

INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS (IMCI)

Millennium Development Goals (MDGs)

In September 2000, UN member states committed to halving global poverty by 2015.

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria, and other diseases
7. Ensure environmental sustainability
8. A global partnership for development (supported by WHO and UNICEF)

The Integrated Case Management Process

The case management process assesses and classifies children across two primary age groups: Birth up to 2 months and 2 months up to 5 years.

Steps of the Case Management Process:

1. Assess the child/young infant
2. Classify illness
3. Treat
4. Counsel the mother
5. Follow-up care

Summary of the Integrated Case Management Process:

1. **ASSESS:**
 - Check for danger signs (or possible bacterial infection). Ask about main symptoms. Check nutrition, immunization status, and other problems.
 - **General Danger Signs:**
 - C - Convulsion (Had or Now)
 - L - Lethargic, unconscious
 - U - Unable to drink/bf (breastfeed)
 - V - Vomits everything
 - **4 Main Symptoms:**
 - Cough or difficult breathing
 - Diarrhea
 - Fever
 - Ear problem
2. **CLASSIFY:**
 - Use a color-coded triage system (Pink, Yellow, Green) to classify main symptoms, nutrition, and feeding status.
3. **TREAT:**
 - **If urgent referral needed:** Identify pre-referral treatments, calm the caretaker, write a referral note, and give instructions.
 - **If no urgent referral needed:** Give the first dose of oral drugs in the clinic, teach home treatment, and provide immunizations if needed.
4. **COUNSEL THE MOTHER:** Assess feeding practices, solve problems, advise on feeding/fluids during illness, discuss when to return, and counsel on her own health.
5. **FOLLOW-UP CARE:** Provide follow-up care and reassess for new problems when the child returns.

Sick Child Age 2 Months to 5 Years

- Assess Danger Sign (at least 1):
 - Classifies as Very Severe Disease (Pink category).

Treatment for Very Severe Disease:

- Give Diazepam if convulsing NOW.
- Quickly complete assessment.
- Give any pre-referral treatment Stat.
- Treat to prevent low blood sugar.
- Refer URGENTLY.

COUGH OR DIFFICULTY OF BREATHING

SEVERE PNEUMONIA/VSD

Signs: Any General Danger sign OR Stridor in a calm child (laryngotracheitis).

Treatment: Antibiotic (1st dose) + Refer Urgently.

PNEUMONIA

Signs: Chest indrawing OR Fast breathing - Visible inward movement of the chest wall when the child breathes in.

Fast Breathing Thresholds (per minute):

- >60 bpm: 2 months & below
- >50 bpm: 2 months - 12 months
- >40 bpm: 12 months - 5 years

Treatment:

- Give oral Amoxicillin for 5 days.
- Give inhaled bronchodilator for 5 days if wheezing is present (or if wheezing persists after rapid-acting bronchodilator).
- Give the first dose of Amoxicillin then REFER if HIV exposed/infected.
- Give safe remedy to soothe the throat and relieve cough.
- Refer if coughing lasts >14 days or if there are recurrent wheezes (possible TB or asthma).
- Advise mother when to return and schedule follow-up in 3 days.

COUGH OR COLD (No signs of severe disease)

Give inhaled bronchodilator for 5 days if wheezing is present.

Give safe remedy to soothe the throat and relieve cough.

Refer: If coughing lasts for 14 days or more, or if there are recurrent wheezes (possible TB or asthma).

Advise mother on when to return immediately and schedule follow-up in 3 days.

DIARRHEA: DEHYDRATION

SEVERE DEHYDRATION

Assessment Criteria (Must have at least 2 of these):

- Lethargic or unconscious
- Sunken eyes
- Not able to drink or drinking poorly
- Skin pinch goes back very slowly (longer than 2 seconds)
- Abnormally sleepy
- Unable to drink

Pinching of skin (Skin Turgor):

- Slowly: Goes back in < 2 seconds.
- Very Slowly: Goes back in >2 seconds.

Technique:

- Use your thumb and bended forefinger.
- Make a vertical pinch on the abdomen.

