

Tishk International University
Faculty of Applied Science
Nutrition and Dietetics Department
Maternal and Child Nutrition – 2nd Grade



Preconception and Maternal Nutritional Status



Developmental Origin of Health and Disease - Barker's Hypothesis -

What happens here



Can influence health here





Contents:

Preconception Nutrition: The Foundation of a Healthy Pregnancy

Nutrition before conception affects fertility, fetal growth, and long-term child health.

Both women and men's nutrient stores and hormones shape conception success.

Aim → Optimize nutrient status before pregnancy begins.

Learning Outcome

Define fertility, fecundity, and infertility.

Describe the hormonal regulation of reproductive function.

Identify nutrition-related factors influencing fertility.

Explain the role of folate, iron, and body composition before conception.

Design dietary recommendations for preconception health.



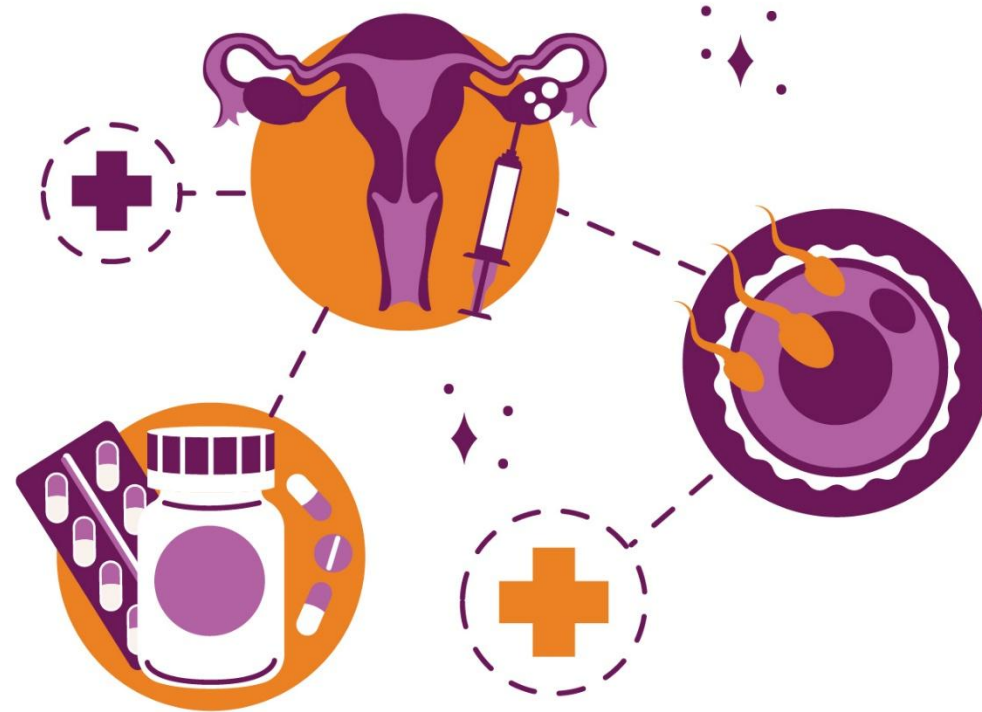
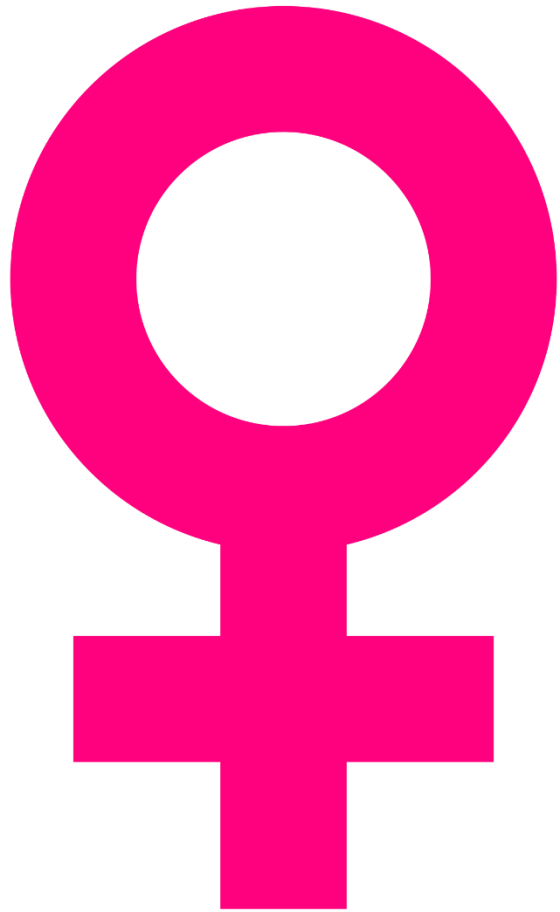
Importance of Preconception Nutrition

Health before pregnancy affects fertility, fetal growth, and long-term child health.

Nutritional deficiencies or excesses may cause hormonal imbalances.

Nutrition impacts egg and sperm quality, implantation, and early embryo development.





Optimizing Preconception Health:
For a Healthy Pregnancy Journey





The Female Reproductive System

Number and Role of Ovaries in Female Fertility

- A healthy female has **two ovaries**, one on each side of the uterus.
- Each ovary is about **3–5 cm** long (the size of an almond).

The ovaries have two main functions:

1. Production of Eggs (Ova)

- Females are born with all the eggs they will ever have — about **1 to 2 million immature ova**.
- By puberty, around **300,000–400,000** remain.
- During a woman's reproductive life, only **400–500 eggs** will mature and be released (about one per month).

2. Secretion of Hormones

- The ovaries make **estrogen (E₂)** and **progesterone (P₄)**.
- These hormones control the menstrual cycle, prepare the uterus for pregnancy, and maintain secondary female traits.



