

Policy

# Clinical Guideline

## Vitamin and Mineral Supplementation in Pregnancy Clinical Guideline

**Policy developed by:** SA Maternal & Neonatal Clinical Network

**Approved SA Health Safety & Quality Strategic Governance Committee on:**  
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**Summary** Clinical practice guideline on vitamin and mineral supplementation in pregnancy

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**Policy history** Is this a new policy? **N**  
Does this policy amend or update an existing policy? **Y v3.0**  
Does this policy replace an existing policy? **N**

**Applies to** All SA Health Portfolio  
All Department for Health and Ageing Divisions  
All Health Networks  
CALHN, SALHN, NALHN, CHSALHN, WCHN, SAAS

**Staff impact** All Staff, Management, Admin, Students, Volunteers  
All Clinical, Medical, Nursing, Allied Health, Emergency, Dental, Mental Health, Pathology

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### Version control and change history

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# South Australian Perinatal Practice Guidelines

# vitamin and mineral supplementation in pregnancy

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## Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

## The Royal Australian and New Zealand College of Obstetricians and Gynaecologists College Statement C-Obs 25 2014 has been used to inform this practice guideline

### Explanation of the aboriginal artwork:

The aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant woman. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.



***Australian Aboriginal Culture is the oldest living culture in the world yet Aboriginal people continue to experience the poorest health outcomes when compared to non-Aboriginal Australians. In South Australia, Aboriginal women are 2-5 times more likely to die in childbirth and their babies are 2-3 times more likely to be of low birth weight. The accumulative effects of stress, low socio economic status, exposure to violence, historical trauma, culturally unsafe and discriminatory health services and health systems are all major contributors to the disparities in Aboriginal maternal and birthing outcomes. Despite these unacceptable statistics the birth of an Aboriginal baby is a celebration of life and an important cultural event bringing family together in celebration, obligation and responsibility. The diversity between Aboriginal cultures, language and practices differ greatly and so it is imperative that perinatal services prepare to respectively manage Aboriginal protocol and provide a culturally positive health care experience for Aboriginal people to ensure the best maternal, neonatal and child health outcomes.***

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# vitamin and mineral supplementation in pregnancy

## Introduction

- > Although, in the general population, a healthy, balanced diet should largely obviate the need for vitamin and mineral supplementation, pregnancy and lactation create extra nutritional demands that, for some individuals, may make supplementation advisable<sup>1</sup>

## Vitamins

### Folate

- > Folic acid deficiency is associated with megaloblastic anaemia and birth defects (especially neural tube defects)
- > As 50 % of pregnancies are unplanned, when contraception is not being used, a daily folate supplement should be taken
- > In Australia, all bread (except organic bread) is fortified with folate; however women are still advised to take supplements

### Food sources of folate

- > Fortified cereals
- > Soy
- > White beans
- > Chickpeas
- > Lentils
- > Yeast extract (e.g. vegemite)
- > Green leafy vegetables
- > Banana, avocado
- > Sunflower seeds

### Dosage<sup>1</sup>

- > All women should take preconceptual folic acid (500 micrograms [0.5 mg] folate daily) for a minimum of one month before conception and for the first 12 weeks of pregnancy to reduce the risk of neural tube defects
- > A higher 5mg daily dose of folic acid should be taken for a minimum of one month before conception and for the first 12 weeks of pregnancy when there is an increased risk of NTD due to:
  - > Women taking certain anticonvulsant medications (for further information see Epilepsy and pregnancy management in the A to Z index at [www.sahealth.sa.gov.au/perinatal](http://www.sahealth.sa.gov.au/perinatal))
  - > Pre-existing diabetes mellitus
  - > Family history of NTD or women with a child with NTD
- > Women at increased risk of folate deficiency should take 5mg of folic acid daily throughout the pregnancy:
  - > Multiple pregnancy
  - > Haemolytic anaemia
  - > Women with an increased BMI (> 30 kg/m<sup>2</sup>)
  - > Malabsorption syndrome (e.g. inflammatory bowel disease)
  - > Women with known MTHFR mutation
  - > Haemoglobinopathy - due to rapid turnover of cells (e.g. beta thalassaemia)
- > While it is well established that pre-pregnancy and early pregnancy dietary supplementation with folic acid is effective in reducing the incidence of NTD; the most effective dose of folic acid is to be determined and is the subject of ongoing research<sup>1</sup>

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# vitamin and mineral supplementation in pregnancy

