



Nutrition in the Periconceptional, Pregnancy and Postpartum Periods

Guide for a Healthy Pregnancy:
From Preconception to Postpartum

Message from the Editor-in-Chief and Project Leader



Adequate nutrition, a fundamental pillar of every individual's health, is particularly critical for women, as inadequate nutrition affects both women and their children. Children of malnourished women are more likely to experience cognitive deficits, stunted growth, lower resistance to infections, and higher risks of disease and death. Malnutrition also weakens women's ability to survive childbirth, increases susceptibility to illness, and slows recovery.

Malnutrition, caused by deficiencies of calories, protein, vitamins, and minerals, often worsened by infections and social conditions, affects millions of women and adolescent girls worldwide. Women are particularly vulnerable due to reproductive biology, poverty, low social status, limited education, and sociocultural practices. Adolescents are especially at risk because of rapid growth. Malnutrition reduces women's productivity, with ripple effects across families and communities.

Addressing female malnutrition allows women to fulfill multiple roles—earning income, feeding families, and raising healthy children—contributing to socioeconomic development. Nutrition depends on food quality, availability, affordability, access to care, and living conditions.

Infertility is increasingly common, and evidence links diet to female fertility. Calcium, iron, zinc, magnesium, iodine, and selenium are essential for reproductive health, yet many women do not meet their needs. Health-conscious diets before and during pregnancy reduce complications, and supplementation with multiple micronutrients plus balanced protein improves birth outcomes.

Postpartum care should include breastfeeding support, nutrition advice, and contraception guidance. Postpartum depression is common, and barriers to healthy eating can increase risks of overweight or obesity. When formula feeding is chosen, mothers need full guidance and support.

Women's nutritional needs vary throughout life, especially preconception, during pregnancy, and while breastfeeding. Ensuring adequate nutrition and care is essential for the health of mothers and children.

This toolkit, based on the videobook "Nutrition in the Periconceptional, Pregnancy and Postpartum Periods," provides an up-to-date, scientifically sound, and easy-to-understand summary of key recommendations for optimal nutrition during the reproductive period. Personalized counseling, guided by this toolkit, can improve reproductive performance, reduce obstetric syndromes, enhance breastfeeding and neonatal care, and decrease risks of adult pathologies originating in fetal and neonatal life.

We thank the NNI editorial staff for their support and look forward to the widespread use of this toolkit to enhance women's health practice.

Gian Carlo Di Renzo, MD, PhD

Editor-in-Chief and Project Leader, on behalf of all coauthors
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Preconception care and fertility support



Preconception care is the provision of biomedical, behavioral, and social interventions to women and couples before conception occurs. It aims to improve health status, reduce harmful behaviors and environmental risks, and support better maternal and child outcomes, in both the short- and long-term



Components of preconception care

- Health assessment and risk factor identification
- Screening for infections and immunizations

Infections: ☐ Hepatitis B ☐ HIV ☐ Syphilis ☐ Rubella	Immunizations: ☐ Influenza ☐ Tetanus, diphtheria, pertussis ☐ Other vaccines based on history or risk (e.g., measles, mumps, varicella, HPV)
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- Genetic counseling and family history

Genetic counseling: Detailed family history of ☐ Sickle cell anemia ☐ Thalassemia ☐ Hemoglobinopathies	Preimplantation genetic testing (if IVF is pursued): ☐ PGT-A (chromosomal abnormalities) ☐ PGT-M (single-gene disorders with known family mutation)
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- Reproductive health education
- Supplements and nutrition counseling
- Environmental and occupational health



When should preconception care be initiated?

Preconception care should begin **at any encounter with individuals of reproductive potential** and ideally **several months** before attempting pregnancy

Certain actions, such as quitting smoking, reaching a healthy weight, or adjusting medications, should start even earlier as part of a healthy lifestyle

Recommendations

- Ask patients about reproductive intentions and desired spacing between pregnancies at routine visits
- For patients not planning pregnancy, assess the risk of unintended pregnancy, review contraceptive method, and address any challenges with its use



Key tool: Preconception Nutrition Questionnaire

As part of preconception care, nutritional status should be evaluated with the **Preconception Nutrition Questionnaire (Appendix A)** to identify nutrition gaps and guide interventions

Reference:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com

Abbreviations:

HIV: Human immunodeficiency virus; HPV: Human papillomavirus; IVF: In vitro fertilization; PGT: Preimplantation genetic testing

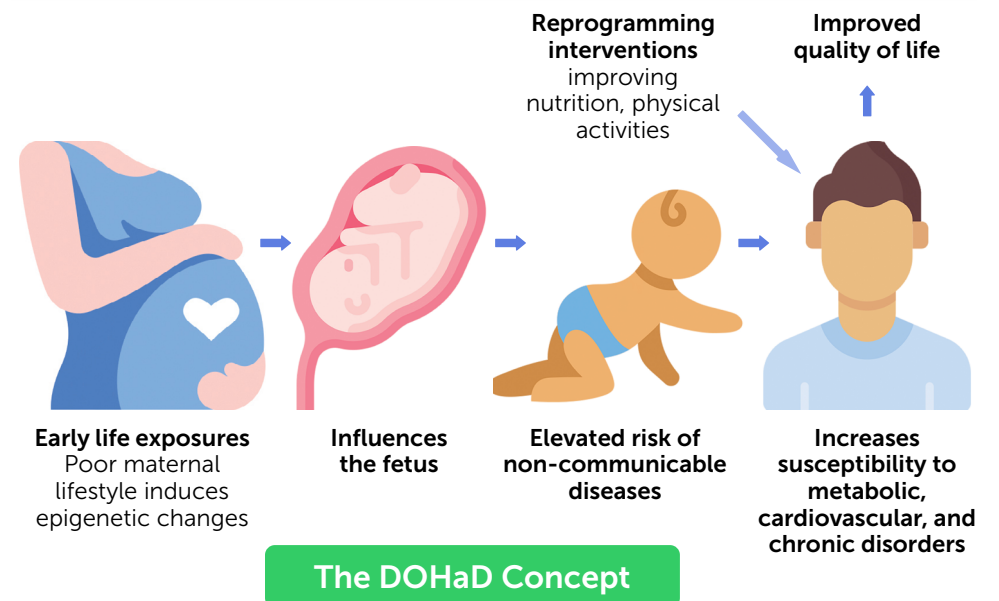
Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

How does preconception care benefit maternal and child health?

	 Maternal	 Child
Short-term	■ Better chronic disease control (e.g., diabetes, hypertension) ■ Optimized nutrition and weight status ■ Improved emotional wellbeing ■ Prevention of infectious diseases ■ Reduced environmental exposures ■ Optimized nutrition and weight status ■ Enhanced fertility awareness	■ Reduced risk of congenital anomalies and neonatal infections ■ Optimized fetal growth and development ■ Decreased risk of preterm birth and pregnancy complications
Long-term	■ Prevention of long-term chronic diseases ■ Sustained reproductive health and fertility ■ Improved postpartum recovery ■ Long-term protection from environmental hazards ■ Informed reproductive decision-making	■ Lower lifetime risk of chronic diseases ■ Improved immunity and metabolic function ■ Enhanced cognitive, emotional, and behavioral development

According to the **Developmental Origins of Health and Disease (DOHaD) hypothesis**, parental health, nutrition, and lifestyle before conception influence a child's lifelong risk of non-communicable diseases. This evidence highlights the importance of preconception care

Cardiovascular disease, diabetes, obesity, respiratory disorders, autoimmune conditions, and mental health disorders



1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com

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and NNI (www.nestlenutrition-institute.org)

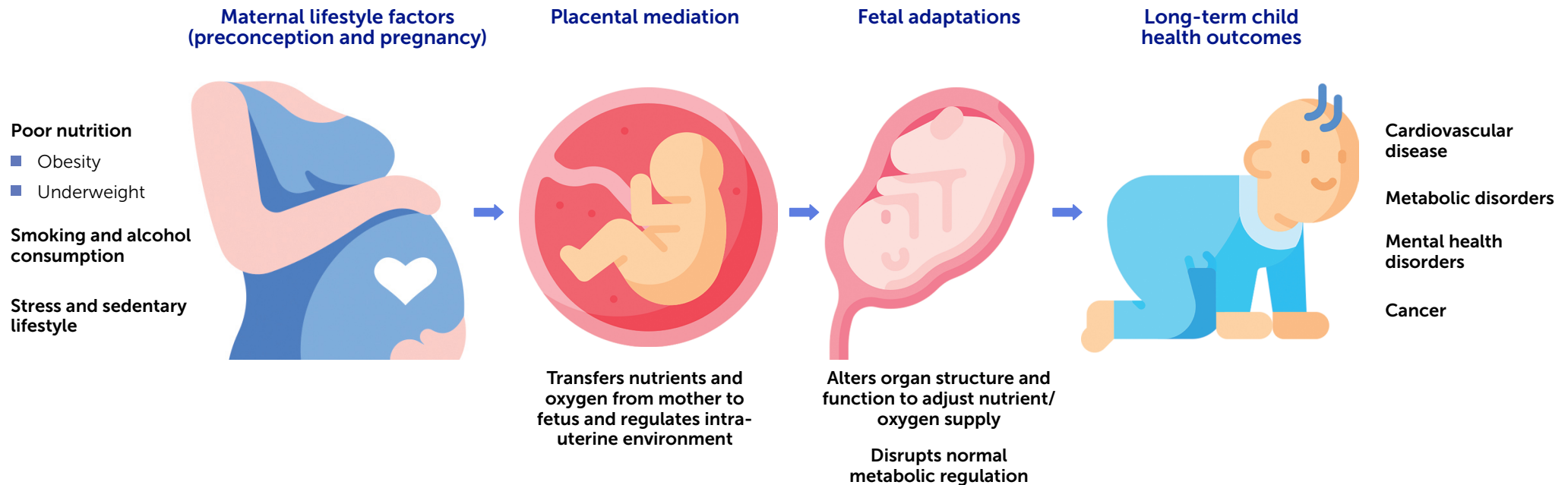
Preconception care and fertility support

Impact of maternal lifestyle on fetal and child health

Poor maternal lifestyle such as inadequate nutrition, smoking, alcohol use, or unmanaged medical conditions can increase the risk of miscarriage, harm fetal development, and increase the child's risk of future health problems. Preconception care addresses these risks before pregnancy to support healthier outcomes for both mother and child.

Key takeaways

- Preconception care is the provision of health interventions before conception
- It should begin at any encounter with individuals of reproductive potential and ideally several months before attempting pregnancy
- It improves maternal and child outcomes in both the short- and long-term, while reducing pregnancy-related risks



Reference:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Diet and exercise for reproductive health

A healthy reproductive journey begins with maintaining nutrition, hydration, and lifestyle behaviors. In both women and men, these measures support fertility, maintain hormonal balance, and promote overall reproductive health, establishing the foundation for a healthy pregnancy and improved long-term outcomes.



Essential macronutrients for women in reproductive health

Protein	- Supports maternal tissue, fetal, and placental growth - RDI: 46 g	Dietary sources: Lean meat, poultry, seafood, nuts, legumes, dairy products, eggs
Carbohydrates	- Provide energy for maternal metabolism and support glucose needs of the fetus, placenta, and maternal brain - RDI: 130 g	Dietary sources: Starches, fruits, vegetables, milk, yogurt
Lipids	- Supply energy, support fetal growth, aid cell signaling, and regulate maternal metabolism - RDI: 20–35% of daily calories	Dietary sources: Fish, avocados, nuts, olives
Omega-3	- Supports fetal brain and retinal development, and may influence gestational length and reduce the risk of perinatal depression - RDI for: ALA: 1.1 g/day DHA and EPA: ≥250 mg/day	Dietary sources: Oily fish, seafood, flaxseeds, nuts
Omega-6	- Supports fetal brain and immune development; requires balance with omega-3 for optimal health - RDI: 5–10% of total energy intake	Dietary sources: Vegetable oil, seeds and nuts, eggs
Fiber	- Facilitates digestive health, helps maintain healthy weight, and may reduce risks of gestational diabetes and hypertension - RDI: 25 g	Dietary sources: Whole grains, fruits, vegetables, legumes, nuts, seeds

References:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com; 2. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com 3. Cetin I. Fat intake recommendations before, during and after pregnancy. GLOWM Videobook. www.glowm.com

Abbreviations:

ALA: Alpha-lipoic acid; DHA: Docosahexaenoic acid; EPA: Eicosapentaenoic acid; RDI: Recommended daily intake

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Diet and exercise for reproductive health



Essential micronutrients for women in reproductive health

Folic Acid	■ Supports neural tube development ■ RDI: 400 µg	Dietary sources: <i>Leafy greens, fortified cereals, supplements</i>
Vitamin B6 & B12	■ Help prevent neural tube defects and support healthy fetal brain development ■ RDI for: Vitamin B6: 1.3 µg Vitamin B12: 2.4 µg	Dietary sources: <i>Fish, poultry, eggs, milk, soy/soymilk</i>
Iron	■ Prevents anemia, supports ovulation and fetal oxygenation ■ RDI: 18 mg	Dietary sources: <i>Red meat, lentils, spinach; vitamin C for absorption</i>
Calcium & Vitamin D	■ Improve bone health and fetal skeletal development ■ RDI for: Calcium: 1000 mg Vitamin D: 2.4 µg	Dietary sources: <i>Dairy, fortified milk, sunlight</i>
Zinc	■ Contributes to egg maturation and immunity ■ RDI: 8 mg	Dietary sources: <i>Shellfish, meat, beans, nuts</i>
Iodine	■ Supports thyroid function and fetal brain development, and prevents reproductive complications ■ RDI: 150 µg	Dietary sources: <i>Iodized salt, dairy products, seaweed, fish</i>
Hydration (water)	■ Vital for hormonal balance, circulation, and amniotic fluid ■ RDI: 2.7 L	Dietary source: <i>Water</i>

References:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com; 2. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com; 3. Divakar H. Nutrition in pre-pregnancy, pregnancy and postpartum: ensuring maternal and child health through balanced diet. GLOWM Videobook. www.glowm.com

Abbreviation:

RDI: Recommended daily intake

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Diet and exercise for reproductive health

Essential macro- and micronutrients for men in reproductive health

Male fertility is a critical determinant of conception, with sperm quality as a primary factor. Although specific nutritional guidelines for men in the preconception period are not established, adequate macro- and micronutrient intake is fundamental for hormonal balance, energy metabolism, and sperm production. Diets rich in high-quality proteins, healthy fats, complex carbohydrates, and essential micronutrients are associated with improved semen parameters and reduced oxidative stress, whereas poor dietary patterns negatively impact fertility outcomes.