Ovaries and Fertility

- ✓ Fertility depends on **healthy ovaries** that:
 - Produce a **mature egg** regularly (ovulation).
 - Release adequate **hormones** for uterine preparation.
- ✓ Damage to one ovary (e.g., cysts or surgery) may reduce egg supply but usually **does not cause infertility** if the other ovary functions normally.
- ✓ Even with only **one ovary**, a woman can still **ovulate and become pregnant**, because the single ovary can release eggs and produce hormones normally.



The Female Reproductive System

<u>Organ</u>	<u>Description</u>	<u>Function in Reproduction</u>
Ovaries	Pair of small glands located on each side of the uterus.	Contain and mature ova (eggs); secrete estrogen and progesterone.
Fallopian Tubes (Oviducts)	Tubes connecting ovaries to uterus.	Transport ovum; site of fertilization (usually in upper third).
Uterus	Pear-shaped muscular organ in pelvic cavity.	Supports embryo implantation and fetal development.
Endometrium	Inner lining of the uterus.	Thickens under estrogen and progesterone; sheds during menstruation if no pregnancy.
Cervix	Lower part of uterus opening into the vagina.	Produces cervical mucus aiding sperm movement; barrier to infection.
Vagina	Muscular canal from cervix to exterior.	Receives sperm during intercourse; birth canal at delivery.



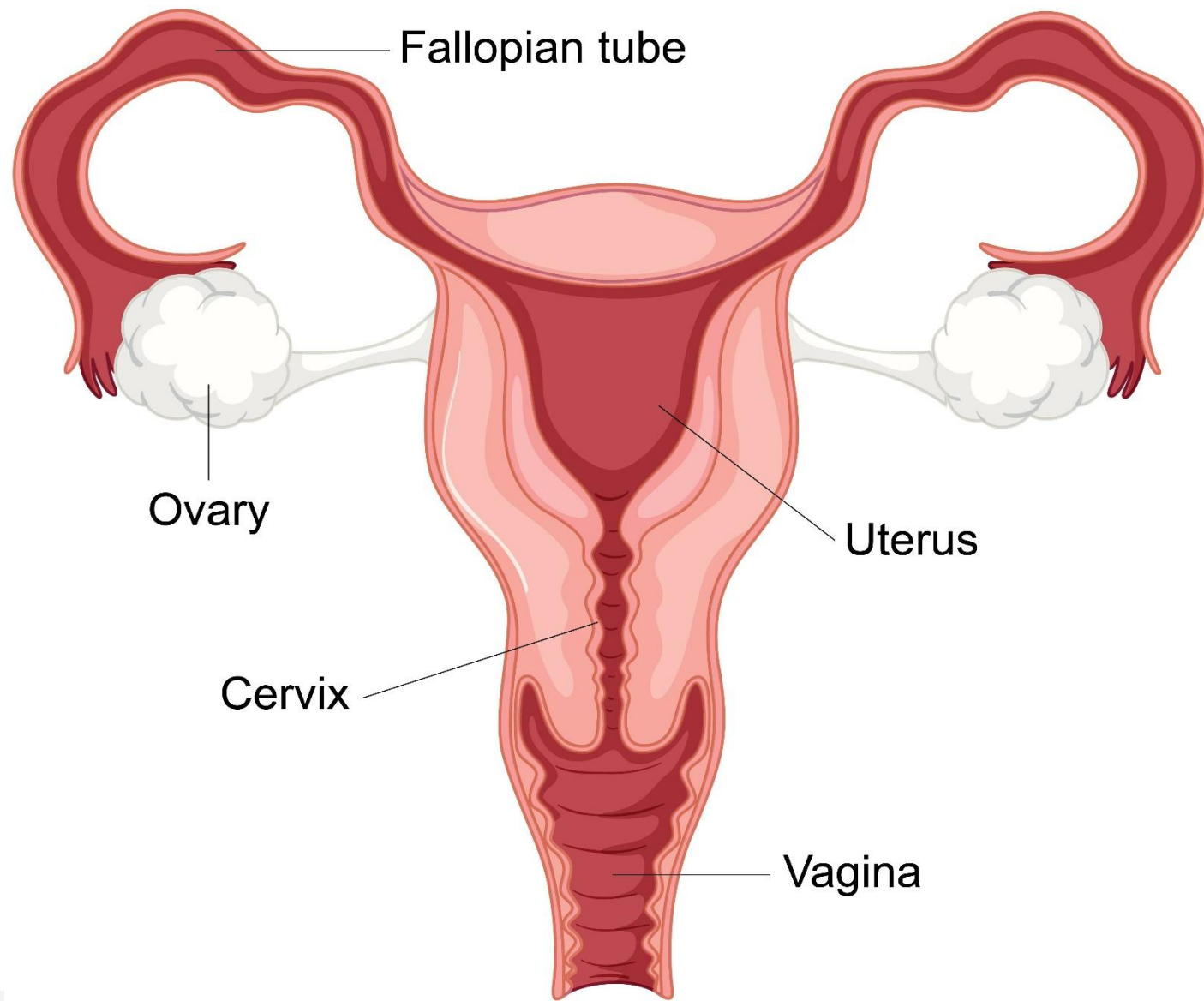
The Vagina (Female)

- The **vagina** is naturally **acidic**, with a **pH between 3.8 and 4.5**.
- The acidity is mainly caused by **lactic acid**, which is made by “good” bacteria (*Lactobacillus*).

Purpose of Vaginal Acidity:

- Prevents infections by harmful bacteria and fungi.
- Keeps the vaginal environment healthy and protective.

However — this acidity can **damage sperm** if it's not balanced by the semen's alkalinity.