## Cobalamin (vitamin B<sub>12</sub>)

- > Cobalamin (vitamin B<sub>12</sub>) is essential for infant neurodevelopment. Undiagnosed maternal vitamin B<sub>12</sub> deficiency may result in irreversible neurological damage to the breastfed infant. The Recommended Daily Intake [RDI] for Vitamin B<sub>12</sub> is 2.6 micrograms / day during pregnancy and 2.8 micrograms / day during breastfeeding (for further information see <https://www.nrv.gov.au/nutrients/vitamin-b12>). Although maternal vitamin B<sub>12</sub> deficiency is uncommon, the majority of women with deficient B<sub>12</sub> levels are asymptomatic<sup>3</sup>
- > Consider supplementation with Vitamin B<sub>12</sub> in pregnancy and lactation for women who are vegetarian or vegan<sup>1</sup>

## Food sources of vitamin B<sub>12</sub>

- > Red meat
- > Oysters, clams
- > Trout
- > Salmon
- > Chicken / poultry
- > Eggs
- > Milk

## Indications for measurement

- > Routine measurement of vitamin B<sub>12</sub> is not required; however vitamin B<sub>12</sub> screening is indicated if any of the following exist:
  - > Increased MCV (> 100 fL but may be of the order of 120 fL)
  - > Vegetarian or vegan diet (long term)
  - > GIT pathology (coeliac disease, Crohn's disease, gastric banding / bypass etc)
  - > Family history of vitamin B<sub>12</sub> deficiency or pernicious anaemia
  - > Falling platelet count (< 100 x 10<sup>9</sup> / L)
- > Except in strict vegans, true vitamin B<sub>12</sub> deficiency is unlikely despite the increased requirements of pregnancy due to the extent of vitamin B<sub>12</sub> stores

## Diagnosis

- > Measurement of serum vitamin B<sub>12</sub> is the standard test
- > Serum B<sub>12</sub> levels should be interpreted in relation to clinical symptoms, because the test measures total, not metabolically active vitamin B<sub>12</sub> and there is a large 'grey zone' between the normal and abnormal levels

## Treatment<sup>6,7</sup>

- > Supplementation with IM hydroxocobalamin or IM / oral cyanocobalamin is safe during pregnancy
- > IM administration is recommended in malabsorption of Vitamin B<sub>12</sub>. High dose oral treatment of malabsorption may be tried if IM administration cannot be tolerated, however regular monitoring of vitamin B<sub>12</sub> concentration is required
- > IM hydroxocobalamin produces higher and more prolonged serum levels of vitamin B<sub>12</sub> than the same dose of IM cyanocobalamin. Hydroxocobalamin disperses more slowly from the site of injection than cyanocobalamin, is more strongly bound to plasma proteins and accumulates in the liver to a greater extent
- > If vitamin B<sub>12</sub> deficiency is associated with severe anaemia or neurological symptoms, give vitamin B<sub>12</sub> in high doses without delay. Various regimens have been reported but a total IM dose of 3 to 10 mg should be given over 2 to 4 weeks. A suitable regimen is: hydroxocobalamin 1 mg IM, on alternate days for 2 weeks OR hydroxocobalamin 1 mg IM, twice weekly for 3 weeks.

# vitamin and mineral supplementation in pregnancy

- > For maintenance or prevention of a Vitamin B<sub>12</sub> deficiency (inadequate dietary intake eg. strict vegans) hydroxocobalamin 1 mg IM, may be given once every 2 to 3 months
  - > Alternatively, for those with inadequate dietary intake oral Vitamin B<sub>12</sub> (cyanocobalamin) 50 - 200 micrograms daily may be given

## Composite B-group vitamins

- > Studies have found that vitamin B<sub>6</sub> reduces the severity of nausea but not vomiting in the first trimester. Vitamin B<sub>6</sub> was also associated with a decrease in the risk of dental decay in pregnant women. However, studies failed to show a positive effect on other obstetric and neonatal outcomes, and the risk of adverse events was difficult to assess. Consequently, there is no strong evidence to support routine vitamin B<sub>6</sub> supplementation in pregnancy<sup>3</sup>
- > Similarly, due to minimal data on the benefits and harms of supplementation with vitamin B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>5</sub>, B<sub>7</sub>, and B<sub>12</sub>, there is no strong evidence to support supplementation with any of these vitamins during pregnancy<sup>4</sup>
- > Hyperhomocysteinaemia is the most common thrombophilia with approximately 1.5 % of the population being homozygous for the MTHFR mutation and 25 % heterozygous. The thrombophilic tendency is minimised by an adequacy of folate, riboflavin, B<sub>6</sub> and B<sub>12</sub>. In the absence of any screening for this condition, some clinicians advise that all women should ensure an adequate intake of these vitamins<sup>1</sup>