Essential macronutrients



Lipids
20–35% of total energy intake

Protein
56 g/day

Fiber
38 g/day

Carbohydrates
130 g/day

Reference:
1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com

Folic Acid	■ Important for proper cell division and DNA synthesis ■ RDI: 400 µg	Dietary sources: <i>Leafy greens, fortified cereals, supplements</i>
Vitamin C & E	■ Protect sperm DNA and improve sperm motility ■ RDI for: <i>Vitamin C: 90 mg</i> <i>Vitamin E: 15mg</i>	Dietary sources: <i>Citrus, nuts, seeds</i>
Zinc	■ Essential for testosterone and sperm quality ■ RDI: 11mg	Dietary sources: <i>Shellfish, meat, legumes</i>
Omega-3	■ Support sperm membrane function and overall quality ■ RDI for: ALA: 1.6 g DHA and EPA: ≥250 mg	Dietary sources: <i>Fatty fish, flaxseed, walnuts</i>

Abbreviations:
ALA: Alpha-lipoic acid; DHA: Docosahexaenoic acid; EPA: Eicosapentaenoic acid; RDI: Recommended daily intake

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Diet and exercise for reproductive health



Physical activity for women in reproductive health

Exercise during preconception

- Improves ovulation and reproductive health
- **Recommended exercises:**
Moderate (walking, cycling, strength training)

Exercise during pregnancy

- Improves cardiovascular health, reduces gestational diabetes/hypertension, and improves mood, labor endurance, postpartum recovery, and may help prevent urinary incontinence
- **Recommended exercises:**
 - **Aerobic** (walking, swimming)
 - **Strength** (light/moderate)
 - **Flexibility and balance** (yoga, Pilates)
 - **Pelvic floor** (Kegels)



Reference:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com

Exercise guidelines for pregnant women



- **≥150 min** moderate activity/week
- Strength training **2x/week** (core + pelvic floor)
- Avoid inactivity and strenuous high-intensity exercise

Recommendations



- Advise patients to avoid contact sports, heavy lifting, and activities with high fall risk
- Monitor hydration status and advise against overheating
- Instruct patients to discontinue activity if bleeding, dizziness, or contractions occur
- Recommend initiation of new exercise or nutrition regimens only under medical supervision

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



2. DIET & EXERCISE

Diet and exercise for reproductive health



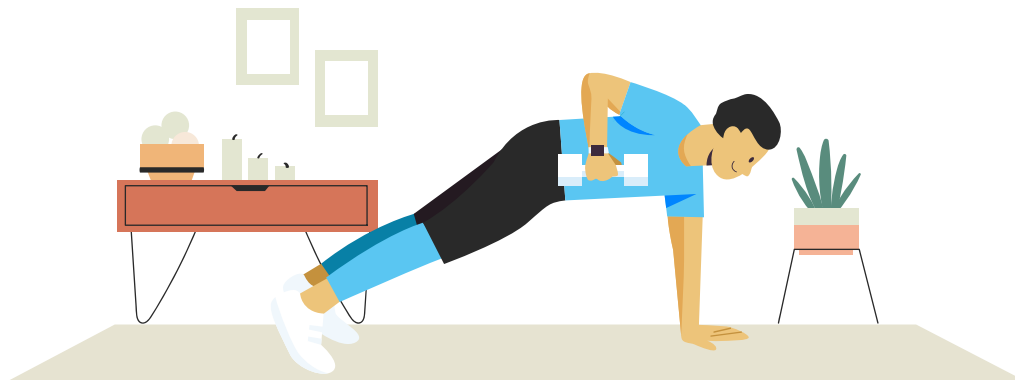
Physical activity for men in reproductive health

Benefits of exercise

- Supports healthy hormone levels and optimal sperm production
- Reduces stress and maintains healthy body weight

Recommended exercises

- **Moderate aerobic exercises:**
Brisk walking, cycling, swimming
- **Strength/resistance training:**
Light to moderate weightlifting or bodyweight exercises
- **Circulation-enhancing activities:**
Yoga, stretching, and exercises that promote blood flow to the pelvic region



Reference:

1. Devlieger R, Miserez L. Reproductive and periconceptional period: opportunity for better health and pregnancy outcomes. GLOWM Videobook. www.glowm.com



Lifestyle factors affecting sperm quality



- **Smoking:** Decreases sperm count and motility
- **Alcohol:** Excess intake lowers testosterone and sperm concentration
- **Environmental toxins:** Pesticides, heavy metals, and endocrine disruptors impair sperm morphology and function
- **Heat exposure:** Saunas, hot tubs, and tight clothing can elevate testicular temperature, reducing sperm production

Recommendations



Advise patients to avoid excessive high-intensity or endurance training (e.g., long-distance running), as it may reduce testosterone levels and sperm count

Key takeaways

- Adequate macro- and micronutrients are essential for reproductive health in both women and men
- Moderate, regular exercise supports fertility; excessive high-intensity training may be harmful
- Exercise during pregnancy is beneficial for both mother and child
- Smoking, alcohol, toxins, and heat negatively affect male fertility

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

3. MATERNAL OBESITY

Prevention and counseling for obesity

Obesity (BMI ≥ 30 kg/m²) is a growing global concern, shaped by social determinants such as socioeconomic status, education, and healthcare access. During pregnancy, it elevates the risk of gestational diabetes, hypertensive disorders, pre-eclampsia, cesarean delivery, and long-term maternal and child complications, highlighting the importance of preconception counseling.

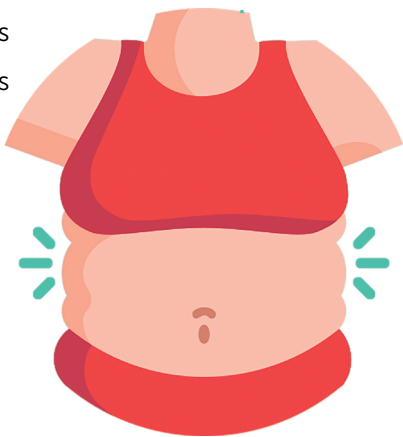
Impact of maternal obesity on fertility, pregnancy, and infant health

Pregnancy

- Gestational diabetes
- Hypertensive disorders
- Delivery complications (e.g., failed labor induction, cesarean delivery, prolonged labor)

Fertility

- Reduced fertility
- Polycystic ovary syndrome
- Reduction in IVF success



Fetal/Neonatal

- Congenital anomalies
- Macrosomia
- Long-term obesity/metabolic risks

Role of preconception care in managing maternal obesity

Preconception care improves maternal health and reduces obesity-associated pregnancy complications



Nutritional counseling: Encourage a balanced diet with fruits, vegetables, whole grains, and lean proteins



Physical activity: Promote regular, individualized exercise to support weight management and overall fitness



Weight management: Set realistic preconception weight loss goals to improve fertility and pregnancy outcomes



Medical and surgical approaches for significant obesity:

- **Medication:** GLP-1 agonists may aid weight reduction but must be discontinued before conception
- **Metabolic and bariatric surgery (MBS):** Considered for severe obesity (BMI ≥ 35). Pregnancies after MBS require specialized monitoring to manage risks such as prematurity and neonatal complications

Reference:

1. Devlieger R, Miserez L, Moulin C. Counseling and prevention in women living with obesity. GLOWM Videobook. www.glowm.com

Abbreviations:

GLP-1: Glucagon-like peptide-1; IVF: In vitro fertilization

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. MATERNAL OBESITY

Prevention and counseling for obesity

Strategies for managing maternal obesity



Healthcare interventions

- Monitor weight, BMI, and metabolic parameters across the pregnancy cycle
- Screen and manage comorbidities (e.g., gestational diabetes, eclampsia/pre-eclampsia)
- Counsel on pharmacologic options and advise discontinuation before conception



Community and policy-level strategies

- Reinforce public health campaigns on healthy lifestyles
- Advocate for access to affordable food and safe activity spaces
- Support workplace policies that enable maternal wellbeing (e.g., maternity leave, lactation accommodations)

Reference:

1. Devlieger R, Miserez L, Moulin C. Counseling and prevention in women living with obesity. GLOWM Videobook. www.glowm.com

Healthy weight gain during pregnancy

Pre-pregnancy BMI

Recommended weight gain (kg)

Underweight (<18.5)

12.5 – 18

Normal (18.5–24.9)

11.5 – 16

Overweight (25–29.9)

7 – 11.5

Obese (≥ 30)

5 – 9

Key takeaways

- Maternal obesity increases risks for infertility, pregnancy complications, and long-term child health
- Preconception care including nutrition, physical activity, weight management, and medical or surgical interventions when needed can reduce these risks
- Clinicians should monitor maternal health, manage comorbidities, and promote supportive community and policy measures for healthy lifestyles



Abbreviation:

BMI: Body mass index

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

4. HIGH-RISK PREGNANCIES



Special considerations for adolescent, multiple, and advanced-age pregnancies

Adolescent pregnancies, multiple gestations, and pregnancies at advanced maternal age each present unique challenges that increase risks for both mother and child. Recognizing these considerations early allows healthcare providers to adapt care, strengthen monitoring, and provide appropriate support to improve outcomes.



Adolescent pregnancy

Key facts	Maternal risks	Fetal risks	Recommendations
High rates in ages 15–19; increasing in <15 years	Hypertensive disorders, infections, premature rupture of membranes, and complications in delivery	Prematurity, low birth weight, perinatal morbidity/mortality, and congenital anomalies	■ Promote evidence-based prevention ■ Improve access to contraception and prenatal care ■ Ensure safe abortion laws, and support gender equality



Multiple pregnancies

Key facts	Maternal risks	Fetal risks	Recommendations
More common with maternal age 30–40, undergoing fertility treatments, family history, and obesity	Diabetes, pre-eclampsia, preterm labor, anemia, postpartum hemorrhage, depression	Preterm birth, low birth weight, higher chance of birth defects (spina bifida, congenital heart disease, and digestive abnormalities)	■ Advise appropriate weight gain by BMI ■ Recommend folic acid supplementation ■ Encourage more frequent prenatal visits

Reference:

1. Lalonde AB. Special aspects of nutrition in pregnancy: adolescence, multiple pregnancy and advanced maternal age. GLOWM Videobook. www.glowm.com

Abbreviation:

BMI: Body mass index

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Special considerations for adolescent, multiple, and advanced age pregnancies



Advanced maternal age pregnancy (35+ years)

Key facts	Maternal risks	Fetal risks	Recommendations
Fertility declines with advanced maternal age [1 in 4 chance per cycle (20–30 yrs) vs. 1 in 10 (35–45 yrs)] Contributing factors: Fewer eggs, chromosomal abnormalities, endometriosis, fibroids	Pre-eclampsia, gestational diabetes, hypertension, miscarriage, higher rate of cesarean deliveries	Chromosomal abnormalities, low birth weight, prematurity, and pregnancy loss	■ Provide preconception and early prenatal care ■ Advise nutrient-rich diet ■ Counsel on avoiding harmful substances ■ Monitor and manage weight

Key takeaways

- Adolescent, multiple, and advanced maternal age pregnancies are associated with increased maternal and fetal complications
- Preventive measures such as preconception assessment, balanced nutrition, weight management, and careful prenatal monitoring can reduce these risks

Reference:

1. Lalonde AB. Special aspects of nutrition in pregnancy: adolescence, multiple pregnancy and advanced maternal age. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

General principles of nutrition



Nutrition is the intake of food in relation to the body’s dietary needs. It is essential for good health and impacts the development process at every stage of the life cycle, from conception to the end of life.