The Menstrual Cycle

The menstrual cycle helps the body prepare for pregnancy every month.

1. Follicular Phase (Days 1–14)

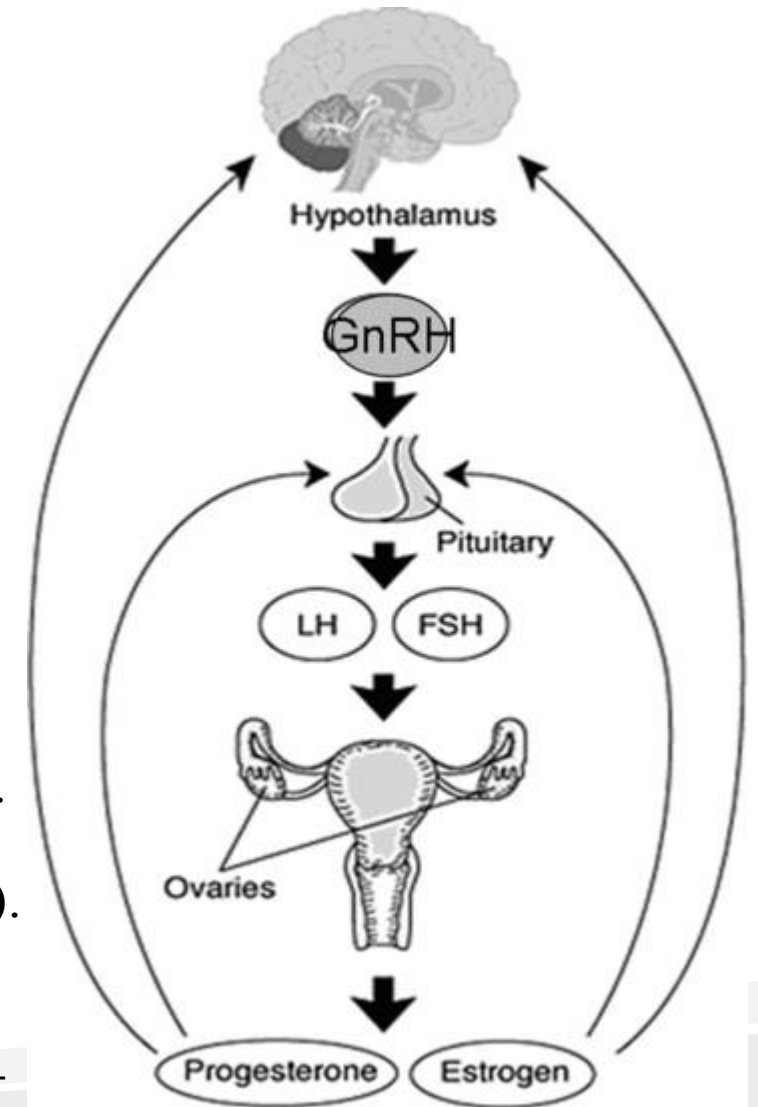
- **FSH (Follicle-Stimulating Hormone)** helps an egg grow inside the ovary.
- **E₂ (Estrogen)** levels rise and make the uterus lining thicker.
- One dominant egg becomes ready for release (ovulation).

2. Ovulation (~Day 14)

- A sudden rise in **LH (Luteinizing Hormone)** causes the mature egg to leave the ovary.
- The egg moves through the **fallopian tube (FT)**.
- The **cervical mucus (CM)** becomes thin to help sperm reach the egg.

3. Luteal Phase (Days 15–28)

- After ovulation, the empty follicle turns into the **corpus luteum (CL)**.
- The CL makes **P₄ (Progesterone)** to keep the uterus lining ready for pregnancy.
- If no fertilization occurs, P₄ levels drop and the lining breaks down — this is **menstruation (Menses)**.





Fertility Disruptions in Females

- 1 Hormonal Imbalance
- 2 Polycystic Ovary Syndrome (PCOS)
- 3 Thyroid Disorders
- 4 Stress
- 5 Under-nutrition / Low BMI
- 6 Obesity / Over-nutrition
- 7 Vitamin & Mineral Deficiencies
- 8 Antioxidant Deficiency
- 9 Endometriosis
- 10 Blocked Fallopian Tubes / Pelvic Inflammatory Disease (PID)



Why Preconception Nutrition Is Important

The **baby's brain, heart, and spinal cord** start forming in the **first 3–4 weeks** of pregnancy — often before a woman knows she's pregnant.

- If the mother's diet is poor before conception, her body may **lack key nutrients** needed for these critical early stages.

A healthy preconception diet helps:

- **Balance hormones** for regular ovulation.
- **Improve egg quality.**
- **Prepare the uterus** for implantation.
- **Prevent birth defects and pregnancy complications.**



Physiological Considerations:

- ✓ **Hormonal Regulation:** A balanced diet supports the hypothalamus–pituitary–ovarian (HPO) axis, ensuring regular ovulation.
- ✓ **Energy Balance:** Both undernutrition and overnutrition can disrupt hormonal cycles.
- ✓ **Nutrient Reserves:** Iron, calcium, and fat-soluble vitamins (A, D, E, K) need to be stored in the body before pregnancy because fetal demand begins immediately after conception.
- ✓ **Oxidative Stress:** Free radicals can damage egg cells; antioxidants protect reproductive tissues and improve egg viability.







Foods for Female Preconception Nutrition:

① Fruits and Vegetables (Vitamins, Minerals & Antioxidants)

Why important:

- Supply vitamins (A, C, E, K, folate) and antioxidants that protect egg cells and reproductive tissues from oxidative stress.
- Support hormone regulation and build nutrient stores for early pregnancy.

