NAME: AYANSIJI OLUWASEYI ENIOLA

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# IMMUNIZATION

## 1. Meaning of Immunization

Immunization is the process of making an individual resistant or protected from an infectious disease by administering a vaccine. It stimulates the body's immune system to recognize, fight, and remember pathogens.

Immunization may occur **naturally** (by infection) or **artificially** (through vaccines).

## Basic Terms

### • Immunity

The ability of the body to resist disease-causing organisms.

### • Vaccine

A biological substance that stimulates the immune system to produce antibodies without causing disease.

### • Vaccination

The act of giving a vaccine.

### • Immunization

The process of becoming protected after vaccination.

## TYPES OF IMMUNIZATION

### A. Active Immunization

The body produces its own antibodies after exposure to a vaccine.

FEATURES

- Long-lasting protection

- Takes time to develop
- Produces memory cells

### Examples

- BCG
- Oral Polio Vaccine
- Measles vaccine
- Hepatitis B vaccine
- DPT/Pentavalent vaccine

## B. Passive Immunization

Ready-made antibodies are given.

### Features

- Immediate protection
- Short-lived
- No memory cells formed

### Examples

- Tetanus antiserum
- Rabies immunoglobulin
- Anti-snake venom
- Hepatitis B immunoglobulin

# Types of Vaccines

Vaccines are grouped based on how they're made:

### 1. Live attenuated vaccines

Contain weakened organisms.
Examples: Measles, BCG, OPV, Yellow fever.

### 2. Inactivated (killed) vaccines

Organism killed but antigen remains.
Examples: IPV, Hepatitis A.

### 3. Toxoid vaccines

Contain inactivated toxins.
Examples: Tetanus toxoid, Diphtheria toxoid.

### 4. Subunit / Purified antigen vaccines

Contain specific parts of the organism.
Examples: Hepatitis B, HPV.

### 5. Conjugate vaccines

Polysaccharides linked to proteins.
Examples: Hib vaccine, Pneumococcal conjugate vaccine.

### 6. mRNA vaccines

Teach cells to produce a harmless protein to stimulate immunity.
Example: Some COVID-19 vaccines.

## Importance of Immunization

Immunization is one of the most powerful public health interventions.

### Benefits

- Prevents childhood killer diseases (measles, polio, tetanus)
- Reduces mortality and morbidity
- Protects individuals and communities (herd immunity)
- Reduces healthcare costs
- Eradication of diseases (e.g., smallpox eradicated, polio almost gone)
- Improves quality of life

## Herd Immunity

When a large percentage of a population is vaccinated, the spread of disease reduces, protecting even unvaccinated individuals.

Threshold varies by disease (e.g., measles requires 95% coverage).

# Immunization Schedule (General Concepts)

While specific schedules differ by country, a typical childhood schedule includes:

- **At birth** → BCG, OPV 0, Hep B (birth dose)
- **6, 10, 14 weeks** → Pentavalent vaccine, OPV/IPV, PCV
- **9 months** → Measles, Yellow fever
- **15–18 months** → Booster doses

Adults also receive:

- Td every 10 years
- Hepatitis B series
- Influenza yearly (risk groups)
- HPV for adolescents

# Contraindications to Immunization

## True contraindications

- Severe allergic reaction to previous dose
- Severe immunodeficiency (for live vaccines only)
- Pregnancy (for some live vaccines)

## Not contraindications

Vaccines should still be given if a child has:

- Mild fever
- Diarrhoea
- Cold or minor illness
- Malnutrition
- Breastfeeding

# Cold Chain System

The cold chain is the system used to store and transport vaccines at the recommended temperature until they reach the recipient.

### Components

- Equipment:
  - Refrigerators (2–8°C)
  - Deep freezers
  - Cold boxes
  - Vaccine carriers
  - Ice packs
- Personnel:
  Healthcare workers trained in vaccine handling.
- Procedures:
  Monitoring temperature using thermometers and vaccine vial monitors (VVM).

### Reason

Vaccines lose potency if exposed to heat, freezing (for some), or light.

## Vaccine Vial Monitor (VVM)

A small square on vaccine vials that changes colour when exposed to heat.

- If inner square is lighter → vaccine OK
- If inner square is darker → discard vaccine

## Adverse Events Following Immunization (AEFI)

### Minor Reactions

- Fever
- Pain/swelling at injection site
- Irritability

### Moderate Reactions

- High fever
- Persistent crying

### Severe Reactions

- Anaphylaxis

- Convulsions
- Encephalopathy

### Management

- Observe every child 15–30 minutes after vaccination
- Keep adrenaline 1:1000 for emergencies
- Report and document AEFI

## Principles of Immunization

- Vaccines must be potent
- Correct storage (cold chain)
- Right child, right vaccine, right dose, right site, right time
- Maintain aseptic technique
- Continuous monitoring of coverage rates

## Routes of Vaccine Administration

- **Oral** → OPV
- **Intramuscular** → Pentavalent, Hep B
- **Subcutaneous** → Measles, Yellow fever
- **Intradermal** → BCG

## Community Participation in Immunization

- Mobilization and education of parents
- Demand creation
- Tracking defaulters
- Support during immunization campaigns
- Dispelling myths and misinformation

## Barriers to Immunization

- Vaccine hesitancy
- Lack of awareness
- Cultural beliefs
- Inadequate cold chain
- Poor access to health facilities
- Rumours and misinformation

## Solutions

- Health education
- Strengthening PHC
- Mobile outreach services
- Community health volunteers
- Government policies supporting routine immunization

## Global Achievements of Immunization

- Eradication of smallpox
- Near elimination of polio
- Sharp reduction in measles deaths
- Protection against cervical cancer (HPV vaccine)

## Summary

Immunization is a safe, cost-effective method of preventing infectious diseases. It protects individuals, communities, and future generations. It remains a cornerstone of primary health care and public health practice.