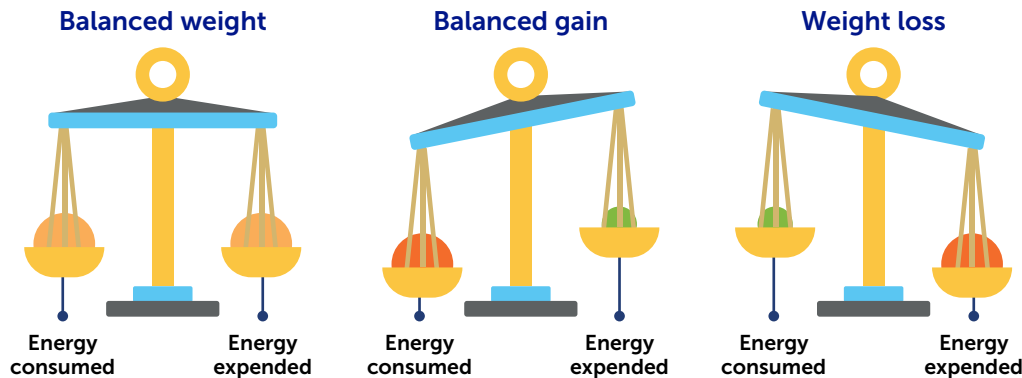


Why is nutrition important in maternal health?

Good nutrition reduces pregnancy complications, supports fetal growth, strengthens maternal immunity, lowers disease risk, and improves long-term health for mother and child

Understanding energy balance in nutrition

Energy balance is defined as the state achieved when energy intake from the diet equals energy expenditure. This concept explains how body weight changes over time in response to variations in dietary intake and energy output. When energy intake and expenditure are balanced, body weight remains stable.mother and child.



Source: BBC Bitesize – Diet and nutrition (WJEC): Energy balance equation
Reference:
1. Di Renzo L. General nutrition principles: energy balance, metabolism, anabolism and catabolism. GLOWM Videobook. www.glowm.com

General principles of nutrition

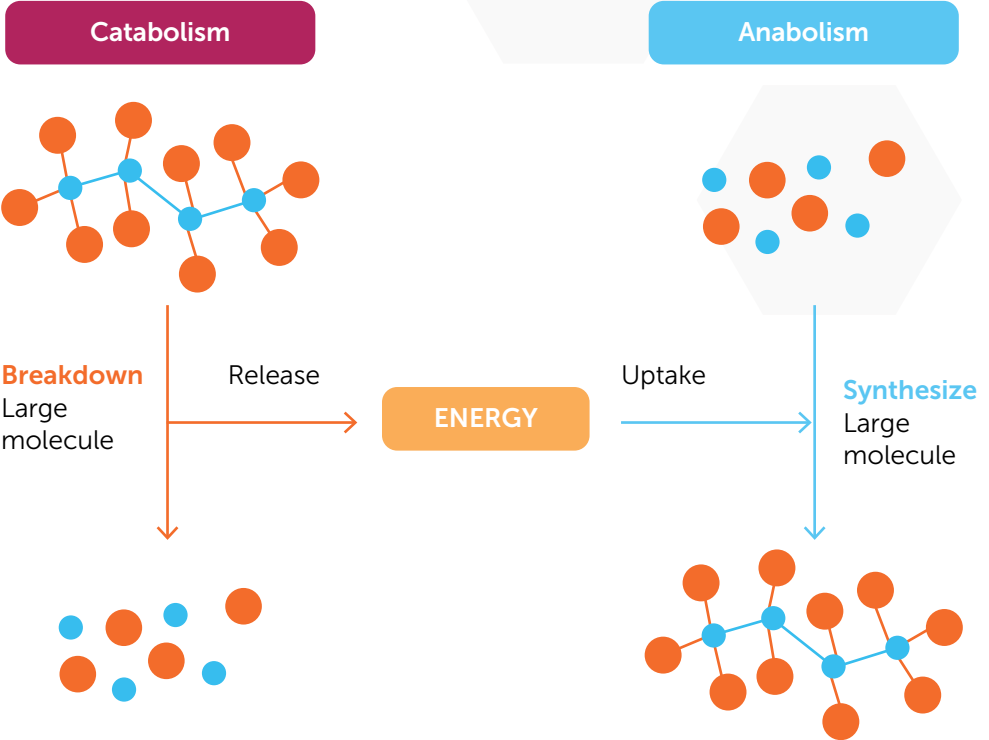
The role of metabolism in maintaining energy balance



Metabolism, through coordinated anabolic and catabolic pathways, drives energy balance by aligning nutrient utilization with physiological demands. During pregnancy, metabolic adaptations ensure sufficient substrate availability for maternal support and fetal growth.

Metabolic adaptations during pregnancy

Phase	Key metabolic changes	Primary hormonal influence
Anabolic (1st & 2nd trimesters)	Increased fat storage, enhanced insulin sensitivity, nutrient accumulation	Estrogen, progesterone, insulin
Catabolic (3rd trimester)	Increased lipolysis, insulin resistance, enhanced fetal glucose uptake	Placental lactogen, cortisol



Source: BMG Labtech – Cell Metabolism (Dr Tobias Pusterla, 2023)

Key points

- The anabolic phase supports nutrient storage for later use
- The catabolic phase ensures efficient nutrient transfer to the fetus during rapid growth

Reference:
1. Di Renzo L. General nutrition principles: energy balance, metabolism, anabolism and catabolism. GLOWM Videobook.
www.glowm.com

Learn more at Glowm (www.glowm.com)
and NNI (www.nestlenutrition-institute.org)



1. NUTRITION

General principles of nutrition

Healthy diet during pregnancy



A **healthy diet** during pregnancy is essential for supporting the health of the pregnant individual and promoting healthy development of the child. Nutritional needs during pregnancy differ significantly from those of non-pregnant women due to increased energy and micronutrient demands. A healthy diet should provide an adequate balance of macronutrients and essential micronutrients to meet these needs.

Fruits & Vegetables

Healthy Carbohydrates:
High soluble and insoluble fibre,
Low glycemic index
Carotenoids, Vitamin C, Polyphenols;
Antioxidants, Folic Acid

Nuts & Seeds

Monounsaturated fat,
Omega-3 fatty acids,
Vegetable Proteins
Vitamin E, Zinc,
Selenium

Legumes

Healthy Carbohydrates:
High soluble fiber,
Low glycemic index
Vegetable Proteins
B vitamins, Iron



Whole grains

Healthy Carbohydrates:
High soluble and insoluble fibre,
Lower glycemic index
B vitamins, Selenium

Protein sources

Proteins
Calcium, Vitamin D,
Selenium, Iron, Zinc,
Iodine, Vitamin B12

Oily fish, Fish oil

Omega-3 fatty acids,
Proteins, Vitamin D

Olive oil, Avocado

Monounsaturated fat,
Polyphenols

References:

1. Di Renzo L. General nutrition principles: energy balance, metabolism, anabolism and catabolism. GLOWM Videobook. www.glowm.com; **2.** Cetin I. Adaptation of a woman's body to pregnancy and postpartum: requirement for energy and elements. GLOWM Videobook. www.glowm.com; **3.** Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com



Importance of macro- and micronutrients during pregnancy and lactation

Adequate intake of these nutrients is essential to:



Support fetal growth and development, including organ formation, brain maturation, and skeletal development



Maintain maternal health by ensuring energy balance and replenishing nutrient stores



Facilitate physiological changes during pregnancy and lactation, such as increased blood volume, hormonal adjustments, and milk production

Recommended daily intakes for key macronutrients in pregnancy and lactation are summarized in **Appendix B (Tables 1A and 1B)**

Recommendations

- Provide dietary counseling for pregnant women, considering BMI, cultural preferences, and complications such as gestational diabetes
- Promote a nutrient-rich diet to support maternal health and optimal fetal development
- When there is a risk of nutritional deficiencies, supplementation should be recommended to help close dietary gaps

Abbreviation:

BMI: Body mass index

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Index



Appendix

Preparing for Pregnancy

Nutrition in Pregnancy

Discomfort and Disorders

Postpartum Care

General principles of nutrition

What good nutrition in the Preconceptional periods should look like

Balanced Diet			
Pre-conceptual	1 st trimester	2 nd & 3 rd trimesters	Breastfeeding
Iron, B12, Vitamin D, Folate, Iodine 	Iron, B12, Vitamin D, Folate, Protein, Fats, Iodine 	Protein, Fats, Carbohydrates, Iron, Calcium, Vitamins, Folate, Iodine 	Protein, Fats, Iron, Calcium, Vitamin D, Iodine, Folate 

Key takeaways

- Adequate intake of protein, carbohydrates, healthy fats, and key micronutrients supports fetal growth, maternal health, and lactation
- A balanced diet rich in whole foods such as lean meats, dairy, legumes, fruits, vegetables, and fortified foods helps meet increased nutrient needs
- Targeted supplementation of nutrients like folate, iron, vitamin D, and DHA may be needed when diet alone is insufficient
- Monitoring energy intake, hydration, and micronutrient status supports maternal recovery and breast milk quality

Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Abbreviation:

DHA: Docosahexaenoic Acid

Common micronutrient deficiencies in pregnancy



Micronutrient deficiency, or micronutrient malnutrition, results from inadequate intake or absorption of essential vitamins and minerals and can impair physiological functions, growth, and development. During pregnancy, increased micronutrient needs support maternal health, placental function, and fetal growth. Recent data indicate that **around 69% of women of reproductive age** are deficient in iron, zinc, and/or folate. Pre-existing deficiencies, common in low-income settings, can cause anemia, low birth weight, preterm birth, and developmental disorders, making dietary management and supplementation essential in antenatal care.



Causes of micronutrient deficiency in pregnancy



Inadequate dietary intake



Poor absorption or utilization of nutrients often due to infections, parasitic infestations, or gastrointestinal disorders



Increased metabolic demands of the body during pregnancy, growth periods, or illness



Poverty and related factors (e.g., limited access to diverse foods, unsafe water, and poor sanitation)



Geographic and environment factors (e.g., iodine depletion in soil due to flooding or glaciation)

Essential micronutrients in pregnancy

Micronutrients of concern during pregnancy including folate, iron, vitamin B12, iodine, and calcium, along with their physiological roles and associated risks of deficiency are summarized in **Appendix B (Tables 2A and 2B)**.

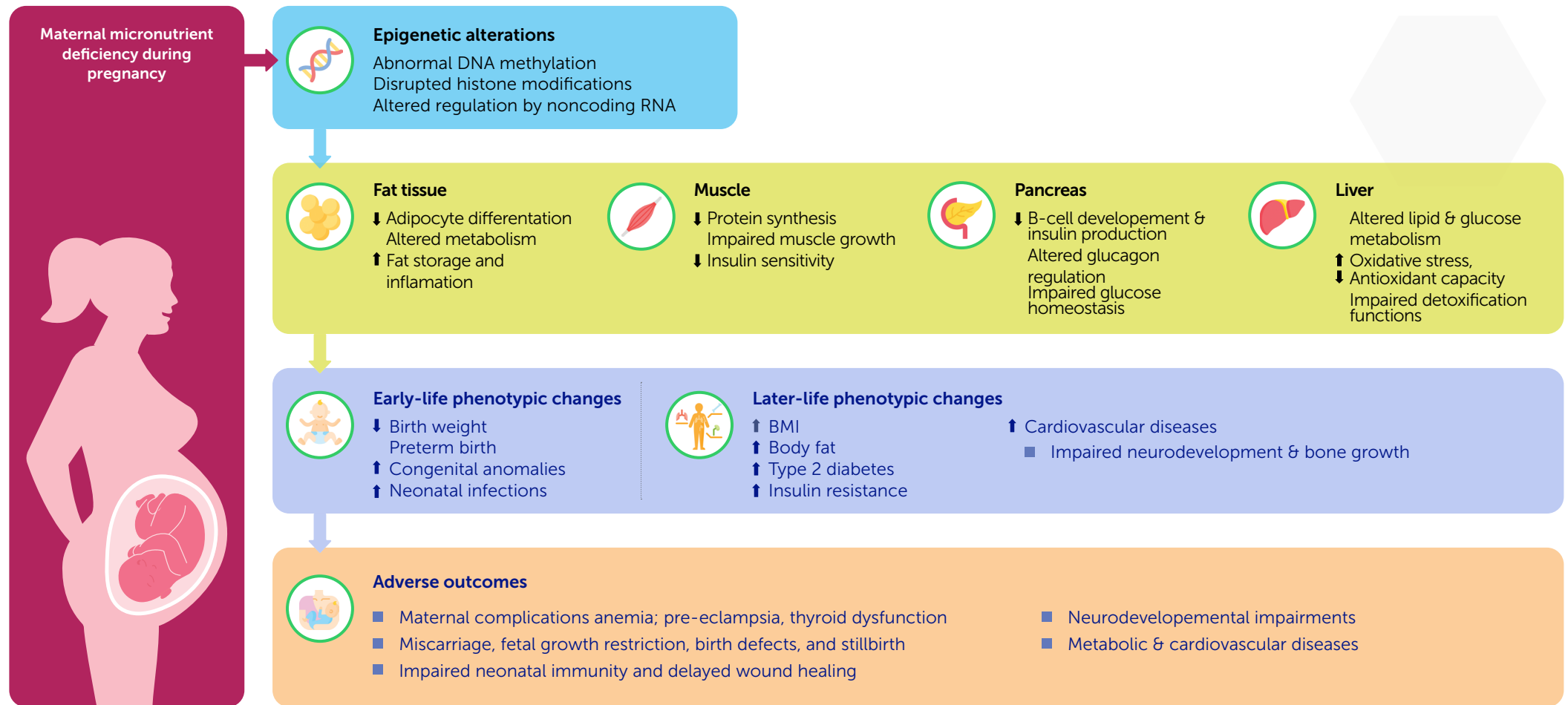
Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Common micronutrient deficiencies in pregnancy