Signs NOT used as official assessment tools:

- Tears
- Dryness of mouth/tongue

Treatment:

- **Plan C** - Treat severe dehydration quickly using IV fluids or nasogastric (NG) tube rehydration if the child can't drink or if IV is unavailable.
- **Plan C Rule:** If no other severe classification, give fluid based on Plan

	C. Oresol by NGT (Nasogastric Tube): • Rate: 20ml/KBW/hr for 6 hours. • Assess every 1-2 hours: ◦ If there is abdominal distension or vomiting, give fluid more slowly. ◦ If after 3 hours hydration is not improving, send to hospital for IV therapy. • Reclassify after 6 hours. Alternative (Oresol by sip in spoon/Refer): • Used if facility limitations prevent NGT. • If IVF (Intravenous Fluids): ◦ Use Ringer's Lactate Solution (LRS) or Normal Saline Solution (NSS) at 100 ml/KBW. ◦ Duration: 6 hours for infants; 4 hours for children. • First 30 ml/kg Loading Dose: ◦ Infant: Given over the first 1 hour. ◦ Child: Given over the first 30 minutes. ◦ Note: If the radial pulse is undetectable or very weak, repeat the loading dose. • Reassessment Schedule: ◦ Reassess after 1-2 hours. ◦ Give ORS (5ml/kg/hr) as soon as the child can drink (after 3-4 hours for infants, 1-2 hours for children). • Reassess after 3 hours (child) or 6 hours (infant) and reclassify. • Oral Antibiotic for Cholera (If Severe Dehydration + age > 2 years): ◦ 1st line antibiotic: Tetracycline 2\4times daily for 3 days ◦ 2nd line antibiotic: Erythromycin 4\4times daily for 3 day
SOME DEHYDRATION	Assessment Criteria (Must have at least 2 of these): • Restless, irritable • Sunken eyes • Drinks eagerly, thirsty • Skin pinch goes back slowly Treatment Plan B Execution: • Give recommended amount of ORS in clinic over a 4-hour period (calculated by multiplying child's weight in kg by 75ml. • Show the mother how to give frequent small sips from a cup. • If the child vomits, wait 10 minutes and continue more slowly. Action: • Give fluid, zinc supplements, and food. • If the child also has a severe classification, refer urgently to hospital with the mother while giving frequent sips of ORS on the way. • Follow-up: Advise mother when to return immediately; follow-up in 5 days if not improving. ORS Administration • Give frequent sips from a cup. • If the child vomits, wait 10 minutes and give more slowly. • After 4 hours (Food & Fluids): ◦ If breastfeeding, continue/give longer. ◦ If not breastfeeding, give 100-200ml of clean water as well. ◦ If the child wants more ORS, give it. • Post-4 Hours Steps: 1. Reassess and reclassify. 2. Give food.

	3. Give Zinc for 10-14 days: • Less than 6 months: 1/2 tablet (10mg). • 6 months & above: 1 tablet (20mg). • Zinc reduces duration and incidence How to Give Zinc: • Infants: Dissolve in expressed breast milk or ORS in a spoon. • Older children: Chew or dissolve.
DIARRHEA: 14 DAYS OR MORE	
SEVERE PERSISTENT DIARRHEA	Diarrhea lasts 14 days or more. Sign (Severe Persistent): Dehydration present. Treatment: Treat dehydration before referral unless the child has another severe classification.
PERSISTENT DIARRHEA	Sign: No dehydration. Treatment: • Advise mother on feeding a child with persistent diarrhea. • Give multivitamin and mineral (zinc) for 14 days. • Give Vitamin A. • Follow-up in 5 days.
DYSENTERY	Sign: Blood in the stool. Treatment: • Give Ciprofloxacin for 3 days. • Follow-up in 3 days. • Advise mother when to return immediately (WTI).
PLAN A: TREAT AT HOME	Rule 1: • Give Extra Fluid (As much as the child can want). • Mother can give: Breast milk, food-based fluids, rice water. • Give 2 packets of ORS. • Follow-up: 5 days. ORS Quantities for Plan A (per loose stool evacuation): • Up to 2 years: 50 to 100ml (1/4 cup). • 2 years or more: 100 to 200ml (1/2 cup). Homemade ORS Recipe & Rules: • Recipe: 8 teaspoons of sugar + 1 teaspoon of salt + 1 litre of water. • Should taste less salty than tears (too salty can cause brain damage). • Expiration: Discard after 24 hours. • Show mother how to give frequent sips from a cup and continue breastfeeding. • Follow-up: 5 days. Standard Composition (Weight in grams/Liter): • Sodium Chloride(NaCl): 2.6g • Glucose, anhydrous: 13.5g • Potassium Chloride: 1.5g • Trisodium citrate: 2.9g • Total weight: 20.5g Reduced Osmolarity Composition (mmol/equiv per Liter): • Sodium (Na): 75 • Glucose, anhydrous: 75 • Chloride: 65 • Potassium: 20 • Citrate: 10 • Total Osmolarity: 245 mOsm/L