Examples:

- ✓  **Leafy greens:** spinach, kale, lettuce, broccoli (rich in folate and calcium)
- ✓  **Orange/yellow veggies:** carrots, pumpkin, sweet potato (vitamin A, beta-carotene)
- ✓  **Red/purple fruits:** tomatoes, strawberries, pomegranates, blueberries (antioxidants, vitamin C)
- ✓  **Citrus fruits:** oranges, grapefruit, kiwi (vitamin C for iron absorption)
- ✓  **Others:** apples, avocado, papaya (fiber, vitamin E)
- ✓  **Aim:** 5–7 servings of fruits and vegetables daily in various colors.



2 Whole Grains (Energy & B Vitamins)

Why important:

- Provide **complex carbohydrates** for steady energy and **B vitamins** (especially B6 and folate) that support hormone balance.
- Fiber helps control insulin levels — important for women with **PCOS** or irregular cycles.

Examples:

- Brown rice
- Whole wheat bread or pasta
- Oats, quinoa, bulgur, barley
- Whole-grain cereals

Aim: 3–5 servings per day (1 serving \approx 1 slice bread, $\frac{1}{2}$ cup rice or cereal).



3 Protein Foods (Iron, Zinc, Amino Acids)

Why important:

- Build and repair body tissues.
- Support hormone production and egg cell development.
- Provide **iron and zinc** essential for ovulation and prevention of anemia.

Examples:

- 🍖 **Animal proteins:** lean meat, chicken, turkey, fish (especially salmon, sardines, tuna)
 - 🍳 **Eggs:** excellent source of protein and choline (important for fetal brain development)
 - 🌱 **Plant proteins:** lentils, chickpeas, beans, peas, tofu, soy products, nuts, and seeds
- ☑ **Aim:** 2–3 servings per day (1 serving = palm-sized portion of meat or ½ cup cooked beans).







4 Dairy and Calcium-Rich Foods (Calcium, Vitamin D, Protein)

Why important:

- Build **strong bones and teeth**, and prepare the mother's calcium reserves for pregnancy.
- Provide **vitamin D**, which helps regulate reproductive hormones.

Examples:

-  Milk (cow's or fortified plant-based alternatives)
-  Cheese (pasteurized varieties)
-  Yogurt (plain, low-fat)
-  Non-dairy calcium sources: tofu, almonds, broccoli, sesame seeds, kale

Aim: 2–3 servings daily (1 serving = 1 cup milk or yogurt, 40–50 g cheese).



5 Healthy Fats (Hormone Balance & Egg Quality)

Why important:

- Fats are essential for **estrogen and progesterone production**.
- **Omega-3 fatty acids** improve egg cell membranes, implantation, and reduce inflammation.

Examples:

- 🐟 **Omega-3 sources:** salmon, sardines, mackerel, trout, chia seeds, flaxseeds, walnuts
- 🌿 **Monounsaturated fats:** olive oil, avocado, nuts, seeds
- 🚫 **Avoid:** fried foods, trans fats (fast food, pastries, margarine)
- ✅ **Aim:** Include small portions (2–3 tablespoons of healthy oil or a handful of nuts daily).



6 Iron-Rich Foods (Blood Health & Oxygen Supply)

Why important:

- Iron prevents anemia and builds healthy red blood cells that deliver oxygen to reproductive organs.
- Important for implantation and early fetal development.

Examples:

- **Heme iron (easily absorbed):** red meat, liver, chicken, fish
 - **Non-heme iron (plant-based):** lentils, beans, spinach, dried apricots, raisins
 - **Enhance absorption:** eat with **vitamin C foods** (e.g., orange juice, lemon, strawberries)
- Aim:** Combine animal and plant iron sources regularly.



7 Folate- and B12-Rich Foods (DNA and Cell Formation)

Why important:

- Folate and B12 help with **egg cell DNA formation** and prevent **neural tube defects** in the baby.
- Support regular menstrual cycles and reduce risk of miscarriage.

Examples:

- **Folate sources:** spinach, kale, beans, lentils, asparagus, oranges, fortified grains
- **Vitamin B12 sources:** eggs, milk, yogurt, fish, chicken, liver, fortified cereals

Supplement: Folic acid 400 µg daily before conception.



8 Antioxidant-Rich Foods (Egg Protection & Hormonal Health)


Why important:

- Protect eggs from **oxidative stress**, which increases with age and pollution.
- Support healthy cervical mucus and uterine lining.

Examples:

- **Vitamin C foods:** citrus fruits, kiwi, guava, strawberries
- **Vitamin E foods:** nuts, seeds, spinach, avocado
- **Selenium foods:** Brazil nuts, tuna, mushrooms
- **Colorful fruits and vegetables:** berries, carrots, tomatoes, bell peppers

Aim: 2–3 servings daily of antioxidant-rich foods.



9 Iodine-Containing Foods (Thyroid Function & Baby's Brain Development)

Why important:

• Iodine supports **thyroid hormone production**, which controls metabolism, fertility, and fetal brain growth.

Examples:

- Iodized salt (use instead of plain salt)
- Fish and seafood
- Dairy (milk, yogurt, cheese)
- Eggs

Aim: Ensure daily intake through iodized salt and seafood 1–2 times per week.



10 Hydration & Fluids

Why important:

- Water helps with **hormone transport, nutrient absorption, and waste removal.**
- Proper hydration supports cervical mucus and reproductive organ function.

Examples:

- Water, herbal teas, soups, natural juices
 - Avoid sugary drinks and excessive caffeine (>200 mg/day)
- Aim:** 6–8 glasses of water per day.