Effects of micronutrient undernutrition in pregnancy



Adapted from: Wu Y, et al.. Front Nutr. 2021;8:763809

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Common micronutrient deficiencies in pregnancy



Recommendations



- Provide nutrition counseling during preconception and throughout pregnancy
- Assess dietary intake and key labs (e.g., ferritin) to identify deficiencies or excess
- Advise on omega-3 intake from supplements or dietary sources, and specify higher-dose recommendations for women at increased risk (e.g., low dietary intake, vegetarian/vegan diets, or complications such as preterm birth risk or hypertension)
- Encourage vitamin A and choline intake per stage-specific recommended daily intakes
- Guide patients to reliable meal planning resources
- In low-resource settings, prioritize multivitamin use; in high-resource settings, supplement only if deficiency risk is high

Key takeaways

- Pregnant women often have micronutrient deficiencies that increase risks for maternal and fetal complications
- Early periconceptional nutrition and supplementation support fetal development and prevent birth defects
- Dietary assessment and lab monitoring help identify deficiencies and guide personalized interventions
- Nutrient-dense diets and supplementation should be encouraged to optimize maternal and child health

References:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com
2. Carlson SE. Iodine, choline and other crucial micronutrients: effects on pregnancy outcome. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

3. FOOD INSECURITY & TOXINS

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy



Maternal nutrition, food insecurity, and environmental exposures significantly influence reproductive outcomes. These factors are associated with increased risks of miscarriage, preterm birth and low birth weight, and may have long-term implications for offspring health. Early recognition and management of these risks are essential in preconception and prenatal care.

Common dietary contaminants and teratogenic risk factors



Food contaminants e.g., heavy metals, microbes, microplastics, allergens, pesticide residues, mycotoxins, and endocrine-disrupting chemicals in processed foods and packaging



Prescription medications with teratogenic risk



Lifestyle and substance use e.g., poor diet quality, high intake of processed foods, alcohol, tobacco, and recreational drugs

Common food groups and associated toxicants

Food group	Toxicants
- Fish - Seafoods (shark, swordfish) - Non-alcoholic beverages - Supplements	Mercury (Hg)
- Breads - Tea - Potatoes - Tap water - Beer - Fermented milk	Lead (Pb)
- Cereals/grains (rice) - Root vegetables - Poultry - Meat - Bivalve mollusks	Cadmium (Cd)
- Seafood/fish - Hijiki-algae - Rice	Arsenic (As)
- Infant formulas - Cereals - Vegetables - Beverages	Aluminum (Al)
- Herbs - Spices and condiments - Drinking water - Sugar	Hexavalent chromium (Cr)

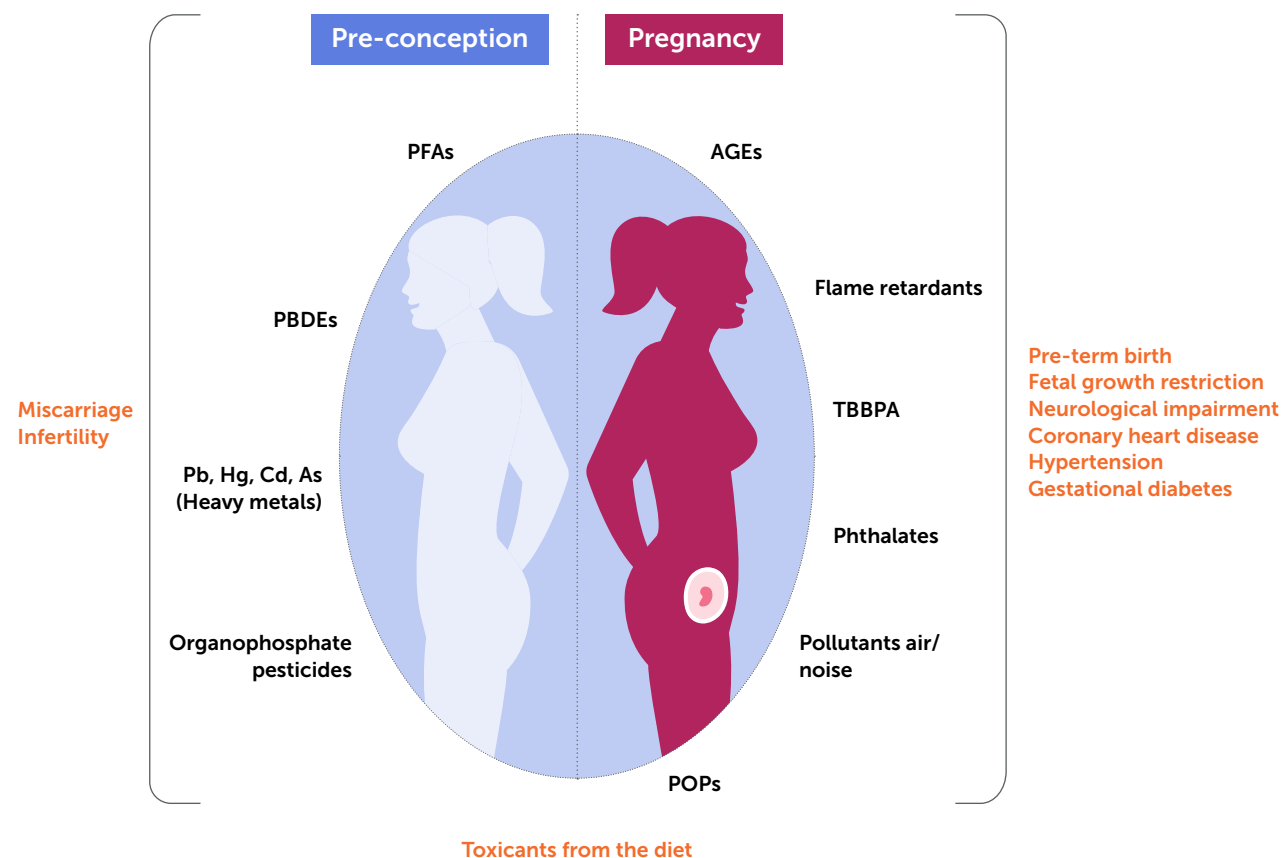
Reference:

1. Oken E. Food insecurity, environmental toxicants and nutrition: effects on reproduction and pregnancy. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy

Health risks of dietary contaminants during pregnancy



Strategies for reducing dietary contaminants and teratogenic risk factors in pregnancy

-  Advise limiting foods with high contaminant risk such as shark, swordfish, and processed meats
-  Recommend safer cooking practices; avoid reused oils and charring
-  Encourage food hygiene
-  Caution against excess coffee intake
-  Promote nutrient-rich diets (diets rich in antioxidants and vitamins)

Reference:

1. Meyyazhagan A, Kuchi Bhotla H, Tsibizova V, Pappuswamy M, Chaudhary A, Arumugam VA, Al Qasem M, Di Renzo GC. Nutrition paves the way to environmental toxicants and influences fetal development during pregnancy. Best Pract Res Clin Obstet Gynaecol. 2023;89:102351

Abbreviations:

AGEs: Advanced glycation end-products; PBDEs: Polybrominated diphenyl ethers; PFAS: Perfluoroalkyl and polyfluoroalkyl substances; POPs: Persistent organic pollutants; TBBPA: Tetrabromobisphenol

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy

Environmental toxins in pregnancy

Environmental toxins are harmful chemicals present in food, water, air, and consumer products that can interfere with maternal and fetal health. Pregnant women are exposed through:



Dietary intake:

Contaminated food and water



Inhalation:

Polluted air, cigarette smoke, combustion by-products



Dermal contact:

Household chemicals, pesticides, personal care products



Lifestyle factors:

Alcohol, tobacco use

Major environmental toxins



Industrial chemicals:

Polychlorinated biphenyls, dioxins, solvents



Agricultural chemicals:

Pesticides, herbicides



Physical agents:

Heat, ionizing and non-ionizing radiation



By-products of combustion and industrial processes:

Dioxins, polycyclic aromatic hydrocarbons



Air and water pollutants:

Lead in water, air pollution particles, volatile organic compounds

Reference:

1. Meyyazhagan A, Kuchi Bhotla H, Tsibizova V, Pappuswamy M, Chaudhary A, Arumugam VA, Al Qasem M, Di Renzo GC. Nutrition paves the way to environmental toxicants and influences fetal development during pregnancy. Best Pract Res Clin Obstet Gynaecol. 2023;89:102351

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3. FOOD INSECURITY & TOXINS

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy

Effects of environmental toxins in pregnancy

Environmental chemical exposure



Adverse pregnancy outcomes

- Gestational diabetes
- Pregnancy complications
- Preterm delivery
- Intrauterine growth restriction
- Low birth weight
- Neural tube defects

Placenta as a target

- Interference with nuclear receptors
- Inducing oxidative stress
- Changes in cytokines levels
- Impact on DNA methylation and microRNAs profiles

Recommendations to reduce environmental toxin exposure

-  Advise choosing organic, fresh foods, and washing produce and hands thoroughly
-  Encourage limiting plastics, pesticides, dry cleaning, canned foods, and toxic flame-retardant products
-  Recommend avoiding insecticides, pest bombs, chalks, smoking, secondhand smoke, and carbonless receipts
-  Promote safer household alternatives (soap, baking soda, fresh air) and personal care products free from phthalates, parabens, fragrances, and triclosan
-  Advise reducing use of hand sanitizers, handling of digital receipts, and exposure to high outdoor air pollution
-  Alert patients to potential lead sources (e.g., imported/ethnic products) and promote practices like leaving shoes at the door to reduce indoor contamination

Source: Li J, et al. Crit Rev Environ Sci Technol. 2023;53(8):964-985

Reference:

1. Meyyazhagan A, Kuchi Bhotla H, Tsibizova V, Pappuswamy M, Chaudhary A, Arumugam VA, Al Qasem M, Di Renzo GC. Nutrition paves the way to environmental toxicants and influences fetal development during pregnancy. Best Pract Res Clin Obstet Gynaecol. 2023;89:102351

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy

What is food insecurity?



Food insecurity refers to the lack of consistent access to sufficient, safe, and nutritious food necessary for normal growth, development, and overall health. It can affect individuals' ability to lead an active and healthy life and is influenced by multiple factors such as economic instability, social inequities, climate change, and disruptions in food systems.

Causes of food insecurity

- Poverty
- Unsustainable production
- Supply-demand gap
- Lack of policies implementation
- Worse climatic conditions
- Unsustainable consumption
- Unequal distribution



References:

1. Oken E. Food insecurity, environmental toxicants and nutrition: effects on reproduction and pregnancy. GLOWM Videobook. www.glowm.com; 2. Di Renzo GC, Tosto V. Food insecurity, food deserts, reproduction and pregnancy: we should alert from now. J Matern Fetal Neonatal Med. 2022;35(25):9119-9121.