FEVER: MALARIA RISK	
VERY SEVERE MALARIA/VERY SEVERE FEBRILE DISEASE	Signs: Any of the General Danger Signs OR Stiff Neck (in a malaria-risk area). Treatment Protocols: - Give 1st dose of IM Quinine (supervised), or if hospital is not accessible within 4 hours. - Side effects of Quinine: Drop in blood pressure, dizziness, ringing of the ears (tinnitus), abscess (keep patient flat). - Give 1st dose of antibiotic. - Give 1 dose of paracetamol if the temperature is 38.5C or above. - Treat to prevent lowering of blood sugar level (hypoglycemia). - Send blood smear to referral hospital and REFER urgently. Drug-Resistant Malaria: Refer with blood smears taken on Days 7, 14, 21, and 28. If Not Able to Refer: - Give Quinine sulfate (300 or 500mg/tablet) and Clindamycin (10 mg/kg 2x a day for 3 days).
Malaria (Blood Smear Positive [+], or if smear was not done with presence of runny nose, measles, or other causes):	Treatment: - Treat with oral antimalarial Artemether-Lumefantrine (AL). - Give 1 dose of paracetamol for high fever (38.5C or above). - Advise mother when to return STAT. - Follow-up in 2 days if fever persists. - If fever has been present daily for more than 7 days, refer for assessment.
Fever: Malaria Unlikely (Blood Smear Negative [-], or presence of runny nose/measles/other causes):	Treatment: - Give 1 dose of paracetamol in the health center for high fever (38.5C or above). - Advise mother when to return STAT. - Follow-up in 2 days if fever persists. - If fever has been present daily for more than 7 days, refer for assessment.
FEVER: NO MALARIA RISK	
VERY SEVERE FEBRILE DISEASE	Signs: Any general danger sign OR Stiff Neck. Treatment Actions: - Give 1st dose of antibiotic. - Give 1st dose of paracetamol at the health center (HC) if the temperature is 38.5C or above. - Treatment to prevent low blood sugar (LBSugar). - Refer URGENTLY.
FEVER: NO MALARIA	Signs: No signs of very severe febrile disease. Treatment Actions: - Give 1st dose of paracetamol at the health center (HC) if the temperature is 38.5C or above. - Advise the mother when to return STAT. - Follow-up in 2 days if ever persists. - If fever has been present daily (QD) for more than 7 days, REFER for assessment.
Malaria Control Program & Strategies Plasmodium Species: Vivax, Ovale, Malariae, and Falciparum Malaria Control Strategies: Vector Control - Chemical Control - Environmental Management	

- Biological Control - Personal Protection	Surveillance - Case Finding - Treatment
Community Action Against Malaria: Chemically Treated Mosquito Nets: Using insecticide-treated nets (ITNs) for personal and community protection.	
Biological & Environmental Control, Herbal Plants L - Larvae-eating Fish (Stream Seeding): - Stat application: 2-4fish/sq.m - Sustained/Delayed application: 200-400 fish/hectare E - Environmental Clean-up (Stream Clearing): Eliminating vector breeding grounds. Neem Tree & Herbal Plants Propagation: - Neem tree and neem flowers - Citronella/lemon grass for mosquito repellent - Anti-mosquito lotions (e.g., commercial repellents like OFF!) Other Preventive Measures: Zooprophylaxis: Using animals to divert mosquitoes away from humans. - Wearing clothing covering arms and legs in the evening. - Avoiding outdoor activities at night between 9:00 PM and 3:00 AM. - House Spraying: Indoor residual spraying and mosquito coils.	
DENGUE	
SEVERE DENGUE HEMORRHAGIC FEVER	Assessment Criteria (Must have at least 2 of these - indicates Severe DHF): - Bleeding from nose or gums - Bleeding from stool (Melena) or vomitus (Hematemesis) - Skin petechiae - Cold, clammy extremities - Slow capillary refill (more than 3 seconds) - Persistent abdominal pain - Persistent vomiting - Positive Tourniquet Test (Pressure applied to nail bed until it turns white, checking for petechiae when released)
	Treatment Actions: - If skin petechiae, persistent abdominal pain, persistent vomiting, or a positive tourniquet test are the only signs, GIVE ORS. - If any signs of bleeding are present (+), GIVE FLUIDS RAPIDLY, as in Plan C. - Treat the child to prevent the lowering of blood sugar. - REFER urgently. CRITICAL WARNING: Do NOT give aspirin (due to the high risk of bleeding/Reye's syndrome).
FEVER: DENGUE HEMORRHAGIC FEVER UNLIKELY	Signs: No signs of severe DHF. Actions: - Advise the mother when to return STAT. - Follow-up in 2 days if fever persists or if any bleeding appears. Do NOT give aspirin.

