birth weights of infants born to vegetarian women were lower than infants with non-vegetarian mothers (13-16). Generally this is found in women following restrictive vegetarian diets, such as macrobiotic diets (14,15). These low weights have been attributed to low maternal weight gain and lower maternal intakes of energy, iron, folate or vitamin B-12 (13-16).

## **Energy**

In order to meet the weight gain recommendations for pregnancy, extra dietary energy is required. The total energy cost of a pregnancy is estimated to be around 55,000 calories over the 280 days of pregnancy (4,17). Assuming that caloric intake does not increase during the first month of pregnancy, an additional 200 to 300 calories per day should meet energy needs (2,4,18).

Since caloric needs increase only about 15% and nutrient needs increase up to 50%, a nutritionally dense diet in pregnancy is needed to meet nutrient needs within the caloric recommendations. Vegetarians should be counseled, just like all clients, that excessive intake of low nutrient vegetarian foods such as candy and sweets should be avoided.

Women who were underweight or who are having difficulty gaining weight should be counseled to choose nutritious foods with a higher caloric density. Suggestions include milk shakes (soymilk or cow's milk blended with fruit and tofu or yogurt), nuts and nut butters, dried fruits, soy products, and bean dips. Small, frequent meals and snacks can help increase food intake.

## **Protein**

Protein is needed during pregnancy to support the rapid growth of the fetus and placenta. Protein is also used in the growth of maternal tissue (4). Current recommendations suggest an increase in protein of 10 grams more than the non-pregnant state for adult women (2). Ten grams of protein is the amount found in 2 cups of soy milk, 3-1/2 ounces of extra-firm tofu, 3 ounces of tempeh or one large bagel. This amounts to a total of only 60 grams of protein per day; in one study vegan and vegetarian women were consuming that amount even before they were pregnant (20).

## **Iron**

Iron needs are high during pregnancy because of both the increase in the mother's blood volume and the blood formed for the fetus. Despite compensatory mechanisms such as cessation of menstruation and increased iron absorption, the iron requirement of pregnancy is quite high and the diet needs to be especially rich in iron. Pregnant vegetarians should choose high iron foods like whole grains, legumes, tofu, and green leafy vegetables daily and consume them with foods rich in vitamin C to increase the bioavailability of the iron. Iron supplements of 30 mg daily during the second and third trimester are commonly recommended (2, 4). Higher dose iron supplements can induce side effects such as constipation, nausea and heartburn. Supplement doses of 38 to 65 mg of iron per day may reduce zinc absorption (21).

Researchers are currently studying whether taking iron supplements less frequently than daily is as effective as daily iron supplementation. A study in Indonesia showed that weekly iron supplementation offered similar health effects compared to daily supplementation and the compliance was higher in the group of women supplemented weekly (22). Therefore an alternative to daily supplementation may be suggested for women experiencing side effects such as constipation that they attribute to iron supplementation.

Iron deficiency anemia is not uncommon during pregnancy, in both vegetarians and non-vegetarians. Several studies of pregnant vegetarians have suggested that dietary iron intakes were close to recommended levels (19) and that rates of anemia were low (6), although Drake et al found that dietary supplements were needed to meet iron recommendations in 34 lacto-ovo vegetarians (12). All pregnant women, including vegetarians, should be checked for iron-deficiency anemia and consider supplementation if they are unable to meet their needs through diet alone.

## **Calcium**

Calcium is needed in pregnancy for synthesis of fetal bones and teeth. Approximately 25 to 30 grams of calcium are transferred to the fetus, primarily in the third trimester (4). Historically, women have been advised to substantially increase their calcium intake during pregnancy in order to meet the fetus's needs without compromising their own bone density. Current research shows that calcium absorption is increased in pregnancy, resulting in a generally positive calcium balance (23, 24). The Institute of Medicine has concluded that, as long as calcium intake prior to pregnancy was adequate for maximizing bone accretion, dietary calcium does not need to be increased in pregnancy (24). The calcium recommendation for pregnant women age 19 and older is 1000 mg a day (24). Adolescents may have an increased need for calcium to support their own bone development and may

benefit from a higher calcium intake (25). The current recommendation is for 1300 mg of calcium daily for pregnant adolescents (25).

Calcium intakes of lacto-ovo vegetarian women are often close to levels recommended for pregnancy while calcium intakes of vegan women are generally lower (26). Pregnant women whose diets do not contain adequate calcium should add calcium-rich foods to their diet or use supplemental calcium (4). This appears to be especially important in adolescents.