Impact of food insecurity on maternal and child health



Maternal health

- **Nutritional deficiencies** e.g., micronutrient deficiencies (iron, folate, calcium), anemia, and inadequate macronutrient intake
- **Pregnancy-related complications** e.g., gestational diabetes and hypertensive disorders



Child health

- **Growth and development complications** e.g., fetal growth restriction, low birth weight, and preterm birth
- **Long-term health risks** e.g., impaired neurodevelopment and metabolic disorders later in life due to suboptimal *in-utero* nutrition



3. FOOD INSECURITY & TOXINS

Effects of food contaminants, environmental toxins, and food insecurity on pregnancy

Addressing food insecurity in preconception and pregnancy visits



1. Screen for food insecurity

Incorporate food insecurity screening during preconception and antenatal visits to identify women at risk or already affected



2. Recognize associated risks

Understand that food insecurity is linked to maternal and child health risks



3. Provide early support

Offer counseling, mental health support, and practical guidance to reduce risks during pregnancy and postpartum



4. Connect to broader goals and resources

Frame interventions within sustainable development goals (*Zero Hunger, Good Health and Wellbeing, Gender Equality*) and refer women to social and nutritional support programs where available



5. Advocate and innovate

Support the development of models of care for food-insecure pregnant women and contribute to research on effective, long-term interventions

Key takeaways

- Maternal nutrition and contaminant exposure strongly influence pregnancy outcomes including miscarriage, preterm birth, low birth weight, and long-term child health
- Routine screening for food insecurity allows timely nutritional, psychological, and social support to improve maternal and child outcomes
- Environmental toxins from food, water, air, and household products can impair reproductive, fetal growth, and neurodevelopmental outcomes
- Counseling on nutrient-rich diets, safe food and household practices, and reducing exposure to contaminants is essential for prevention

References:

1. Oken E. Food insecurity, environmental toxicants and nutrition: effects on reproduction and pregnancy. GLOWM Videobook. www.glowm.com. 2. Di Renzo GC. Preface: ecology starts in utero. Best Pract Res Clin Obstet Gynaecol. 2023;88:102352

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1. MINOR DISCOMFORT

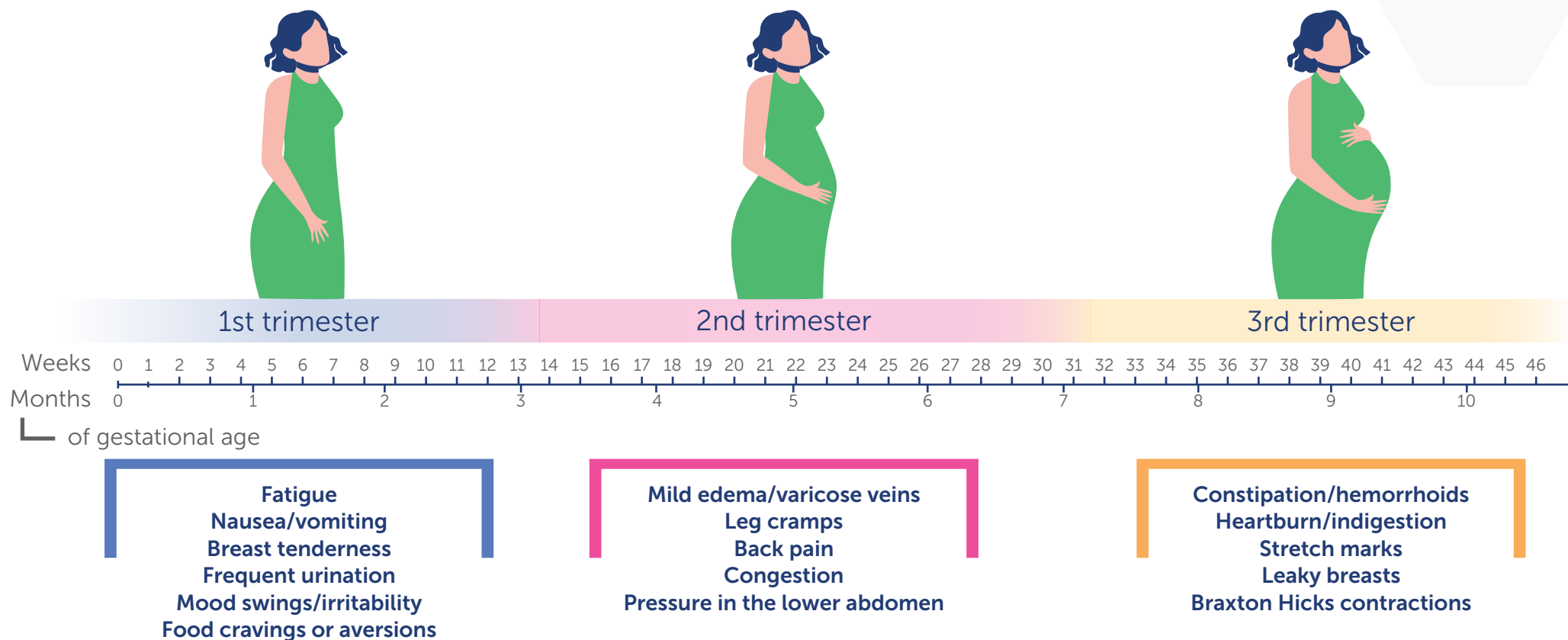


Diet and nutrient recommendations for minor pregnancy discomforts



Discomforts of pregnancy are common, non-pathological conditions that occur as a direct consequence of the physiological, anatomical, biochemical, and immunological adaptations during gestation or are worsened by pregnancy. These conditions are generally not harmful and are temporary.

Common pregnancy-related discomforts by trimester



Reference:

1. Rodríguez Cano AM. Diet, supplements, and minor discomfort in pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

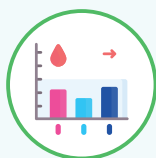


1. MINOR DISCOMFORT



Diet and nutrient recommendations for minor pregnancy discomforts

What are the causes of minor discomforts in pregnancy?



Hormonal fluctuations

- Progesterone causes constipation, reflux, and urinary stasis
- Estrogen and progesterone cause nasal congestion and gingival changes
- Human chorionic gonadotropin (hCG) causes early pregnancy nausea and vomiting



Anatomical changes

- Uterine growth causes back pain, pelvic discomfort, and leg cramps
- Diaphragm pressure leads to breathlessness
- Pelvic vessel compression results in hemorrhoids, varicosities, and edema



Cardiovascular and hemodynamic adaptations

- Increased blood volume and cardiac output cause fatigue, palpitations, and edema
- Vasodilation lowers blood pressure, leading to dizziness or fainting



Gastrointestinal modifications

- Slowed gastric emptying and intestinal motility causes constipation and bloating
- Lower esophageal sphincter relaxation leads to heartburn and reflux



Urinary and renal changes

- Increased renal blood flow and glomerular filtration rate leads to urinary frequency



Immunological adaptations

- Altered immune response to maintain fetal tolerance can predispose to minor infections or discomfort

Reference:

1. Rodríguez Cano AM. Diet, supplements, and minor discomfort in pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



1. MINOR DISCOMFORT



Diet and nutrient recommendations for minor pregnancy discomforts

Common pregnancy-related discomforts

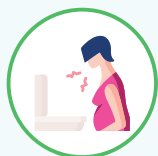


Fatigue

Diet: Balanced meals with protein and complex carbohydrates

Nutrients:

- Iron if anemic
- Folate & B12, Vitamin D if deficient



Nausea/Vomiting

Diet: Small, frequent, protein-rich meals; avoid spicy food/triggers

Nutrients:

- Vitamin B6 **10-25mg/day**
- Ginger **1g/day**
- Adjust iron (intermittent/alternate-day)

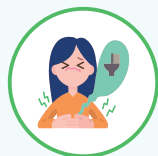


Heartburn/Indigestion

Diet: Small, frequent meals, avoid triggers, stay up right after eating

Nutrients:

- Calcium carbonate (per label)
- Ginger
- Probiotics



Constipation/Hemorrhoids

Diet: High-fiber foods, adequate fluids (including water)

Nutrients:

- Psyllium **6.4-10 g/day**
- Probiotics
- Adjust iron (intermittent alternate-day)



Leg edema/Varicose veins

Diet: Limit sodium, stay active, elevate legs

No nutrients recommended

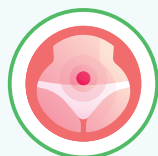


Mood swings/Irritability/Depression

Diet: Diet: Balanced meals (include omega-3 rich foods), hydration with water

Nutrients:

- Omega-3 (DHA) **250 mg/day**
- Vitamin D, B12/folate, iron if deficient



Postpartum perineal pain

Diet: Mediterranean diet, adequate protein intake, omega-3

Nutrients:

- Probiotics



Postpartum urinary retention

Diet: Adequate hydration with water, avoid bladder irritants

Nutrients:

- Probiotics



Lactation problems

Diet: Adequate intake of energy, vitamins and minerals, proper hydration with water

Nutrients:

- Multiple-micronutrient supplementation debated
- Probiotics may help prevent mastitis

References: 1. Rodríguez Cano AM. Diet, supplements, and minor discomfort in pregnancy and postpartum. *GLOWM Videobook*. www.glowm.com 2. Yu Q, Xu C, Wang M, Zhu J, Yu L, Yang Z, Liu S, Gao X. The preventive and therapeutic effects of probiotics on mastitis: a systematic review and meta-analysis. *PLoS One*. 2022;17(9):e0274467

Abbreviation:

DHA: Docosahexaenoic acid

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



1. MINOR DISCOMFORT



Diet and nutrient recommendations for minor pregnancy discomforts

Managing minor discomforts in pregnancy



Assess onset, triggers, lifestyle, and medications; examine as needed and rule out pathology before linking symptoms to pregnancy



Encourage fiber-rich diet, hydration, activity, posture changes, and moderate salt intake; **use evidence-based symptom management**



Screen for mood changes, promote a realistic body image and self-care, and refer for mental health counseling if needed



Adapt to cultural norms, explain discomforts are temporary, and give practical tips to manage stress

Key takeaways

- Minor discomforts in pregnancy are common, non-pathological symptoms from normal physiological and anatomical changes
- Common ones include nausea, fatigue, breast tenderness, heartburn, constipation, back pain, leg edema, and mood swings
- Though usually temporary, they can affect comfort and daily functioning
- Assessment helps rule out pathology, while preventive and symptom-specific measures, mental health support, individualized care, and education on the temporary nature of symptoms contribute to effective management



Reference:

1. Rodríguez Cano AM. Diet, supplements, and minor discomfort in pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Anemia: Prevention and management during pregnancy and postpartum



Anemia is a condition in which the amount of healthy red blood cells or hemoglobin in the blood is lower than a normal threshold, causing a lack of oxygen to the body's tissues and organs. It may result from poor nutrition or other health problems. Symptoms range from non-specific (fatigue, dizziness, headache, cold extremities, shortness of breath) to severe (pallor, rapid breathing or heart rate, postural dizziness, easy bruising).

Hemoglobin levels define anemia



Pregnancy

- **<11 g/dL** (first and third trimester)
- **<10.5 g/dL** (second trimester)



Postpartum

- **<10 g/dL** after delivery
- **<11 g/dL** at 1 week postpartum
- **<11 g/dL** at 8 weeks postpartum
- If Hb value is **<7 g/dL** (severe postpartum anemia)

Iron deficiency is one of the most common nutrient deficiencies. Since iron is important to hemoglobin synthesis, deficiency **leads to anemia** when iron demands chronically exceed intake



Serum ferritin: **<30 µg/L**



Abnormal iron saturation and total iron binding capacity

When to measure ferritin* in patients?



- Hemoglobinopathies
- Previous parenteral iron replacement
- Previous anemia
- Multiparity (≥2 previous births)
- Multiple pregnancy (e.g., twins, triplets)
- Interpregnancy interval <1 year
- Teenage pregnancies
- Recent bleeding history
- High risk of bleeding
- Vegetarian lifestyle

Reference:

1. Guinto VT. Prevention and management of anemia in the reproductive period and pregnancy. GLOWM Videobook. www.glowm.com

Footnote:

*Determination of serum ferritin, bleeding parameters, hemoglobin, and hematocrit is advised

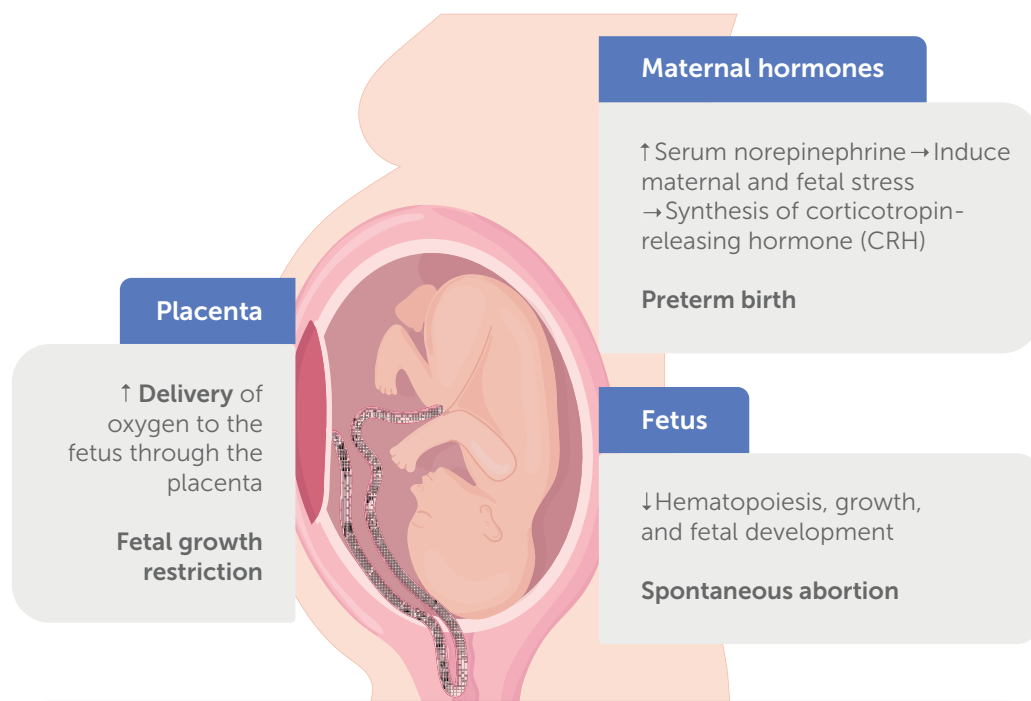
Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)





Anemia: Prevention and management during pregnancy and postpartum

How can iron deficiency affect pregnancy?