Dengue Control Program
Community-Based Prevention & Control for Aedes Mosquito:

- "4 o'clock habit"
- "4 S" Strategy:
 1. Search & Destroy mosquito breeding sites
 2. Seek Early Consultation at the health facility when fever or symptoms occur
 3. Self-Protection Measures (e.g., using mosquito repellents, wearing long sleeves/pants)
 4. Say NO to indiscriminate fogging (fogging should only be done during outbreaks or when specifically indicated)

MEASLES
SEVERE COMPLICATED MEASLES
Signs:

- Clouding of the cornea
- Deep or extensive mouth ulcers

Treatment Protocols:

- Give Tetracycline eye ointment if there is clouding of the cornea or pus draining from the eye.
- Give Vitamin A.
- Give 1st dose of Antibiotic.
- REFER urgently.
- If Not Able to Refer: Give Vitamin A today, tomorrow, and after 2 weeks.

MEASLES WITH EYE OR MOUTH COMPLICATIONS
Signs:

- Pus draining from the eye
- Mouth ulcers

Treatment:

- Apply Tetracycline ointment for pus from the eye (3x daily).
- Give Vitamin A.
- Apply Gentian Violet to mouth ulcers (2x daily for 5 days).
- Follow-up: 2 days.

MEASLES (UNCOMPLICATED)
Treatment:

- Give Vitamin A.

EAR PROBLEM
MASTOIDITIS

- **Sign:** Tender swelling behind the ear

Treatment:

- Give 1st dose of antibiotic.
- Give the first dose of paracetamol for pain.
- Refer URGENTLY.

ACUTE EAR INFECTION
Sign:

- Ear discharge + pain present for less than 14 days.
- Pus seen draining from ear & discharge is less than 14 days.

Treatment:

- Paracetamol for pain.
- Give appropriate antibiotics for 5 days.
- Dry by wicking.
- Follow-up: 5 days.
- **Wick:** Made of absorbent cotton cloth or strong, soft tissue paper wrapped around a cotton applicator.

CHRONIC EAR INFECTION

- **Sign:** Pus seen draining from ear & discharge is 14 days or more.

Treatment:

- Dry by wicking.
- Treat with topical quinolone eardrops for 14 days (2 weeks).
- Wicking - dry/replace dry 3x daily.
- Follow-up: 5 days.

MALNUTRITION & ANEMIA (2 MONTHS - 5 YEARS OLD)
SEVERE MALNUTRITION
Signs:

- Skin and bone appearance, severe muscle wasting, folds of skin, and "buggy pants" appearance.
- Kwashiorkor: Edema of both feet.
- Severe Malnutrition Threshold (MUAC): Less than 110mm measured via Mid-Upper Arm Circumference.

Very Low Weight for Age (Weight-for-Age Chart for Girls):

- If the intersection point falls below the bottom curve, the child has very low weight for age.

Classifications Based on Age:

- 2 months & below: Low Weight for Age.
- 2 months & above: Very Low Weight for Age.

Treatment Protocol:

- Give Vitamin A and REFER.

Action for Low / Very Low Weight (LwA / VlwA):

- Counsel on feeding.
- Follow-up in 30 days.

SEVERE ANEMIA

- **Sign:** Severe Palmar Pallor - Entire palm looks all white.

Treatment Action: REFER
ANEMIA OR VERY LOW WEIGHT

- **Sign:** Palm looks pink and white (pale compared to normal).

Treatment:

- Give iron for 14 days.
- Give Albendazole once if 12 months old and above and haven't had it in the last 6 months.