## Vitamin D

- > Studies of pregnant women in Australia and New Zealand have found an increased frequency of vitamin D deficiency in some communities. Women at increased risk include those with reduced sunlight skin exposure (e.g. veiled women, those who use sunscreen on a regular basis and dark-skinned women, mothers of infants with rickets and women with a BMI > 30).
- > Vitamin D deficiency is known to be an important risk factor for the development of osteoporosis in later life
- > For further information on screening for vitamin D deficiency and vitamin D supplementation, see "Vitamin D deficiency (antenatal screening of at risk mothers and prevention of deficiency in their infants)" in the A to Z index at [www.sahealth.sa.gov.au/perinatal](http://www.sahealth.sa.gov.au/perinatal)

## Vitamin K

- > Vitamin K is a fat soluble vitamin crucial to the production of many proteins involved in the coagulation process
- > Vitamin K may be administered in late pregnancy to women with proven cholestasis of pregnancy, due to reduced vitamin K absorption (for further information see "Obstetric cholestasis" in the A to Z index at [www.sahealth.sa.gov.au/perinatal](http://www.sahealth.sa.gov.au/perinatal)). It is also recommended in the last 4 weeks of gestation for women on some anticonvulsant medications (liver enzyme-inducing), although recent evidence casts doubt on the need for this<sup>1</sup> (see "Epilepsy and pregnancy management" in the A to Z index at [www.sahealth.sa.gov.au/perinatal](http://www.sahealth.sa.gov.au/perinatal))
- > It may be given orally or parenterally according to patient and clinician preference

## Food sources of vitamin K

- > Spinach
- > Brussel sprouts
- > Green salad vegetables
- > Broccoli
- > Plant oils (e.g. canola oil)

# vitamin and mineral supplementation in pregnancy

## Other vitamin supplementation

- > There is little evidence to support routine supplementation of the fat soluble vitamins A & E, and excessive quantities of fat soluble vitamins may be harmful
- > Pregnant women should be informed that vitamin A supplementation (intake above 10,000 units of Retinol) may cause birth defects and therefore should be avoided. Pregnant women should be informed that liver and liver products may contain high levels of vitamin A, and therefore consumption of these products should also be avoided<sup>10</sup>
- > Betacarotene, the vegetable form of vitamin A is not associated with an increased rate of birth defects
- > Vitamin C is an essential water soluble vitamin found widely in fruits and vegetables. A low intake of vitamin C may be associated with complications of pregnancy such as preeclampsia, anaemia and intrauterine growth restriction. However, there is not enough evidence to determine if supplementation with vitamin C (either alone or in combination with other vitamins e.g. vitamin E) is beneficial in pregnancy<sup>11</sup>

## Minerals

### Iron

- > The iron demands of pregnancy are particularly pronounced due to the expanded red cell volume, blood loss around the time of delivery and the demands of the developing fetus and placenta. Iron supplementation will generally be recommended for women at particular risk of iron deficiency. This includes vegetarians and women with a multiple pregnancy. All women should have their haemoglobin level checked at the first antenatal visit and again at approximately 28 weeks' gestation and any anaemia investigated and treated. Routine iron supplementation is not recommended in every pregnancy
- > For further information on iron deficiency anaemia see "anaemia in pregnancy" in the A to Z index at [www.sahealth.sa.gov.au/perinatal](http://www.sahealth.sa.gov.au/perinatal)

### Calcium

- > Providing there is no vitamin D deficiency, a balanced diet will have sufficient calcium for pregnancy and lactation. If the woman avoids dairy in her usual diet, and does not consume alternative high calcium food (e.g. calcium enriched soya milk), calcium supplementation is advisable (at least 1,000 mg per day). The Recommended Daily Intake (RDI) of calcium per day 1,300 mg / day (ages 14 -18 years) and 1,000 mg/day (19-50 years) during pregnancy
- > A systematic review found calcium supplementation almost halved the risk of pre-eclampsia, reduced the risk of preterm birth and occurrence of the composite outcome 'death or serious morbidity'. The effect was greatest for women with low baseline calcium intake. There were no other clear benefits, or harms<sup>14</sup>

### Food sources of calcium

- > Primarily dairy foods, although bony fish, legumes and fortified foods are also sources of calcium
  - > Milk (reduced / low fat)
  - > Cheese (only hard yellow cheese during pregnancy)
  - > Yoghurt (reduced / low fat)
  - > Calcium fortified soy products, almonds
  - > some legumes e.g. white beans, baked beans
  - > white bait, sardines, the little crunchy bones in canned salmon that are edible