What if iron is elevated?

Excessive iron levels increase oxidative stress, beta cell toxicity and insulin resistance, disrupting glucose homeostasis causing gestational diabetes

Reference:

1. Guinto VT. Prevention and management of anemia in the reproductive period and pregnancy. GLOWM Videobook. www.glowm.com

Management of anemia

Normal Hb

By the first prenatal visit:

All pregnant women should take continuous or intermittent iron supplementation to prevent anemia at term

Dosage:
30 mg/day, 1-3 times a week

Low Hb: <11 g/dL

At any stage of pregnancy:

Dosage: **30-120 mg/day, until anemia is corrected**

If the dosage is high, iron absorption decreases.

- Splitting supplementation into several doses during the day is recommended
- Vitamin C can enhance iron absorption

Pregnancy

Dosage: **27 mg/day**

Breastfeeding

Dosage: **9-10 mg/day**

Key takeaways

- Anemia can affect women, especially during their reproductive years
- Iron deficiency is the most common micronutrient deficiency and a leading cause of anemia
- During pregnancy and postpartum periods, iron deficiency can affect maternal and fetal health
- Timely iron supplementation can help prevent iron deficiency and reduce the risk of anemia and its related complications

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)





3. GESTATIONAL DIABETES



Gestational diabetes mellitus: Prevention using inositols



Gestational diabetes mellitus is glucose intolerance first recognized in pregnancy, caused by pregnancy-induced insulin resistance. It is classified as *diet-controlled (class A1GDM)* or *requiring pharmacologic treatment (class A2GDM)* and is identified through prenatal screening. Gestational diabetes is associated with an increased long-term risk of type 2 diabetes and cardiovascular disease for both mother and child.

Pathophysiology of gestational diabetes

Gestational diabetes occurs when **pancreatic insulin secretion is insufficient** to meet the increased insulin demands of pregnancy

Pregnancy-associated hormonal changes and weight gain reduce insulin sensitivity (insulin resistance)



All women experience some insulin resistance in **late pregnancy**

Women with **pre-existing insulin resistance** have a higher risk of developing gestational diabetes due to increased insulin requirements



Symptoms

Gestational diabetes is often asymptomatic. When present, symptoms are usually mild and may include **excessive thirst or increased urinary frequency**. Diagnosis requires biochemical testing rather than symptom assessment

Risk factors



- Overweight/obesity (BMI >25) or low physical activity
- First-degree relative with diabetes
- High-risk ethnicity
- Personal history of any of the following:
 - ☐ Gestational diabetes
 - ☐ Macrosomic infant (≥ 4000 g)
 - ☐ Cardiovascular disease/hypertension
- Metabolic abnormalities:
 - ☐ Polycystic ovary syndrome
 - ☐ Abnormal lipids
 - ☐ HbA1C >5.7%
 - ☐ Abnormal OGTT
 - ☐ Insulin resistance markers

Reference:

1. Facchinetti F, Lecis S. Inositols for prevention of gestational diabetes. *GLOWM Videobook*. www.glowm.com

Abbreviations:

HbA1c: Hemoglobin A1c; GDM: Gestational diabetes mellitus; OGTT: Oral glucose tolerance test

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. GESTATIONAL DIABETES



Gestational diabetes mellitus: Prevention using inositols

Impact of gestational diabetes on mother and child



Source:
Choudhury AA, et al. *Biomed Pharmacother.* 2021;143:112183

Learn more at Glowm (www.glowm.com)
and NNI (www.nestlenutrition-institute.org)



3. GESTATIONAL DIABETES



Gestational diabetes mellitus: Prevention using inositols

Diagnosis and management of gestational diabetes

Screening and evaluation of gestational diabetes



During Pregnancy

Timing

- Screen all pregnant individuals **between 24–28 weeks**
- Consider earlier screening if high-risk

Approaches

- One-step: 75 g fasting OGTT (2-hour); diagnosis made in one visit
- Two-step:
 - 50 g, 1-hour glucose challenge test (non-fasting)
 - If abnormal → 100 g, 3-hour OGTT (fasting)



Postpartum

Immediate

- Monitor glucose **24–72 hours** after delivery
- Adjust insulin or hypoglycemic therapy as required

Follow-up (4–12 weeks postpartum)

- Screen with fasting plasma glucose or 75 g, 2-hour OGTT

Management based on results

- **Diabetes:** Initiate or refer for treatment
- **Impaired glucose tolerance:** Lifestyle interventions; consider metformin or insulin if targets unmet
- **Normal:** Routine screening every 1–3 years

Table. OGTT criteria for diagnosis of gestational diabetes

75 G - OGTT	NORMAL	GESTATIONAL DIABETES MELLITUS	DIABETES MELLITUS IN PREGNANCY
FBS	< 92 mg/dl (5.1 mmol/l)	92 - 125 mg/dl (5.1 - 6.9 mmol/l)	≥126 mg/dl (7.0 mmol/l)
1hr post	<180 mg/dl (10 mmol/l)	≥ 10 mmol/l	
2hr post	<153 mg/dl (8.5 mmol/l)	153 to 199 (8.5 - 11.0 mmol/l)mg/dl	≥ 200 mg/dl (11.1 mmol/l)

Source:

WHO Guideline 2018 on Diabetes Mellitus/Hyperglycemia in Pregnancy

Reference:

1. Facchinetti F, Lecis S. Inositols for prevention of gestational diabetes. *GLOWM Videobook*. www.glowm.com

Abbreviations:

FBS: Fasting blood sugar; OGTT: Oral glucose tolerance test

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. GESTATIONAL DIABETES



Gestational diabetes mellitus: Prevention using inositols

Pre-pregnancy strategies aim to reduce the risk of developing gestational diabetes in high-risk women



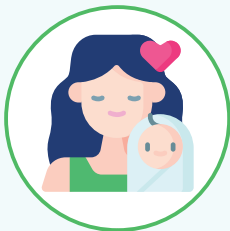
Healthy lifestyle before conception

- Maintain a healthy BMI through balanced diet and regular physical activity
- Counsel on weight management and nutrition in women planning pregnancy
- Optimize glycemic control before conception (**HbA1c <6.5%**) and avoid pregnancy if **HbA1c >10%**



Inositol supplementation for prevention

- Inositols (myo-inositol and D-chiro-inositol) act as insulin sensitizers by improving insulin signaling and glucose uptake, which may help prevent gestational diabetes in high-risk women (e.g., polycystic ovary syndrome)
- **Dosage:** 4 g/day combined with folic acid 200 µg/day
- **Initiation:** Initiated preconception in high-risk women or early in the first trimester and continued until delivery
- **Benefits:** Improved glycemic control, better metabolic health, and regulation of ovulation and menstrual cycles in women with polycystic ovary syndrome, which can support conception
- **Evidence:** Clinical data is promising, but inositol is not yet included in universal guidelines



Postpartum care

- Up to 50% of women with gestational diabetes develop type 2 diabetes within 10 years postpartum
- Encourage follow-up and blood glucose monitoring

Reference:

1. Facchinetti F, Lecis S. Inositols for prevention of gestational diabetes. GLOWM Videobook. www.glowm.com

Abbreviations:

BMI: Body mass index; HbA1c: Hemoglobin A1c

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. GESTATIONAL DIABETES



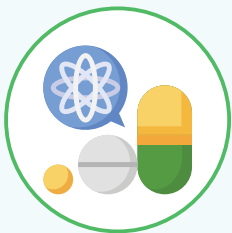
Gestational diabetes mellitus: Prevention using inositols

Treatment of gestational diabetes



Lifestyle (Class A1GDM/diet-controlled):

- Identified via prenatal screening
- Managed with regular glucose monitoring, healthy diet with proper portions and timing, and moderate physical activity



Pharmacologic (Class A2GDM/medication-requiring):

- Used if lifestyle measures are insufficient
- Includes insulin (first-line) or, in select cases, other diabetic medications

Key takeaways

- Gestational diabetes is glucose intolerance first recognized during pregnancy and is often asymptomatic; universal screening at 24–28 weeks is essential. It increases long-term risk of type 2 diabetes, cardiovascular disease, and other complications for both mother and child
- Healthy diet, physical activity, and blood glucose monitoring are first-line; insulin or metformin may be required if lifestyle measures are insufficient
- Inositols (myo-inositol and D-chiro-inositol) improve insulin sensitivity, support maternal glucose control, and may reduce the incidence of gestational diabetes and adverse pregnancy outcomes

Reference:

1. Facchinetti F, Lecis S. Inositols for prevention of gestational diabetes. GLOWM Videobook. www.glowm.com

Abbreviation:

GDM: Gestational diabetes mellitus

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



1. POSTPARTUM CARE

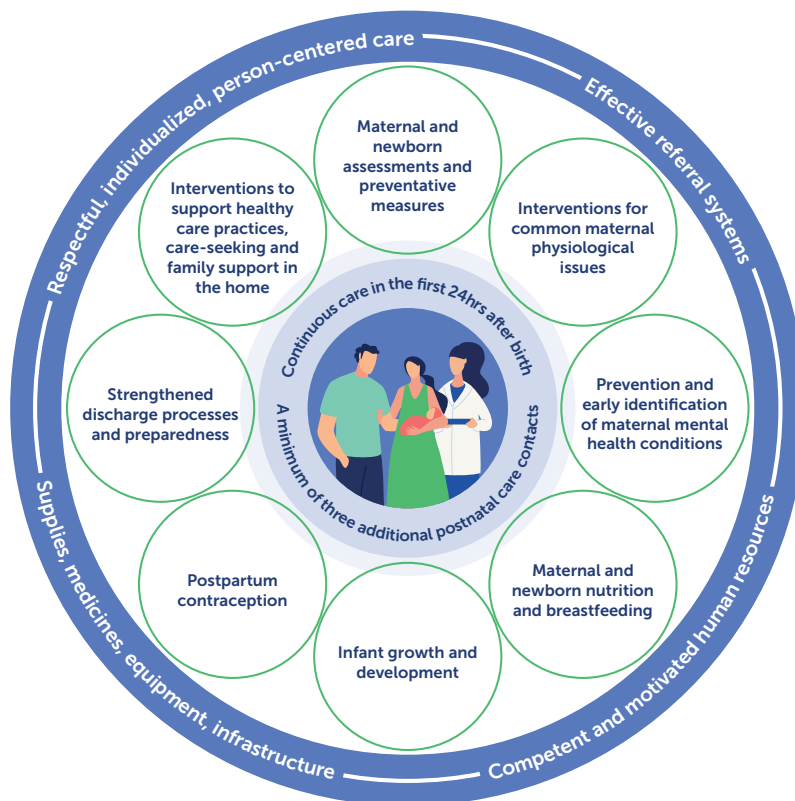


Nutritional strategies for post-delivery care and recovery



The **postpartum period**, from **birth to 6 weeks (42 days)**, is a critical time for mothers, newborns, and families. Postpartum care is essential for promoting maternal and child health, and creating an environment that addresses the health, social and developmental needs of the mother, newborn and family is crucial.

Schematic representation of WHO postnatal care model



Reference:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. GLOWM Videobook. www.glowm.com



Importance of postpartum care

Postpartum care is crucial for reducing maternal and newborn morbidity and mortality, yet **up to 40% of women** miss postpartum care due to cultural, socioeconomic, or access barriers

Early visits help detect complications, support maternal mental health, monitor recovery, and ensure infant wellbeing

When should postpartum care visits occur?