NO ANEMIA AND NOT VERY LOW WEIGHT
Sign:

- Not very low weight for age
- No other signs of malnutrition

Nutritional Status Sub-Categories:

- Complicated Severe Acute Malnutrition (SAM)
- Uncomplicated Severe Acute Malnutrition (SAM)
- Moderate Acute Malnutrition (MAM)

RUTF - Ready-to-Use Therapeutic Food: Used for children aged 6 months and older with severe acute malnutrition

Z-score (or SD-score):

- The ratio of the difference between the observed data value and the median value of the reference population.

Triage Table for Acute Malnutrition:

- **Pink (Complicated Severe Acute Malnutrition):** Edema of both feet OR Weight-for-Height/Length (WFH/L) less than -3 z-scores OR MUAC less than 115mm and any medical complication, inability to finish RUTF, or breastfeeding problem.
 - **Action:** Give first dose of appropriate antibiotic, treat to prevent low blood

sugar, keep warm, REFER URGENTLY.

- **Yellow (Uncomplicated Severe Acute Malnutrition):** WFH/L less than -3 z-scores OR MUAC less than 115mm and able to finish RUTF.
 - **Action:** Give oral antibiotics for 5 days, give RUTF (if 6 months or more), counsel mother on feeding, assess for TB, follow-up in 7 days.
- **Yellow (Moderate Acute Malnutrition):** WFH/L between -3 and -2 z-scores OR MUAC 115 up to 125mm.
 - **Action:** Assess feeding/counsel, follow-up in 7 days if feeding problem, follow-up in 30 days if no problem.
- **Green (No Acute Malnutrition):** WFH/L -2 z-scores or more OR MUAC 125mm or more.
 - **Action:** Assess feeding if the child is <2 years old.

BACTERIAL INFECTION

POSSIBLE SERIOUS BACTERIAL INFECTION

- Target Age: 1 week to 2 months (updated to Birth to 2 months) using the IMCI approach.

Check for Possible Bacterial Infection:

Ask, Look, Listen, Feel:

Has the infant had **convulsions**?

- Count breaths in 1 minute (repeat if elevated); look for severe chest indrawing.
- Look for nasal flaring.
- Look and listen for grunting (the soft, short sounds a young infant makes when breathing out).
- Look and feel for a bulging fontanel.
- Look for pus draining from the ear.
- Look at the umbilicus: Is it red or draining pus? Does redness extend to the skin?
- Measure temperature (or feel for fever >37.5C or low body temp <35.5C).
- Look for skin pustules (many or severe).
- Check if lethargic or unconscious, or if movements are less than normal (abnormally sleepy/less movement).

Severe Chest Indrawing & Local Bacterial Infection

- Severe Chest Indrawing: Deep inward pulls of the lower chest wall during inspiration.

Treatment:

- First dose of IM antibiotics: Gentamicin & Benzylpenicillin.
- Refer.
- Treat low blood sugar (LBSugar).

LOCAL BACTERIAL INFECTION

Local Bacterial Infection Management:

- **Skin pustules:** Wash pus/crust with soap and water, then dry.
- **Red umbilicus/Pus draining:** Clean with 70% alcohol and paint with Gentian Violet.

When to Return Immediately:

- **General:** Unable to drink, sicker, fever.
- **With Diarrhea:** Blood in stool, drinks poorly.
- **With Cough:** Difficulty of breathing, fast breathing.
- **Bring Young Infant (<2 Months Old):**
 - **Signs:** Breastfeeding poorly (BF poorly), other danger signs.

Assess Breastfeeding: For infants aged 1 week to 2 months with serious disease or feeding problems.

Part 1: Ask about breastfeeding frequency and what else the infant is fed.

Part 2: Determine Low Weight for Age (LWA).

Initiate Breastfeeding:

Observe for 4 Minutes:

1. **PSBI (Possible Serious Bacterial Infection)/Not Able to Suck/Attach:**
 - Good Attachment Signs: Chin touching breast, lower lip turned outward, mouth wide open, more areola visible on top.
 - **Action:** Give 1st dose IM antibiotic (Gentamicin/Benzylpenicillin), refer, and treat low blood sugar.
2. **Feeding Problem/Low Weight for Age (LWA):**
 - **Signs:** Not well attached, not sucking well, not exclusive, feeding less than 8 times, or has oral thrush/ulcers (treat with 1/2 Gentian Violet).
3. **No Feeding Problems:**
 - **Signs:** Not LWA/not inadequately fed. Praise mothers and provide home care.