<u>Food Group</u>	<u>Nutrients</u>	<u>Benefits for Preconception</u>
Fruits & Vegetables	Folate, Vitamins C & E, Antioxidants	Protect eggs, regulate hormones
Whole Grains	B Vitamins, Fiber	Steady energy, hormone balance
Protein Foods	Iron, Zinc, Amino Acids	Ovulation, tissue growth
Dairy & Calcium Sources	Calcium, Vitamin D	Bone health, hormonal support
Healthy Fats	Omega-3, Vitamin E	Egg quality, implantation
Iron-Rich Foods	Iron, Vitamin C	Prevent anemia, improve oxygen supply
Folate & B12 Sources	B Vitamins	DNA repair, fetal protection
Iodine Foods	Iodine, Selenium	Thyroid health, brain development
Fluids	Water	Hydration, nutrient transport



Lifestyle and Health Factors

- ✓ **Regular exercise** (30 minutes most days) improves blood circulation and hormone balance.
- ✓ **Sleep:** 7–8 hours nightly supports reproductive hormone function.
- ✓ **Stress management:** Chronic stress elevates cortisol, which can block ovulation.
- ✓ **Medical check-up:** Screen for anemia, thyroid disorders, diabetes, and update vaccinations (e.g., rubella, tetanus, hepatitis B).

⊘ Foods and Habits to Avoid in Preconception

<u>Food Category</u>	<u>Examples</u>	<u>Why to Avoid / Negative Effects on Fertility</u>
Alcohol	Beer, wine, spirits, cocktails	Damages egg DNA, disrupts hormones, increases miscarriage risk, may harm embryo in early pregnancy.
Excess Caffeine	Coffee, strong tea, energy drinks, cola, chocolate	>200 mg/day may delay conception, increase miscarriage risk, and reduce iron absorption.
Processed & Junk Foods	Fast food, fried snacks, chips, instant noodles, pastries	High in trans fats and sodium → cause hormonal imbalance, inflammation, and poor egg quality.
Refined Carbohydrates & Sugary Foods	White bread, sweets, cakes, soft drinks	Spike blood sugar and insulin → disrupt ovulation and increase PCOS risk.
High-Mercury Fish	Shark, swordfish, king mackerel, tilefish, large tuna	Mercury accumulates and damages egg and sperm DNA; affects baby's brain if pregnancy occurs.
Processed Meats	Bacon, sausages, hot dogs, salami	Contain nitrates and preservatives → increase oxidative stress, inflammation, and sodium load.

⊘ Foods and Habits to Avoid in Preconception

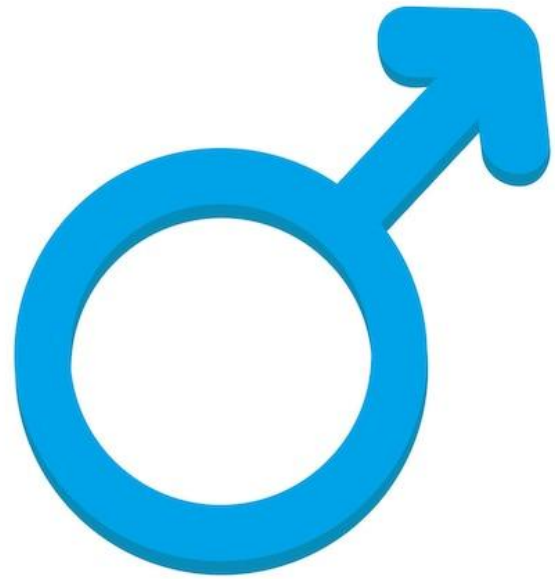
<u>Category</u>	<u>Examples</u>	<u>Why to Avoid / Health Risks</u>
Raw or Undercooked Foods	Raw meat/fish (sushi), undercooked eggs, unpasteurized milk or cheese	May contain Listeria, Salmonella, or Toxoplasma → infections can cause miscarriage or stillbirth.
Unwashed Fruits & Vegetables	Raw produce not properly cleaned	May contain pesticides or bacteria → foodborne illness and toxin buildup.
Unsafe Herbal Supplements & Teas	Ginseng, licorice root, high-dose green tea extracts	Some herbs disrupt hormone balance or stimulate uterine contractions; not proven safe in pregnancy.
Artificial Sweeteners	Diet sodas, sugar-free candy, aspartame, saccharin	Affect insulin and metabolism; uncertain long-term fertility effects.
Excess Vitamin A (Retinol)	Liver, high-dose vitamin A supplements	Toxic in high doses and linked to birth defects in early pregnancy.
Environmental Toxins	Plastics (BPA), pesticides, solvents, lead, mercury	Act as endocrine disruptors → damage reproductive organs and egg quality.

⊘ Foods and Habits to Avoid in Preconception

<u>Habit</u>	<u>Examples / Sources</u>	<u>Why to Avoid / Effect on Fertility & Health</u>
Smoking (Tobacco, Hookah, or Vaping)	Cigarettes, shisha, secondhand smoke	Damages ovarian cells, lowers estrogen, increases miscarriage and infertility risk, accelerates menopause.
Excess Salt Consumption	Pickles, canned soups, chips, salted snacks	Causes fluid retention, high blood pressure, and kidney strain.
Extreme Dieting / Fasting	Skipping meals, crash diets	Causes nutrient deficiencies, irregular ovulation, and hormonal imbalance.
Sleep Deprivation	Less than 6 hours per night	Increases cortisol (stress hormone), disturbs menstrual cycle and fertility.
Chronic Stress	Long-term anxiety, overwork, poor rest	High stress hormones interfere with ovulation and progesterone levels.
Sedentary Lifestyle	No physical activity	Leads to weight gain and hormonal imbalance; reduces blood flow to reproductive organs.