# vitamin and mineral supplementation in pregnancy

## Iodine

- > Iodine is a trace element essential for synthesis of the thyroid hormones; triiodothyronine (T3) and thyroxine (T4). These hormones play a vital role in the early growth and development stages of most organs, in particular the brain
- > Iodine plays a critical role in neuropsychological development of the fetus throughout gestation and in the first two years of life<sup>8</sup>
- > The National Iodine Nutrition Survey (2006) has identified that the Australian population is mildly iodine deficient. Iodine uptake by the thyroid is higher in pregnancy and the iodine reserve in the thyroid can decrease to approximately 40 % of preconception levels
- > From September 2009, Food Standards Australia New Zealand (FSANZ) mandated the fortification of bread with iodised salt (with the exception of organic bread), however this will not provide sufficient dietary iodine intake for pregnant and lactating women<sup>8</sup>
- > The National Health and Medical Research Council (NHMRC) recommends that all women who are pregnant, breastfeeding or considering pregnancy, take an iodine supplement of 150 micrograms each day<sup>12</sup>
  - > However, randomised controlled trials to support routine supplementation and dosage are lacking

## Food sources of iodine

- > Bread (except organic bread), eggs, meat, dairy products, seafood and seaweed\*
- > The amount of iodine varies greatly based on factors such as changes in season and processing practices<sup>12</sup>
- > The NHMRC (2010) advises that women who are pregnant, breastfeeding or planning pregnancy should not take kelp (seaweed) supplements or kelp based products because they contain varying levels of iodine and may be contaminated with heavy metals such as mercury<sup>12</sup>
- > The availability of iodine in plant foods varies considerably depending on the availability of iodine in the soil in which the plants are grown

## Dosage and administration

- > Iodine supplement 150 micrograms daily
- > Clinicians may recommend a multivitamin that contains the recommended daily intake of iodine
- > Women with pre-existing thyroid conditions should be referred for medical review before taking a supplement

## Other minerals

- > There is little evidence to support routine supplementation of other minerals in pregnancy such as magnesium, fluoride, zinc or rare minerals<sup>1</sup>

# vitamin and mineral supplementation in pregnancy

## Prostaglandin precursor supplementation

### Fish (marine) oil

- > Population studies have shown that higher intakes of marine foods during pregnancy are associated with longer gestations, higher infant birth weights and a low incidence of pre-eclampsia. It is suggested that the fatty acids of marine foods may be the underlying cause of these associations<sup>15</sup>
- > Marine oils are a rich source of the n-3 long chain polyunsaturated fatty acids (LCPUFA) eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)
- > These fatty acids are precursors to the 3-series prostaglandins and have been shown to modulate inflammatory and vascular effects
- > While there are many nutritional benefits from eating fish in pregnancy, concerns have been raised regarding the intake of environmental pollutants, particularly mercury. Food Standards Australia New Zealand recommend no more than 2-3 serves (150 g serve) of fish per week OR for large, long living fish (e.g. shark) one serve per fortnight<sup>1</sup>
- > Most commercially available fish oils have been processed in a way that strips magnesium along with other heavy metal. Some preparations are marked as mercury tested
- > However, there is not enough evidence to support the routine use of fish oil supplements during pregnancy to prevent preeclampsia and preterm birth and to increase birth weight<sup>15</sup>

### Evening primrose oil

- > There are no studies that assess evening primrose oil consumption in pregnancy<sup>15</sup>
- > The use of evening primrose oil in pregnancy is of questionable value. It contains that fatty acid gamma-linolenic acid (GLA) which is a metabolic precursor of arachidonic acid (AA). It is AA that would have the biological activity as a precursor to the 2-series prostaglandins. Robust information regarding the conversion rate of GLA to AA does not exist



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## Abbreviations

AA	arachidonic acid
DHA	docosahexaenoic acid
e.g.	For example
EPA	eicosapentaenoic acid
et al.	And others
etc	Et cetera
fL	Femtolitre(s)
FSANZ	Food Standards Australia New Zealand
GIT	Gastrointestinal tract
GLA	gamma-linolenic acid
LCPUFA	long chain polyunsaturated fatty acids
MCV	Mean corpuscular volume
mg	Milligram(s)
mL	Millilitre(s)
NHMRC	National Health and Medical Research Council
NTD	Neural tube defects
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCF	Red Cell Folate
RDI	Recommended dietary intake
T3	Triiodothyronine
T4	Thyroxine
Vit	Vitamin

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