DOH Guidelines on Low Birth Weight (LBW) & Infant Feeding:

- **LBW:** Weight less than 2,500\text{ grams}.
- **Term babies:** Suck effectively and breastfeed more often than larger babies.
- **Preterm babies:** Have difficulty suckling at first; can be fed expressed breast milk by tube or cup, establishing full breastfeeding later.
- **Under 6 months:** No extra water. Only allowed in drop form (vitamins, minerals, medicines).

Fluid Needs of Young Child (Mother NOT Breastfeeding):

- Temperate Climate: 2-3 cups of water/day.
- Hot Climate: 4-6 cups of water/day. (Note: Water can be incorporated into stews or porridge).

Complementary Feeding Guidelines:

- 6-8 months: 2-3 meals per day.
- 9-23 months: 3-4 meals per day.
- **Snacks:** Nutritious snacks 1-2 times/day as desired.

HEALTH INDICATORS/VITAL STATISTICS

Health Indicators

- Variable, susceptible to direct measurement, it mirrors the state of health of persons in a community.
- Quantitative measures, expressed as RATES, RATIOS OR PROPORTIONS.

Vital Statistics

- Conventionally numerical records of marriage, birth, sickness & death by which health & growth of community may be studied.
- Fertility Rates
- Population Indicators

Crude Birth Rate (CBR)

- Measures how fast people are added to the population through births; the annual number of live births per 1,000 population.

$$CBR = \frac{\text{number of births}}{\text{mid-year population}} \times 100$$

Factors:

- Measures: Population Growth.
- Affected by:
 - Fertility
 - Marriage pattern & practices of the place
 - Sex and Age Composition
 - Birth Registration Practice

General Fertility Rate (GFR)

- The General Fertility Rate (GFR) is a refined measure of fertility that focuses specifically on the segment of the population capable of reproducing—namely, women of reproductive age.

$$GFR = \frac{\text{number of live births}}{\text{mid-year population of 15-44 years of age}} \times 1000$$

Factors:

- Measures: Fertility among women of reproductive age.
- Affected by:
 - Age Structure
 - Nuptiality (Marriage patterns & practices of the place)
 - Contraceptive Prevalence
 - Socioeconomic and Cultural Factors
 - Health and Nutritional Status

Practice Question:

Question 1: If the Crude birth rate is 2,600... It means that:

- It is the total persons born in a year for every 1,000
- The number of persons added in a community by women in the reproductive age group.

Question 2: Which one is considered as the true measure of fertility rate?

- Crude Birth Rate
- General Fertility Rate

Mortality Rate

- Measure of frequency of occurrence of death in a defined population during a specified interval.

Crude Death Rate (CDR)

- The mortality rate from all causes of death for a population.
- **Factors:** Age and sex structure of the population, socioeconomic conditions, availability and access to health services, environmental sanitation, and general living standards.

$$CDR = \frac{\text{Total No. of deaths from all causes in 1 year}}{\text{No. of persons in the population at mid-year}} \times 1000$$

Specific Mortality Rate

- The proportion of deaths occurring within a specified subgroup of a population (such as by specific age group or sex) relative to the mid-year population of that same specified group, multiplied by 1,000.
- **Factors:** Age, sex, occupation, education, exposure to specific environmental hazards, lifestyle behaviors, and targeted health risks unique to that demographic.
- Sub-categories: Sex Specific Mortality Rates, Age Specific Mortality Rates.

$$\text{Specific Mortality Rate} = \frac{\text{number of death in a specific group}}{\text{mid-year population of the same specific group}} \times 1000$$

Cause-of-Death Rate

- The frequency or rate of deaths resulting from a specified cause or disease relative to the mid-year population, multiplied by a standard factor (F) such as 1,000 or 100,000.
- **Factors:** Prevalence and virulence of specific diseases, diagnostic ascertainment and reporting accuracy, availability of specialized medical treatment, and lifestyle or environmental risk factors (e.g., smoking, diet, occupational hazards).
- where F can be 1,000, 100,000, etc.

$$\text{Cause of Death Rate} = \frac{\text{number of deaths from a specified cause}}{\text{mid-year population}} \times F$$

Infant Mortality Rate (IMR)

- The annual number of deaths of infants under one year of age per 1,000 live births. It serves as a vital index or important marker of the overall health condition and socio-economic status of a community or society.
- **Factors:** Low birth weight, prematurity, birth injuries, maternal health and nutrition, prenatal care, immunization coverage, and environmental sanitation/access to clean water.
- **Significance:** A good index of the general health condition/important marker of overall health of a community/society.