- Support is recommended **over 12 weeks**
- Initial evaluation should occur within the **first 3 weeks**, followed by ongoing care
- A comprehensive visit should be completed by **12 weeks**

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

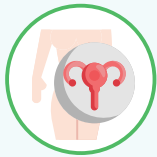


1. POSTPARTUM CARE

Nutritional strategies for post-delivery care and recovery

Components of postpartum care

Routine care and guidance are essential to support maternal recovery, promote health, and ensure newborn wellbeing



Physical recovery

- Support perineal healing
- Encourage bowel/bladder regularity
- Discuss resumption of sexual activity (typically after **4–6 weeks**)



Lactation and breastfeeding

- Assess nipple latch and positioning at each visit
- Encourage regular feeds every **3–4 hours**
- Promote exclusive breastfeeding for **4–6 months** unless contraindicated



Nutrition and activity

- Recommend a balanced diet (breastfeeding mothers need **300–500 extra calories/day**)
- Light activity can usually be resumed after 2–3 weeks



Family planning

- Discuss contraception options early
- Progestin-only methods are preferred during breastfeeding; barrier methods and intrauterine devices are also appropriate



Parental education

- Provide guidance on newborn care (umbilical cord care, bathing, breastfeeding, immunizations)



Psychosocial support

- Offer counseling and guidance for emotional wellbeing, including after pregnancy loss

Reference:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)





1. POSTPARTUM CARE



Nutritional strategies for post-delivery care and recovery

Postpartum nutrition guide: Essential macro- and micronutrients



Energy

Postnatal needs are slightly lower than in pregnancy, but an **extra 300–500 calories daily** supports recovery and lactation



Protein

21–23 g/day (0–6 months), 14 g/day (>6 months); supports tissue repair and milk production



Carbohydrates

210 g/day; main energy source



Fats

20–35% of total energy (monitor saturated fats intake to avoid excess); provides energy for recovery and milk production



Folate

500 µg/day; supports mood (deficiency linked to depressive symptoms)



Vitamin B12

2.8 µg/day; deficiency linked to inflammation and poor mental health



Vitamin D

600 IU/day; supports mood and bone health



Iron

9 mg/day; linked to lower postpartum depression risk

References:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. *GLOWM Videobook*. www.glowm.com **2.** Cetin I. Adaptation of a woman's body to pregnancy & postpartum: requirement for energy & elements. *GLOWM Videobook*. www.glowm.com **3.** Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy & postpartum. *GLOWM Videobook*. www.glowm.com **4.** Divakar H. Nutrition in pre-pregnancy, pregnancy and postpartum: ensuring maternal and child health through balanced diet. *GLOWM Videobook*. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



1. POSTPARTUM CARE



Nutritional strategies for post-delivery care and recovery

Common postpartum concerns

Clinical issues can arise in the postpartum period and may require screening, management, or referral to a specialist as appropriate



Postpartum blues: Common in the **first week**; symptoms include mood swings, irritability, anxiety, and sleep disturbance. Typically resolves within **2 weeks**

- Screen with validated tools; refer to a mental health specialist if symptoms persist or significantly affect functioning



Urinary incontinence: Often due to pelvic floor injury. Recommend Kegel exercises, bladder training, and weight management



Hemorrhoids: Common after labor/constipation. Encourage fluids, high-fiber diet, and stool softeners; refer severe cases



Breast engorgement: Manage with frequent feeding, milk expression, or warm/cold compresses. Probiotics may reduce the risk of mastitis and related symptoms, such as breast pain, helping mothers continue breastfeeding



Persistent vaginal bleeding or infection: Abnormal or heavy bleeding, fever, or foul discharge warrants prompt evaluation

Key takeaways

- The postnatal period (birth–6 weeks) is critical for maternal recovery and newborn health; timely follow-up reduces complications and supports wellbeing
- Key components of postpartum care include physical recovery, breastfeeding, nutrition, rest, contraception, mental health, and newborn care
- Nutritional needs rise in postpartum, especially for protein, fiber, vitamin D, folate, vitamin B12, and iron; supplementation may be required
- Common issues such as postpartum blues, incontinence, vaginal bleeding, breast engorgement, and hemorrhoids need early recognition, support, and intervention

References:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. *GLOWM Videobook*. www.glowm.com
2. Yu Q, Xu C, Wang M, Zhu J, Yu L, Yang Z, Liu S, Gao X. The preventive and therapeutic effects of probiotics on mastitis: a systematic review and meta-analysis. *PLoS One*. 2022;17(9):e0274467

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



2. EFFECTIVE BREASTFEEDING



Recommendations for effective breastfeeding



Breastfeeding is the practice of feeding an infant directly from the breast or through expressed milk by hand or with a pump. It is a natural and essential practice that provides optimal nutrition and promotes the overall health and development of infants.

Recommendations

Infants should be **exclusively breastfed** for the **first 6 months postpartum** to support optimal growth, development and health

What are the benefits of breastfeeding?



Promotes bonding between mother and baby



Reduces risk of breast cancer



Provides the right amount of nutrients for baby's development



Helps baby build a strong immune system



Helps with weight loss after childbirth



Lowers risk of postpartum depression

Reference:

1. Simeoni U. Counseling the breastfeeding woman: diet and supplements for breast milk quality and quantity. *GLOWM Videobook*. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

2. EFFECTIVE BREASTFEEDING

Recommendations for effective breastfeeding

How to optimize breast milk supply?

Adequate and sustained milk production depends on frequent, effective milk removal and maternal wellbeing



Support maternal health: Encourage balanced meals, adequate rest, and stress reduction to promote wellbeing and milk quality



Maintain hydration: Recommend increased water intake to meet lactation needs



Promote frequent feeds: Encourage feeding on demand, usually **8–12 times per 24 hours** and responding to infant cues



Encourage both breasts per feed: Ensure effective emptying of each breast to stimulate supply



Use breast massage and compression: Gentle massage during feeds can enhance milk flow and drainage



Recommend pumping if indicated: When direct breastfeeding is insufficient or separation occurs, advise expressing milk **≥8 times/day**. Involve lactation consultants for technique optimization

Medications and substances to avoid or limit



Contraindicated drugs

Anti-cancer medicines, radiopharmaceuticals, some anticonvulsants*



Illicit drugs

Amphetamines, cocaine, phencyclidine, heroin



Cannabis

Avoid due to potential neurodevelopmental risks



Alcohol

Safest option is to avoid alcohol consumption. However, one drink per day is considered safe. *Wait 2–3 hours after a drink before breastfeeding*



Caffeine

Limit to **200 mg/day** to avoid infant irritability, sleep disturbance, and reduction in growth



Tobacco and vaping

Strongly discouraged due to nicotine transfer and increased risk of sudden infant death syndrome (SIDS)

Reference:

1. Simeoni U. Counseling the breastfeeding woman: diet and supplements for breast milk quality and quantity. *GLOWM Videobook*. www.glowm.com

Footnote:

*Consult NLM LactMed database and Infant Risk Center for information on specific drugs

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



2. EFFECTIVE BREASTFEEDING



Recommendations for effective breastfeeding

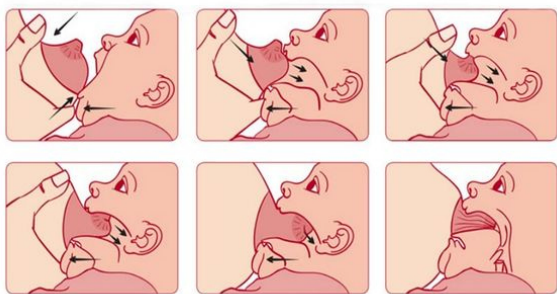
Techniques for effective breastfeeding

1. Positioning and nipple latch:

Ensure the infant is well-positioned and latched deeply, covering both nipple and areola



Source: Doula Wisdom – Breastfeeding basics: position and latch



Source: HSE Ireland – Positioning and attachment

2. Responsive feeding:

Encourage mothers to feed according to infant cues rather than a rigid schedule

“I’m hungry”



Stirring



Mouth opening



Turning head
Seeking/rooting

“I’m really hungry”



Stretching



Increasing
physical movement



Hand to mouth

“Calm me, then feed me”



Crying



Agitated body
movements

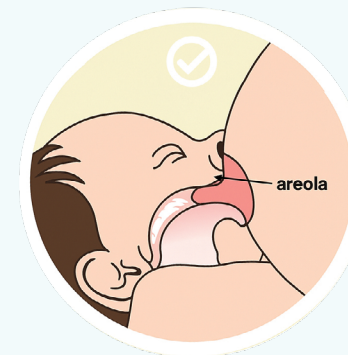


Colour turning red

Source: Women and Newborn’s services. Royal Brisbane and Women’s Hospital, July 2013

3. Observation of swallowing:

Look for rhythmic sucking and swallowing as indicators of milk transfer



Tongue over gum
ridge. Nipple drawn
far into mouth and
milk flows



Tongue behind
gum ridge. Nipple
is pinched and milk
cannot flow

Source: HealthHub – Feeding your baby: Breastfeeding

Reference:

1. Simeoni U. Counseling the breastfeeding woman: diet and supplements for breast milk quality and quantity. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com)
and NNI (www.nestlenutrition-institute.org)



2. EFFECTIVE BREASTFEEDING

Recommendations for effective breastfeeding

How healthcare providers can support successful breastfeeding



Stay trained in evidence-based breastfeeding practices (nipple latch, positioning, counseling) and follow guidelines (e.g., *baby-friendly hospital initiative*)



Provide empathetic, person-centered support and advocate for continuity of care, peer support, and resources



Support across settings:

- Antenatal: Prepare women
- Postnatal: Early initiation and skin-to-skin
- Follow-up: Address challenges

Reference:

1. Simeoni U. Counseling the breastfeeding woman: diet and supplements for breast milk quality and quantity. GLOWM Videobook. www.glowm.com



Key takeaways

- Exclusive breastfeeding for the first 6 months is recommended, with continued breastfeeding alongside complementary foods up to 2 years or beyond
- Adequate milk supply depends on frequent, effective feeding, maternal nutrition, hydration, rest, and stress management
- Proper positioning, nipple latch, and responsive feeding are essential for effective breastfeeding and preventing complications
- Certain drugs, substances, alcohol, caffeine, and tobacco should be avoided or limited
- Consistent, supportive, evidence-based guidance from healthcare providers helps optimize breastfeeding

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

3. POSTPARTUM DEPRESSION

Management and support for postpartum depression



Postpartum depression is a prevalent and disabling mood disorder that typically begins within **4–8 weeks** after childbirth, though onset may occur anytime in the first year. It can range from mild to severe and adversely affect both maternal health and child wellbeing. Despite its clinical significance, postpartum depression remains underdiagnosed and undertreated, highlighting the need for timely diagnosis and evidence-based intervention

CAUSES

Hormonal changes

Rapid decrease in estrogen, progesterone, and allopregnanolone disrupts mood regulation

Immune alterations

Postpartum shift from immunosuppression to proinflammatory state increases risk of postpartum depression

Genetic predisposition

Polymorphisms and epigenetic changes increase vulnerability to depression

Nutritional/lifestyle contributors

Sleep deprivation, vitamin D deficiency, poor diet, and substance use impair coping and mood regulation

Neuroendocrine dysregulation

HPA axis dysfunction, altered cortisol/CRH/ACTH signaling, and neuroinflammation cause mood instability



How is postpartum depression different from baby blues?

The **baby blues** are mild, short-lived anxiety and restlessness after delivery, usually resolving within **2 weeks**. Symptoms that are severe, persistent, or interfere with daily life may indicate postpartum depression

Risk factors



History of depression/anxiety



Limited partner/social support, conflict, adverse life events, abuse



Diabetes mellitus, emergency cesarean delivery, traumatic birth, preterm/low birth weight, multiple pregnancy



Obesity, body image concerns, chronic illness, vitamin D deficiency, genetic/epigenetic vulnerability



Low socioeconomic status, young maternal age, immigration/acclimation stress



Gender preference and related familial/social pressures

Reference:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. *GLOWM Videobook*. www.glowm.com

Abbreviations: ACTH: Adrenocorticotropic hormone; CRH: Corticotropin-releasing hormone; HPA: Hypothalamic-pituitary-adrenal axis

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. POSTPARTUM DEPRESSION



Management and support for postpartum depression



Sadness



Insomnia



Trouble bonding with baby

Symptoms of postpartum depression



Self-harm thoughts

Key point

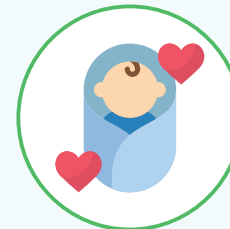
In rare cases, severe or untreated postpartum depression can escalate to **postpartum psychosis**, characterized by delusions or hallucinations, requiring urgent psychiatric evaluation and hospitalization

Impact of postpartum depression on maternal and child wellbeing



Impact on mother

- ↓ Quality of life and functioning
- ↑ Risk of chronic depression and recurrence
- Impaired daily activities and mother–infant bonding
- Strained relationships
- Poor self-care, low treatment adherence, and suicide risk (severe cases)



Impact on child

- Impaired bonding and reduced breastfeeding
- Delayed cognitive, language, and socio-emotional development
- Behavioral issues, lower IQ, and poor academic performance
- Increased long-term risk of anxiety, depression, and other psychiatric disorders, especially with chronic maternal depression

Reference:

1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Management and support for postpartum depression

Screening and diagnosis of postpartum depression

Routine postpartum screening during postpartum and well-infant visits enables early identification and timely management, reducing long-term risks for both mother and child



Routine screening

- Screen all women **at least once in pregnancy and again postpartum (ideally at 4-12 weeks)**
- Use a validated tool (e.g., EPDS, PHQ-9)
- Positive screen should prompt further clinical evaluation, not a standalone diagnostic