Vegetarians who consume dairy products get calcium from milk and cheese. Many women may be surprised to learn that the many foods thought of as a serving of dairy, such as pudding, hot chocolate and cottage cheese, are not excellent sources of calcium. For example, it would take 3 servings of a ready-to-eat pudding to equal the calcium in one cup of cow's milk. Numerous brands of soy and rice milk, fruit juices, cereals and waffles are fortified with calcium. Plant sources of well-absorbed calcium include soybeans; dark green leafy vegetables like collard greens, kale, and turnip greens; and calcium-precipitated tofu.

## **Vitamin D**

Vitamin D plays an important role in maintenance of maternal calcium absorption. Its role in placental transport of calcium is not clear nor is its role in fetal vitamin D status. Vitamin D status of vegetarians can vary based on sunlight exposure and dietary choices (27-30). While it is well known that vitamin D can be made from exposure to the sun, the modern lifestyle of work and leisure spent mostly indoors and the use of sunscreens to prevent skin cancer may not guarantee sufficient UV light exposure for adequate vitamin D synthesis. As an illustration: 42% of adults less than 65 years of age, without known risk factors for hypovitaminosis D, admitted to a general medical ward in a Boston hospital were found to be vitamin D deficient (31). Therefore a dietary source of vitamin D is highly recommended. For lacto-vegetarians vitamin D-fortified cow's milk can be used to meet vitamin D requirements. Clients may need to be reminded that other dairy products like cheese are not fortified with this essential nutrient. Some cereals and soy milk are fortified with vitamin D and many multivitamins contain the recommended level of 10 mcg (400 IU) of vitamin D. Many calcium supplements contain vitamin D as well. Supplements of vitamin D-2 (ergocalciferol) and vitamin D-3 (cholecalciferol) are utilized equally well by the mother and fetus (32).

## **Folate**

The central nervous system develops in the fetus during the first weeks of gestation. By day 23 the neural tube that will become the spinal cord has closed. A lack of folate can keep the neural tube from closing properly,

resulting in neural tube defects (NTDs). Since neural tube development is complete before most women are aware that they are pregnant, the current recommendation is that all women of child-bearing years should get at least 400 mcg of folate per day.

Folate derives from the Latin word *folium*, which means "foliage," and is found in particularly high concentrations in dark green, leafy vegetables. Vegetarian diets tend to be rich in folic acid compared to non-vegetarian diets (26).

The Food and Nutrition Board suggests an intake of 600 mcg of folic acid during pregnancy (1). The FDA has also mandated the fortification of grain products like bread with folic acid (140 mcg folic acid/100 g of the food item).

### **Vitamin B-12**

The recommended level of vitamin B-12 in pregnancy is 2.6 mcg per day (1). Vitamin B-12 is needed during pregnancy for normal cell division and protein synthesis. It appears that maternal stores of vitamin B-12 may not be available to the fetus (33), therefore a maternal dietary source should be assured. Vitamin B-12 is found in animal products such as milk and eggs. Vegans can easily meet vitamin B-12 needs with the use of foods fortified with vitamin B-12, such as breakfast cereals, some soymilks, and Red Star brand T6635 nutritional yeast (also called Vegetarian Support Formula). Foods which have been previously proposed as good sources of vitamin B-12 such as tempeh, sea vegetables, and algae have been shown to be unreliable and therefore inappropriate sources (34-35). In addition these foods may contain vitamin B-12 analogues (substances which mimic vitamin B-12 but which actually block vitamin B-12 absorption).

### **Zinc**

The recommended intake of zinc increases by 50 percent during pregnancy (2). Mild zinc deficiency has been related to complications of labor and delivery including prolonged or inefficient first stage labor (cervical dilation) and protracted second stage labor (pushing) and premature rupture of the membranes (the sac of fluid that cushions the infant) (36). Many women in the US, both omnivores and vegetarians, do not consume diets that meet the RDA for zinc during pregnancy. Several studies have examined vegetarians' zinc status during pregnancy. One found that although vegetarians' diets were slightly lower in zinc than those of non-vegetarians, their blood and urine zinc levels were similar (5). In another study, vegetarians' zinc intakes were similar to intakes of non-vegetarians (11). Since zinc status is difficult to assess and zinc is an essential nutrient for growth and development, pregnant vegetarians should emphasize good food sources of zinc.