Nutritional Status in Females

Aspect	Description	Effect on Fertility
Body Weight (BMI)	Ideal range: 18.5–24.9	Both underweight and overweight reduce fertility.
Under-nutrition / Low Fat Stores	Body fat <18% → low estrogen	Leads to irregular or absent menstruation (amenorrhea) and anovulation.
Over-nutrition / Obesity	High body fat → ↑ insulin and estrogen	Causes ovulation problems, PCOS, poor egg quality.
Protein Status	Needed for hormone synthesis and follicle growth	Deficiency causes poor ovarian function.
Micronutrient Status	Iron, folate, B ₁₂ , vitamin D, zinc, iodine	Deficiencies lead to ovulation failure, anemia, or miscarriage.
Antioxidant Status	Vitamins C, E, selenium, beta-carotene	Low levels cause oxidative stress → DNA damage in eggs.
Energy Balance	Adequate calorie intake supports hormone function	Too low or too high energy intake disrupts fertility.
Vitamin D & Calcium	Regulate ovarian function and bone health	Deficiency linked with PCOS and poor implantation.

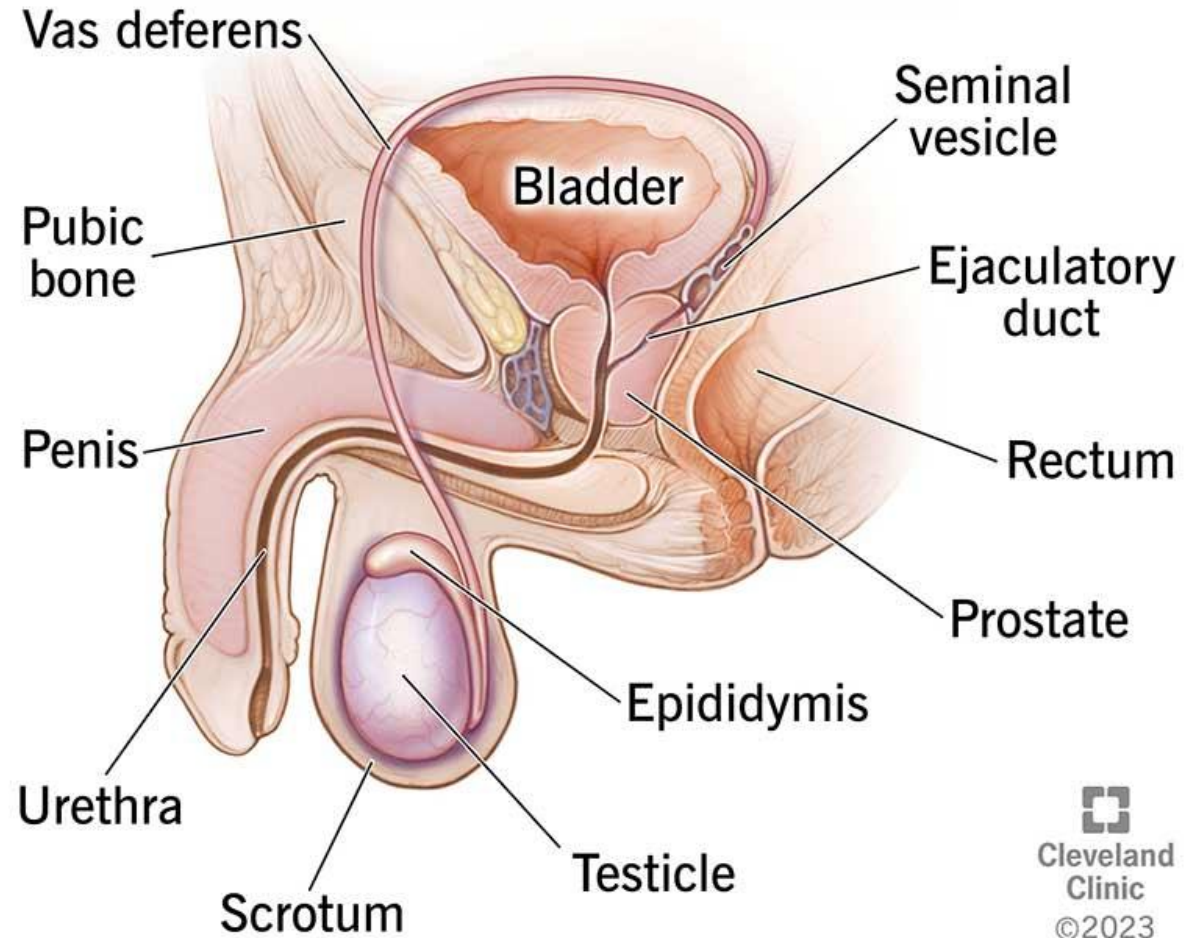


Male Reproductive System

Organ	Function
Testes (Testicles)	Make sperm and the hormone testosterone .
Epididymis	Stores sperm and helps them mature.
Vas Deferens	Carries sperm from testes to urethra during ejaculation.
Seminal Vesicles	Add sugar-rich fluid (fructose) for sperm energy.
Prostate Gland	Adds alkaline fluid to protect sperm in the vagina.
Penis and Urethra	Deliver semen to the female reproductive tract.

- **Produce sperm cells** (the male reproductive cells).
- **Make and release testosterone**, the main male hormone.
- **Deliver sperm** into the female reproductive system during sexual intercourse.

Male Reproductive System





The Prostate Gland (Male)

- The **prostate gland** is part of the **male reproductive system**.
- It produces a **milky, slightly alkaline fluid** (pH about **7.2–8.0**).
- This fluid mixes with sperm and other secretions to form **semen**.

Purpose of Prostate Fluid:

- Protects sperm from the **acidic environment** of the vagina.
- Helps sperm **survive longer** and **move more easily** after ejaculation.
- Provides **enzymes and nutrients** that activate sperm for fertilization.