Clinical assessment

- Confirm diagnosis with **clinical interview/DSM-5 criteria**: ≥2 weeks of depressed mood or anhedonia plus associated symptoms
- Differentiate from:
 - Postpartum blues (self-limited, <2 weeks)
 - Thyroid dysfunction
 - Anemia



High-risk presentations requiring immediate referral

- Suicidal ideation or intent
- Thoughts of harming the infant
- Psychotic symptoms (hallucinations, delusions)

Prevention of postpartum depression



1. Psychological interventions

- **Cognitive behavioral therapy (CBT) and interpersonal therapy (IPT)**: Effective in high-risk women (history of depression, stressors)
- Group programs: **Mothers and Babies** (CBT-based), **ROSE** (IPT-based)



2. Mindfulness approaches

- **Mindfulness-based cognitive therapy (MBCT)**: Lowers relapse risk in women with prior depression



3. Education and practical support

- Provide guidance on infant sleep, parenting, stress
- Use brief, action-oriented tools (pamphlets, videos, sessions) useful in low-resource settings



4. Peer support

- Trained mentors and groups reduce isolation and validate postpartum experiences



5. Pharmacologic prevention

- Consider selective serotonin reuptake inhibitors for women with recurrent/severe postpartum depression, after risk-benefit counseling

Reference:
1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. *GLOWM Videobook*. www.glowm.com

Abbreviations:
BDI-II: Beck depression inventory-II; CES: Centre for epidemiologic studies depression scale; DSM: Diagnostic and statistical manual of mental disorder; EPDS: Edinburgh postnatal depression scale; PHQ: Patient healthcare questionnaire

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



3. POSTPARTUM DEPRESSION



Management and support for postpartum depression

How friends and family can support mothers with postpartum depression

Encourage friends and family to be



Empathetic listeners who validate feelings and provide encouragement



Practical helpers with childcare, household tasks, and daily responsibilities



Supportive partners who encourage treatment adherence and appointment attendance



Advocates who acknowledge postpartum depression as a medical condition and counter stigma

Key takeaways

- Postpartum depression is a serious mood disorder that can begin anytime in the first year after childbirth and lasts weeks to months if untreated
- Causes are multifactorial, with higher risk from prior psychiatric history, low support, or stressful births
- Untreated postpartum depression can harm both mother and child, impacting maternal mental health, mother–infant bonding, and child development
- Early screening, preventive measures, and timely management with therapy, medication, and support are essential



Reference:

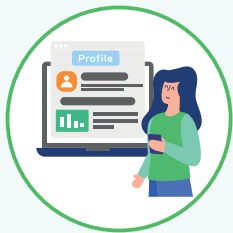
1. Perichart-Perera O. Postpartum: diet & supplements after a spontaneous or operative delivery and the postpartum blues. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

Guide for a Healthy Pregnancy: From Preconception to Postpartum

A healthy pregnancy begins long before conception and continues through postpartum. This toolkit aims to equip healthcare professionals with practical, evidence-based guidance across every stage of maternal care.

Preparing for Pregnancy



Early counseling and preventive strategies to optimize maternal and fetal health

Supporting a Healthy Pregnancy with Proper Nutrition



Optimized dietary guidance to promote maternal wellbeing and fetal development

Managing Pregnancy-related Discomfort and Disorders



Practical solutions for common pregnancy challenges

Caring for Post-delivery Care, Breastfeeding, and Postpartum Depression



Support for maternal recovery, mental health, and successful breastfeeding

As clinicians, you play a pivotal role in empowering women and families with knowledge, reassurance, and interventions that foster healthier generations. We hope this toolkit serves as a trusted companion in your practice, bridging science and care.

Together, we can ensure that every woman is supported on her journey from preconception through pregnancy and beyond

An educational initiative supported by the **Global Library of Women's Medicine (GLOWM)** and the **Nestlé Nutrition Institute (NNI)**

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Appendix A



Preconception Nutrition Questionnaire

Personal Information

- Name: _____
- Age: _____
- Height (cm): _____
- Prepregnancy weight (kg): _____
- Weight gain (kg): _____
- Smoking during pregnancy: ☐ Yes ☐ No
- Drinking alcohol during pregnancy: ☐ Yes ☐ No
- Special diets (e.g., vegan, vegetarian, celiac): _____
- Exercise frequency: ☐ None ☐ <2 times/week ☐ ≥2 times/week

#	Question	Response Options	Score
1	Do you mainly use olive oil/extra virgin olive oil as a dressing fat?	☐ Yes ☐ No	1 / 0
2	How much oil do you consume per day (including cooking oil)?	☐ ≥4 tbsp ☐ <4 tbsp	1 / 0
3	How many portions of vegetables do you eat per day? (1 portion = 200 g)	☐ ≥2 portions ☐ <2 portions	1 / 0
4	How many portions of fruit/sugar-free fruit juice do you consume per day?	☐ ≥3 portions ☐ <3 portions	1 / 0
5	How many portions of red meat/sausages do you consume per week? (1 portion = 100–150 g)	☐ <3 portions ☐ ≥3 portions	1 / 0
6	How much butter/margarine/cream do you consume per day? (1 portion = 12 g)	☐ <1 portion ☐ ≥1 portion	1 / 0
7	How many glasses of sweet drinks do you drink per day? (1 glass = 125 ml)	☐ <1 glass ☐ ≥1 glass	1 / 0

#	Question	Response Options	Score
8	How many portions of legumes do you consume per week?	☐ ≥3 portions ☐ <3 portions	1 / 0
9	How many portions of fish/shellfish/crustaceans do you consume per week? (1 portion = 100–150 g)	☐ ≥2 portions ☐ <2 portions	1 / 0
10	How many times a week do you consume baked goods (cakes, croissants, biscuits, excluding homemade)?	☐ <3 times ☐ ≥3 times	1 / 0
11	How many portions of dried fruit do you consume per week? (1 portion = 30 g)	☐ ≥1 portion ☐ 0	1 / 0
12	Do you consume mainly white meat (chicken, turkey, rabbit) compared to red meat and sausages?	☐ Yes ☐ No	1 / 0
13	How many times a week do you eat fried food?	☐ <2 times ☐ ≥2 times	0 / 1

Scoring: Total score: _____ / 13

A Mediterranean diet pattern is indicated by a score >8

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)

**Table 1A. Macronutrient requirements during pregnancy and lactation**

Nutrient	Pregnancy	Lactation	Dietary Sources
Protein	+1 g/day (1st trimester) +11 g/day (2nd trimester) +31 g/day (3rd trimester)	0-6 months: 21-23 g/day >6 months: 14 g/day	 Meat, eggs, legumes, nuts, seeds
Carbohydrates	175 g/day	210 g/day	 Vegetables, fruit, grains, legumes, dairy
Fiber	28 g/day	29 g/day	 Vegetables, fruit, whole grains, legumes
Lipids	20-35% of energy	20-35% of energy	 Meat, full-fat dairy, eggs, oils, avocado, nuts
Omega-6	5-10% of energy	5-10% of energy	 Vegetable oils, seeds, nuts, eggs
Omega-3 (ALA)	0.6-1.2% or ~1.4 g/day	0.6-1.2% or ~1.3 g/day	 Oily fish, seafood, flaxseed, nuts, seeds
DHA & EPA	250 mg/day DHA+EPA (+100-200 mg DHA)	250-450 mg DHA	 Oily fish, seafood, fish oil

Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. *GLOWM Videobook*. www.glowm.com

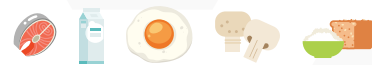
Abbreviations:

ALA: Alpha-lipoic acid; DHA: Docosahexaenoic Acid; EPA: Eicosapentaenoic acid

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Table 1B. Micronutrient requirements during pregnancy and lactation

Nutrient	Pregnancy	Lactation	Dietary Sources
Vitamin D	600 IU/day	600 IU/day	 Oily fish, dairy, egg yolk, mushrooms, fortified foods
Vitamin A	770 µg/day	1300 µg/day	 Liver, fish, dairy, eggs, orange and green vegetables/fruits
Fiber	600 µg/day	500 µg/day	 Leafy greens, legumes, citrus, eggs, nuts
Folate	2.6 µg/day	2.8 µg/day	 Meat, fish, dairy, eggs
Vitamin B12	1.4 mg/day	1.6 mg/day	 Meat, dairy, eggs, mushrooms, almonds
Riboflavin (B2)	1.9 mg/day	2.0 mg/day	 Dairy, meat, fish, eggs, vegetables, legumes
Vitamin B6	27 mg/day	9 mg/day	 Meat, liver, poultry, legumes, greens
Iron	1000 mg/day	1000 mg/day	 Dairy, salmon, tofu, greens, fortified foods
Calcium	11 mg/day	12 mg/day	 Meat, shellfish, dairy, nuts, whole grains
Zinc	220 µg/day	290 µg/day	 Seaweed, fish, dairy, eggs
Iodine			

Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Appendix B



Table 2A. Essential micronutrients in pregnancy

Micronutrient	Function	Deficiency risks
 B9 Folate	Neurological function, erythropoiesis, neural tube formation, brain development	- Macrocytic anemia, neural tube defects, congenital malformations, impaired fetal growth, low birth weight - High homocysteine; impaired nucleotide synthesis - Depressive symptoms
 Fe Iron	Oxygen transport, fetal and placental development, neurodevelopment	Maternal anemia, puerperal sepsis, low birth weight, and preterm birth
 B12 Vitamin B12	Neurological function, erythropoiesis, neural tube formation, brain development	- Macrocytic anemia, neural tube defects - High homocysteine; impaired nucleotide synthesis - Reduced cognitive function in children
 Iodine Iodine	Supports balance in maternal thyroid hormones and metabolism, embryogenesis, fetal growth and developing the infant's brain, nervous system, and mental abilities	- Hypothyroidism; abortion, hypertensive disorders, placental abruption, postpartum hemorrhage - Alterations in T3/T4; impaired neuropsychological development and attention deficit disorder in infancy
 Ca Calcium	Fetal skeletal and bone development, maternal bone health	Pre-eclampsia, eclampsia, preterm birth, fetal respiratory diseases and neurological morbidity

Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. GLOWM Videobook. www.glowm.com

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



Table 2B. Essential micronutrients in pregnancy

Micronutrient	Function	Deficiency risks
Vitamin D	Maternal bone health and calcium regulation, fetal skeletal development, placental function and immune modulation	Pregnancy: Pre-eclampsia, calcium malabsorption, bone loss, myopathy, gestational diabetes Infant: Small-for-gestational age, rickets, neonatal hypocalcemia
Omega 3 (DHA)	Supports fertility, maternal health, fetal brain and eye development	Increased risk of pregnancy complications, preterm birth, poor neurodevelopment, and low DHA in breast milk
Vitamin A	Supports vision, immunity, reproduction, embryonic development, and cell differentiation	Impaired immunity, fetal growth restriction, congenital anomalies, anemia, and neurodevelopmental risks, especially in late pregnancy and low-resource settings
Choline	Supports neural tube closure, brain development, liver function, and lipid metabolism	Neural tube defects, impaired brain development, cognitive issues, fatty liver, and maternal complications (e.g., pre-eclampsia)

Reference:

1. Perichart-Perera O. Macro and microelements: optimal intake and body concentration in reproduction, pregnancy and postpartum. *GLOWM Videobook*. www.glowm.com

Abbreviation:

DHA: Docosahexaenoic Acid

Learn more at Glowm (www.glowm.com) and NNI (www.nestlenutrition-institute.org)



<https://www.glowm.com/>

GLOWM is an entirely charitable, non-profit organization that provides free, expertly reviewed multimedia clinical guidance for obstetric, gynecological and reproductive healthcare professionals, contributing to the safeguarding and improvement of women's health and wellbeing worldwide. Its Welfare of Women program, aimed directly at women, offers practical advice on common health issues, tailored to overcome barriers of language and literacy.



The **Nestlé Nutrition Institute** (NNI) is a not-for-profit association based in Switzerland with the goal of sharing leading science-based information and education with practicing healthcare professionals in all parts of the world. NNI is committed to fostering the highest levels of discussion within the scientific community and building nutrition knowledge globally. Our resources include free access to nutrition articles and publications, video presentations from world-renowned experts, infographics, exclusive accredited and self-learning programs, and a lot more.

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Disclaimer: The toolkit "Nutrition in the Preconception, Pregnancy and Postpartum Periods" provides educational information to support healthcare professionals in promoting maternal nutrition and overall well-being. It emphasizes the role of maternal health in supporting positive outcomes for both mother and infant. The materials are intended solely to supplement continuing professional development for healthcare professionals. Anyone using these materials assumes full responsibility and all risk for their appropriate use. GLOWM and Nestle Nutrition Institute make no warranties or representations regarding the accuracy, completeness, or fitness for a particular purpose of the materials. In no event will GLOWM and Nestle Nutrition Institute be liable for any decision made or action taken based on the materials. The information provided should not replace professional medical advice, diagnosis, or treatment.

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Appendix

Preparing for Pregnancy

Nutrition in Pregnancy

Discomfort and Disorders

Postpartum Care