Although legumes, nuts and whole grains are good sources of zinc, the availability of the zinc is lower than found in animal products due to the phytic acid content. Zinc availability is increased when grains are sprouted or eaten as yeast-raised bread, as both of these food preparation techniques destroy phytate (37).

## ***Complications of Pregnancy***

### **Nausea**

Nausea and vomiting, also called morning sickness, are a concern of many pregnant women, vegetarians included. Eating low fat, high carbohydrate foods, which are digested fairly quickly, eating often, avoiding foods with strong smells, and eating those healthful foods that are tolerated are some coping mechanisms. The health care provider should be contacted if a pregnant woman is unable to eat or drink adequate amounts of fluids for 24 hours.

### **Aversions and cravings**

Food aversions are extremely common in pregnancy and are believed to be due to a heightened sense of smell, possibly caused by hormonal changes (38). Dietetics professionals can offer suggestions for foods to replace those that are no longer attractive to the client. Because many foods served at room temperature or colder have less of an odor than heated foods, some women may tolerate some foods served raw that they will not eat when cooked. For example, broccoli may be tolerated if served raw with a dip and cabbage may be acceptable in cole slaw.

Contrary to popular belief, food cravings are not a sign of a need for a certain nutrient or food. This seems obvious when the most commonly reported foods to be craved are sweets (39, 40). Interestingly, one of the most common foods that women become averse to eating during pregnancy is meat. Therefore women may become vegetarian or nearly vegetarian during pregnancy simply due to a food aversion.

### **Constipation**

Constipation is a common complaint in pregnancy. The higher fiber diet of vegetarian women may be an asset in avoiding constipation. If a woman feels her constipation is a side effect of iron supplementation, increasing high vitamin C fruits may serve a dual purpose of counteracting the constipating effect and enhancing iron absorption. Assurance of adequate fluid intake is also helpful in preventing and alleviating constipation.

### **Preeclampsia**

Preeclampsia, or pregnancy induced hypertension with proteinuria, is a potentially serious complication of pregnancy. One study has examined the rate of preeclampsia in a community of vegans in Tennessee between 1977 and 1982. Of 775 vegan pregnancies, there was only one case of preeclampsia (8). This is a much lower rate than that seen in the general population. Since the cause of preeclampsia is still not well understood, it is unclear what factors explain the lower rate of preeclampsia experienced by vegans in this study.

## Food Guide

The Vegetarian Nutrition Dietetic Practice Group has produced a food guide for pregnant vegetarians, presented in Table 2 (41). These guidelines are an average suggestion and should be adjusted to meet the needs of the individual. Some women will need more calories to support adequate weight gain in pregnancy, especially women expecting twins or triplets, adolescents and women who entered pregnancy underweight. In this case, additional servings of foods can be added and fats such as oil and salad dressing used to increase calories. Other women, such as women beginning pregnancy obese or women who are very short in stature, may choose lower calorie selections from each of the groups.

**Table 2. Meal Planning Guidelines for Pregnant Vegetarians**

<b>Food Group</b>	<b>Serving size</b>	<b>No of Servings</b>	<b>Comments</b>
Grains	1 slice of bread; 1/2 cup cooked cereal, grain or pasta; 3/4 to 1 cup ready-to-eat cereal	7 or more	Choose whole or enriched
Legumes, nuts, seeds, milks	1/2 cup cooked beans, tofu, tempeh; 3 oz of meat analogue; or 2 Tbsp nuts, seeds, nut or seed butter; 1 cup fortified soy milk; 1 cup cow's milk, 1 cup yogurt)	5 or more	Calcium-rich foods such as dried beans, calcium-precipitated tofu, calcium-fortified soymilk, cow's milk, and yogurt should be chosen often. A regular source of vitamin B-12

			should be used.
Vegetables	1/2 cup cooked or 1 cup raw	4 or more	Calcium-rich foods such as kale, collard greens, mustard greens, broccoli, and bok choy, should be chosen often.
Fruits	1/2 cup canned fruit or juice or 1 medium fruit	4 or more	Choose calcium rich figs, and fortified juices often.

### **Conclusion**

A vegetarian diet planned in accord with current dietary recommendations can easily meet the nutritional needs of pregnancy (3). Potential benefits of a vegetarian diet in pregnancy include adequate folate status at conception and a possible reduced risk of pre-eclampsia (6).