<u>Nutrient</u>	<u>Function</u>	<u>Deficiency Effect</u>
Zinc	Needed for testosterone and sperm structure.	Low sperm count, poor motility.
Selenium	Antioxidant for sperm cell membranes.	Sperm damage, infertility.
Vitamin C & E	Protect DNA from oxidative stress.	Sperm DNA damage.
Folate & B12	Help make DNA in sperm.	Abnormal sperm or low count.
Omega-3 fatty acids	Improve sperm fluidity and motility.	Poor sperm movement.
Coenzyme Q10	Energy for sperm tail movement.	Reduced motility.



Factors That Reduce Male Fertility

Smoking → lowers sperm count and damages DNA.

Alcohol → reduces testosterone and sperm quality.

Obesity → increases estrogen, decreases testosterone.

Heat exposure → laptops on lap, saunas, tight underwear.

Toxins → pesticides, heavy metals, plastics (BPA).

Stress & lack of sleep → reduce GnRH and testosterone.



Role of Male Age:

- ✓ Sperm quality slowly declines after age 40.
- ✓ Increased age → higher risk of genetic mutations, autism, or schizophrenia in offspring.
- ✓ Encouraging healthy lifestyle earlier improves long-term fertility and child outcomes.



<u>Concept</u>	<u>Importance</u>
Sperm health	Reflects both hormonal and nutritional status.
Hormone balance	Needed for testosterone and sperm growth.
Antioxidants	Protect sperm DNA from damage.
Lifestyle	Avoid heat, toxins, alcohol, smoking.
Shared responsibility	Both partners' preconception health affects the baby.

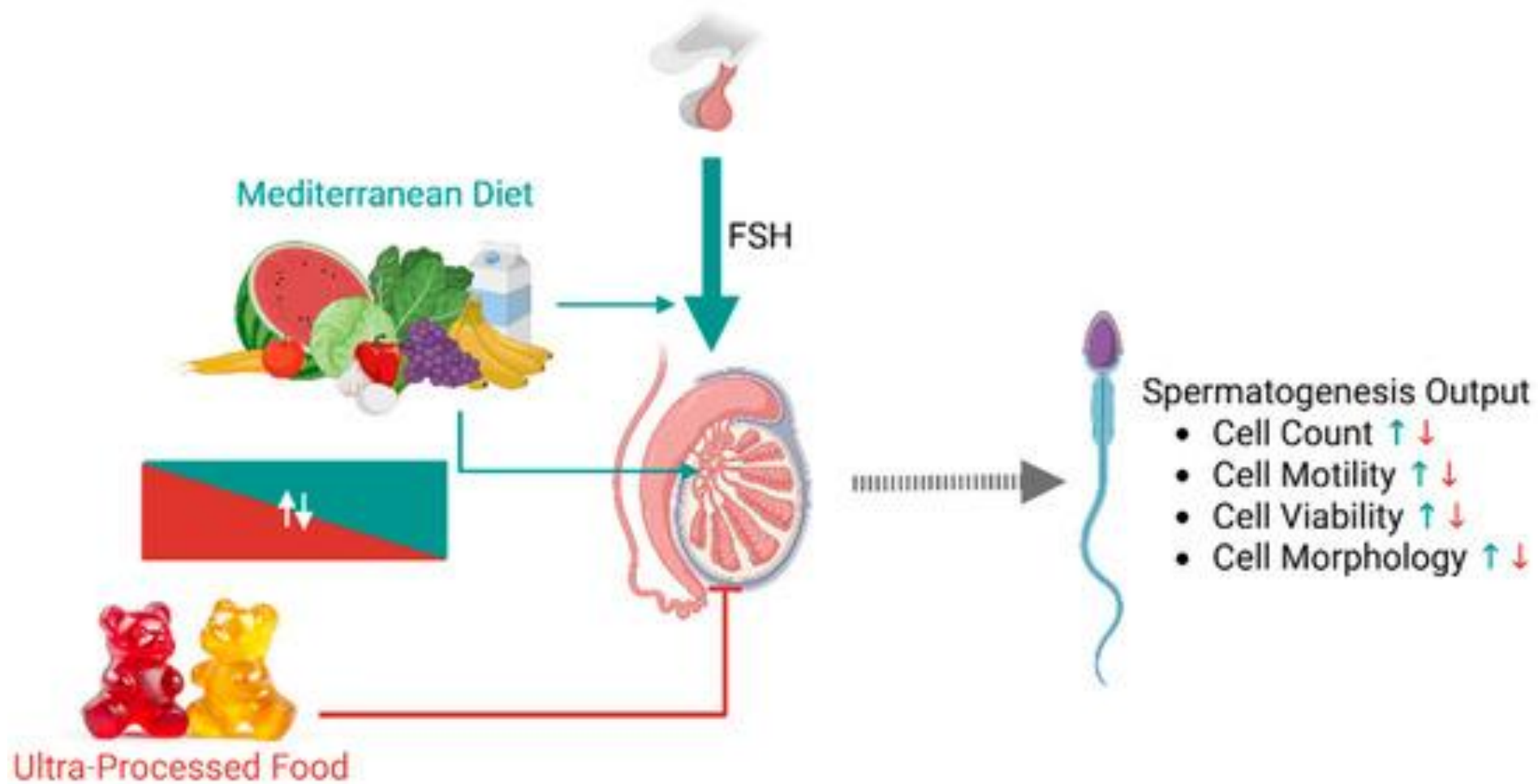


Diet and Sperm Quality — How Food Affects Male Fertility

Sperm quality means:

- ✓ **Count** – how many sperm are produced.
- ✓ **Motility** – how well they move.
- ✓ **Morphology** – how normal their shape is.
- ✓ **DNA integrity** – how healthy their genetic material is.