$$IMR = \frac{\text{death under one year of age}}{\text{number of live births}} \times 1000$$

Neonatal Mortality Rate (NMR)

- The number of deaths among infants under 28 days of age in a calendar year per 1,000 live births in the same year.
- **Factors:** Prenatal factors, genetic factors, congenital malformations, birth asphyxia, and the quality of intrapartum and immediate newborn care.

$$NMR = \frac{\text{number of deaths among those under 28 days of age in a calendar year}}{\text{number of live births in the same year}} \times 1000$$

Post Neonatal Mortality Rate (PMR)

- The number of deaths among infants aged 28 days to less than 1 year of age in a calendar year per 1,000 live births in the same year.
- **Factors:** Environmental factors, nutritional factors (malnutrition), infectious diseases (such as acute respiratory infections and diarrhea), hygiene practices, and housing conditions.

$$PMR = \frac{\text{number of deaths among those 28 days to less than 1 year in a calendar year}}{\text{number of live births in the same year}} \times 1000$$

Maternal Mortality Rate (MMR)

- **Measures:** Obstetrical risk.
- Death of a female from any cause related to/or aggravated by pregnancy or its management (excluding accidental or incidental causes) during

pregnancy & childbirth or within 42 days of termination of pregnancy.

- **Affected by:** Diagnostic ascertainment, completeness of registration of births.

$$MMR = \frac{\text{no. of deaths due to pregnant delivery, puerperium in a calendar year}}{\text{no. of live births in the same year}} \times F$$

Proportionate Mortality Rate

- The proportion of total deaths in a specified population during a calendar year that are attributable to a specific cause or disease, calculated as the number of deaths from a particular cause divided by total deaths, multiplied by 100.
- **Factors:** The underlying disease burden of the population, prevalence of specific chronic or infectious illnesses, public health interventions, demographic aging (health transitions), and access to healthcare and accurate cause-of-death certification.

$$\text{Proportionate Mortality Rate} = \frac{\text{no. of deaths from a particular cause}}{\text{total deaths}} \times 100$$

Swaroop's Index

- Measure of longevity of life; higher index means higher number of population reaches 50 years of age (the higher this rate, the better the health status).

$$\text{Swaroop's Index} = \frac{\text{number of deaths among those 50 years and over}}{\text{total deaths}} \times 100$$

Case Fatality Rate (CFR)

- Risk of dying among persons afflicted with a particular disease/proportion of cases that ends up in mortality.
- **Magnitude Depends On:** Nature of disease, diagnostic ascertainment, level of reporting in population.

$$\text{Case Fatality Rate} = \frac{\text{number of deaths from a specified cause}}{\text{number of cases of the same disease}} \times 100$$

Morbidity Indicators Prevalence Proportion

$$P = \frac{\text{number of existing cases of disease at a particular point in time (old or new)}}{\text{number of people examined at the point in time}} \times 100$$

- **Increased by:** Longer duration of disease, prolongation of life without cure, increase in new cases (incidence), in-migration of cases, out-migration of healthy people, in-migration of susceptible people, improved diagnostic facilities.
- **Decreased by:** Shorter duration of disease, high case-fatality rate, decrease in incidence, in-migration of healthy people, out-migration of cases, improved cure rate.

Incidence Measures

- **Incidence Rate (IR):** Occurrence of new events in a specific period of time in a defined population.
- Types of Incidence Measures:
 1. Incidence Density Rate (ID)

$$ID = \frac{\text{number of new cases that develop during the period}}{\text{sum of person time at risk}} \times F$$

2. Cumulative Incidence (CI)

$$CI = \frac{\text{new cases of infection or disease in a population in a given time period}}{\text{number of persons followed-up}} \times 100$$

- **Indicators of Condition:** Increasing, decreasing, static.
- **Measures:** Evaluate effect of health intervention.

Specific Morbidity Rates

- Shows disease rates in specific population groups categorized by age, sex, occupation, education, exposure to risk factors, place of residence, or combinations.
- **Example:**

$$\frac{\text{number of TB cases among those aged 20-24 years}}{\text{mid-year population}} \times 1000$$

Attack Rate

- **Outbreak Investigation:**
 - The next step is to calculate attack rates for each food item.

$$CI = \frac{\text{number of people exposed who are sick}}{\text{total number of people exposed}} \times 100$$