Here is the latest Routine Immunization Schedule (2024/2025) used in many countries including Nigeria under the National Programme on Immunization (NPI) and aligned with WHO recommendations.

Latest Routine Immunization Schedule (Birth – 15 Months)

| Age | Vaccine(s) | Disease(s) Prevented |
|---|---|---|
| At Birth | BCG | Tuberculosis |
| | Hepatitis B Birth Dose (HepB-BD) | Hepatitis B |
| | OPV 0 (Oral Polio Vaccine) | Poliomyelitis |
| 6 Weeks | Pentavalent (DPT-HepB-Hib) 1 | Diphtheria, Pertussis, Tetanus, Hepatitis B, Hib |
| | PCV 1 | Pneumococcal disease |
| | OPV 1 | Poliomyelitis |
| | Rotavirus 1 | Severe diarrhoea caused by Rotavirus |
| 10 Weeks | Pentavalent 2 | Same as above |
| | OPV 2 | Poliomyelitis |
| | Rotavirus 2 | Rotavirus diarrhoea |
| 14 Weeks | Pentavalent 3 | Same as above |
| | OPV 3 | Poliomyelitis |
| | IPV (Inactivated Polio Vaccine) | Poliomyelitis |
| | PCV 2 | Pneumococcal disease |
| 6 Months | Vitamin A (1st dose)* | Prevents blindness & boosts immunity |
| 9 Months | Measles/Rubella (MR1) | Measles & Rubella |
| | Yellow Fever | Yellow Fever |
| 12 Months | Meningococcal A (Men A) | Meningitis A |
| 15 Months | Measles/Rubella 2 (MR2) | Boost immunity |

- Vitamin A is not a vaccine but part of routine child health.

Additional Notes

TT (Tetanus Toxoid) is given to pregnant women.

Some states offer HPV vaccine for girls (9–14 years).

**PREVENTION**

1. **What is Prevention?**

Prevention refers to all measures taken to stop diseases, injuries, or health problems before they occur, worsen, or cause complications.

It focuses on promoting health, reducing risk factors, and ensuring early detection.

2. **<u>Levels of Prevention</u>**

Prevention is divided into three main levels, plus a fourth (primordial) which is now widely recognized.

**A. Primordial Prevention**

This is the earliest level.

It prevents the development of risk factors themselves.

Examples:

Promoting healthy lifestyle in children

Anti-smoking campaigns for youths

Creating environments that discourage unhealthy habits

Policies banning trans fats or limiting sugary drinks

**B. Primary Prevention**

Acts before disease occurs.

It aims to reduce risk and exposure.

Methods:

1. Health promotion

a.Healthy eating

b.Regular exercise

c. personal hygiene

d .Adequate sleep

e .Stress management

2. Specific protection

Immunization (vaccines)

Use of seat belts

Insecticide-treated mosquito nets

Safe water supply

Hand washing

**C. Secondary Prevention**

Involves early detection and prompt treatment to stop disease progression.

Examples:

Screening tests (BP check, blood sugar check, cancer screening)

Early diagnosis and treatment of malaria

Checking vision and hearing in school children

Routine antenatal visits

The goal: Catch the disease early and prevent complications.

**D. Tertiary Prevention**

Reduces complications, disability, and suffering after a disease has already set in.

Examples:

Rehabilitation for stroke patients

Physiotherapy after accidents

Insulin therapy for diabetes

Support groups for mental health

Occupational therapy for disability patients

The goal: Improve quality of life and prevent further damage.

1. Personal (Individual) Prevention

Good hygiene

Safe sexual practices

Healthy diet

Avoiding smoking and alcohol abuse

2. Medical/Clinical Prevention

Immunization

Routine medical check-ups

Antenatal care

Dental check-up's

3. Environmental Prevention

Clean water

Proper waste disposal

Sanitation

Air pollution control

4. **Social and Community Prevention**

Health education campaigns

Community sanitation projects

Enforcement of health law

5. **Policy and Government Prevention**

Food safety regulations

Tobacco control laws

Road safety rules

Occupational safety laws

**3. Prevention in Specific Areas**

A. Communicable Diseases
B. Vaccination
C. Hand washing
D. Isolation of cases

E. Vector control (mosquito nets, fumigation)
F. Non-Communicable Diseases
G. Weight control

Keeping normal BP and sugar levels

Limiting salt and fat

Exercise

Maternal & Child Health

Antenatal care

Exclusive breastfeeding

Vitamin A supplementation

Immunization of mother and child

Mental Health Prevention

Stress management

Early therapy

Avoiding substance abuse

**Benefits of Prevention**

Saves lives

Cheaper than treatment

Reduces hospital admissions

Improves productivity

Enhances quality of life

Reduces pressure on health systems

**Barriers to Prevention**

Ignorance

Poverty

Cultural and religious beliefs

Poor access to healthcare

Lack of policy enforcement

Stigma

**Strategies to Improve Prevention**

Strong health education

Affordable screening programs

Strengthening primary health care

Collaboration between government and communities

Supporting healthy environments

**Summary**

| | | |
|---|---|---|
| Primordial: | Prevent risk factors | School health programs |
| Primary: | Prevent disease | Vaccines, exercise |
| Secondary: | Early detection | Screening tests |
| Tertiary : | Reduce complications | Rehabilitation |