A man's **diet directly affects all these aspects**, because sperm are constantly made (every 70–80 days). This means **dietary changes can improve sperm quality within 2–3 months**.





Body Weight and Hormones

Obesity:

- Increases estrogen and lowers testosterone.
- Leads to lower sperm count and poor motility.

Underweight:

- Can reduce testosterone and GnRH → lower sperm production.

Maintaining a **healthy BMI (18.5–24.9)** supports balanced hormone levels and better sperm production.



How Diet Affects Sperm Production

Spermatogenesis (sperm production) depends on:






- ✓ **Protein** for cell structure.
- ✓ **Zinc, selenium, folate, vitamins C & E, B₁₂** for DNA and enzymes.
- ✓ **Antioxidants** to prevent damage from free radicals.
- ✓ **Healthy fats (omega-3)** for flexible sperm membranes.

Poor diet → hormonal imbalance, oxidative stress, and DNA damage
→ weak or deformed sperm.








Foods That Improve Male Sperm Quality and Quantity


1 Protein-Rich Foods (for sperm formation)

-  **Lean meats** (chicken, turkey, beef, lamb)
-  **Fish** (especially salmon, sardines, tuna — rich in omega-3)
-  **Eggs**
-  **Legumes** (lentils, beans, chickpeas)
-  **Why:** Sperm are made mostly of protein. Amino acids and zinc from these foods help form sperm and support testosterone production.



2 Zinc-Rich Foods (for testosterone and sperm count)

-  **Oysters** (highest natural zinc source)
-  **Beef and lamb**
-  **Pumpkin seeds and sesame seeds**
-  **Whole grains** (oats, wheat germ)
-  **Nuts** (cashews, almonds)
- **Why:** Zinc supports sperm production, helps build the sperm tail, and improves motility.



3 Antioxidant-Rich Foods (for sperm DNA protection)

- 🍊 **Vitamin C foods:** citrus fruits, kiwi, guava, strawberries
 - 🥜 **Vitamin E foods:** almonds, sunflower seeds, spinach, avocado
 - 🐟 **Selenium foods:** Brazil nuts, tuna, brown rice, eggs
 - 🍇 **Colorful fruits & vegetables:** berries, tomatoes, carrots, sweet potatoes
- ☑ **Why:** Sperm cells are easily damaged by **oxidative stress**. Antioxidants protect DNA and improve shape and movement.



4 Folate & Vitamin B12 Foods (for sperm DNA and shape)

- 🌿 **Folate:** spinach, kale, broccoli, asparagus, lentils
- 🐔 **Vitamin B12:** fish, meat, eggs, milk, yogurt
- ☑️ **Why:** These vitamins help sperm DNA form correctly and reduce abnormal sperm.

5 Omega-3 Fatty Acids (for sperm movement and membrane health)

- 🐟 **Fatty fish:** salmon, mackerel, sardines
- 🌰 **Walnuts, flaxseeds, chia seeds**
- 🌿 **Canola oil, olive oil**
- ☑️ **Why:** Omega-3s improve sperm motility (how well sperm swim) and membrane flexibility, helping them reach and fertilize the egg.



6 Iron & Coenzyme Q₁₀ (for energy and sperm motility)







- 🍖 Red meat, chicken liver (iron)
- 🧀 Dairy, spinach, lentils
- 🐔 CoQ₁₀ foods: beef, chicken, fatty fish, peanuts, sesame seeds

✓ Why: Iron boosts blood flow and oxygen delivery; CoQ₁₀ increases sperm energy and improves movement.

“What’s good for the heart is good for sperm.”
A diet rich in **whole foods, lean proteins, fruits, vegetables, nuts, and fish** supports hormone balance, reduces stress on sperm, and improves both **quantity and quality**.



⚠ Foods and Habits to Limit or Avoid

<u>Type</u>	<u>Effect</u>
 Processed foods / fast food	High in trans fats → lower sperm count
 Alcohol	Reduces testosterone, damages sperm DNA
 Smoking	Causes oxidative stress → poor motility
 Excess caffeine (>3 cups/day)	Can reduce sperm concentration
 Soy-heavy diets	Large amounts may lower testosterone slightly
 Heat exposure (hot tubs, tight underwear)	Reduces sperm production



Lifestyle Recommendations for Men (Before Conception)

- Eat balanced diet rich in fruits, vegetables, whole grains, and lean proteins.
- Maintain healthy weight (BMI 18.5–25).
- Exercise regularly, but avoid overtraining.
- Limit alcohol; avoid smoking and drugs.
- Manage stress and get enough sleep.
- Take multivitamin if diet is poor (especially zinc, folate, and selenium).

Nutritional Status in Males

Aspect	Description	Effect on Fertility
Body Weight (BMI)	Ideal range: 20–25	Both obesity and underweight lower sperm quality.
Obesity	Increases estrogen, lowers testosterone	Reduces sperm count, motility, and libido.
Under-nutrition	Low protein and calorie intake	Decreases sperm production and testosterone levels.
Protein & Energy Intake	Adequate intake supports spermatogenesis	Deficiency affects sperm formation.
Micronutrients	Zinc, selenium, folate, vitamins C, E, D, B ₁₂	Deficiency causes low sperm count, poor motility, and DNA damage.
Antioxidant Status	Antioxidants protect sperm from oxidative stress	Low levels lead to malformed or non-motile sperm.
Fatty Acid Balance	Omega-3 improves sperm membrane fluidity	Low intake reduces sperm motility and fusion ability.
Alcohol & Smoking	Deplete vitamins and damage testicular tissue	Lower testosterone and sperm quality.





Class Activity:

-  **How the Male Can Affect the Baby in the Preconception Period**
- Explain how **insulin resistance** contributes to the development of **PCOS** and its effects on fertility.



Thank
You